



Certified smart and integrated living environments for ageing well

D2.4 – Working taxonomy

D3.1 – KPI Framework for Smart age friendly living environments

Deliverable D2.4 and D3.1		
Authors and institution	Menno Hinkema (TNO), Norman Egter van Wissekerke (TNO)	
Date	29-Nov-19	
Dissemination level		
PU	Public, fully open, e.g. web	X
CO	Confidential, restricted under conditions set out in Model Grant Agreement	
CI	Classified, information as referred to in Commission Decision 2001/844/EC	



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N° 826295.

The content of this document reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains.



Document change history		
Date	Authors	Description
June-2019	All partners	Taxonomy structure consolidated for use in task 3.1 and 3.2
04-Nov-2019	TNO, AGE, EUCa, TEC, UU	Consolidation of KPI-framework
08-Nov-2019	TNO, AGE, EUCa, TEC, UNIVPM, UU	Consolidation of NoP-set
19-Nov-2019	TNO (Menno Hinkema)	First draft combined report
27-Nov-2019	R2M, ECTP, TEC	Review of first draft
28-Nov-2019	TNO	Final version
29-Nov-2019	TEC	Submission to the EC



Table of Contents

Executive Summary	7
1 Introduction	10
1.1 Aims and objectives.....	10
1.2 Relations to other activities in the project	10
1.3 Report structure.....	11
2 Taxonomy background and rationale	12
2.1 What do we mean by a taxonomy?	12
2.2 Why a taxonomy in Homes4Life?	12
3 Objectives and limitations of the taxonomy	14
3.1 Objectives	14
3.1.1 Agenda-setting objective.....	14
3.1.2 Conceptual objective	15
3.1.3 Practical objective	16
3.2 Limitations.....	17
4 Structuring the taxonomy	19
4.1 Discarded approaches	19
4.1.1 Building typology	19
4.1.2 Health system typology	19
4.1.3 New build or retrofit	20
4.2 Rationale for selected approach	20
5 Developing the taxonomy	22
5.1 Departure points	22
5.1.1 Theoretical approaches.....	22
5.1.2 Policy-based approaches	24
5.2 Development process and strategy	24
6 Description of the taxonomy	27
6.1 Overview of taxonomy structure	27
6.2 Stakeholder perspectives	28
6.2.1 Users' perspectives	28
6.2.2 Relatives and carers' perspectives	28



6.2.3	Organisational perspectives.....	29
6.3	Age-Friendly home Functions.....	31
6.3.1	Physical Cluster.....	31
6.3.2	Outdoor access cluster	34
6.3.3	Personal cluster	35
6.3.4	Social cluster	38
6.3.5	Economic cluster	40
7	Putting the taxonomy to work: Needs and preferences.....	42
7.1	Approach	42
7.1.1	Process	42
7.2	Effects	44
7.3	Summary table of NoPs	46
7.4	Practical evaluation points	53
8	Putting the taxonomy to work: KPI-framework.....	55
8.1	Status of the deliverable	55
8.2	Link with other deliverables	55
8.3	What is understood by a KPI in Homes4Life?	55
8.4	A word on objectives	56
8.5	Limitations.....	57
8.6	Development process.....	57
8.6.1	Physical and outdoor access KPIs	57
8.6.2	Personal, Social and Economic KPIs	58
8.7	Overview of KPIs	60
9	Conclusions and recommendations for further development.....	83
	Appendix 1: Taxonomy overview.....	85
	Appendix 2: Overview of NoPs	95
	Appendix 3: Overview of KPIs.....	140
	Appendix 4: Bibliographies	255
	Sources for taxonomy	255
	Sources for NoPs and KPIs.....	258



Table of Figures

Figure 1: simplified representation of homes4life taxonomy	21
Figure 2: taxonomy structure	27

Table of Tables

Table 7-1 summary overview of NoPs.....	46
Table 7-2 NoPs per cluster and perspective group	54
Table 8-1 Physical cluster KPIs	61
Table 8-2 Outdoor Access cluster KPIs	66
Table 8-3 Personal cluster KPIs	67
Table 8-4 Social cluster KPIs.....	74
Table 8-5 economic cluster KPIs.....	80



Acronyms and abbreviations

ADL	Activities of Daily Living
AFC	Age-Friendly Cities
AFEE	Age-Friendly Environments for Europe
Dx.x	Deliverable
EC	European Commission
EU	European Union
FPI	Functional Performance Indicator
GP	General Practitioner
KPI	Key Performance Indicator
MAFEIP	Monitoring and Assessment Framework for the European Innovation Partnership on Active and Healthy Ageing
MS(S)	Member State(s)
NoP	Need or Preference
SEE-IT	Social, Economic and Environmental Impact Tool
SoC	Sense of Coherence
UNECE	United Nations Economic Commission for Europe
WHO	World Health Organization
WP	Work Package



Executive Summary

The Homes4Life project has posited for itself an ambitious set of targets. It aims to stimulate investment in age-friendly homes and improve opportunities for ageing well in place for the European population, by both defining and offering a holistic, positively framed long-term vision for inclusive housing in Europe, and offering practical tools in the form of certification. To unite those two workstreams into a coherent whole that will support stakeholders to understand one another, work together and find common ground for action, tools are needed to bridge the gap and facilitate the transition between long-term vision and current practice.

The Homes4Life has accordingly set itself the task to develop two instruments for this purpose: a working taxonomy, and a framework of Key Performance Indicators (KPIs).

The working taxonomy of age-friendly homes (D2.4) presents a structured and detailed breakdown of what it means for a home to be age-friendly? Which functions does the home environment have to fulfil? Which elements in its location, setting, design, construction and components contribute to its fitness for purpose? Which stakeholder groups are in some way involved with the age-friendly home environment and what do they need and want from the home in order for it to be fit for their social, practical or economic purpose? The working taxonomy is a first attempt to answer these questions in a structured way. In doing so, it aims to fill an evident gap in current understanding of and discussions around age-friendly homes: the lack of basic shared descriptive language for academic and practical discourse. This lack of a common reference framework hinders efforts to improve the age-friendliness of the European stock of homes: without a usable framework it is very hard to identify which problems to tackle, which intervention strategies are likely to work, and/or how to incentivize improvements appropriately.

The development of the working taxonomy has been shaped by **three main objectives**. In terms of agenda-setting, work on the taxonomy has sought to redefine the terms "smart" and "integrated" from the narrow ICT-sense in which they are currently applied to the home environment. Work on the taxonomy has sought to demonstrate that "smart" can be more usefully understood in a teleological sense as the extent to which a home contributes to the personal and organisational aspirations of its occupants and other stakeholders and can adapt as these change over time. "Integrated", likewise, should be construed more broadly as describing how well a home is embedded in its spatial and social context, and the extent to which it helps its occupants to maintain existing social networks and build new connections. Conceptually, the goal of the taxonomy is to address a number of specific current gaps in understanding of and approaches to age-friendly homes. Practically, and most importantly for a working instrument, the taxonomy sets itself the task to develop a reference framework that works to support and tie together the Homes4Life project objectives.

Taking its inspiration from academic research in salutogenesis, place making and gerontechnology, as well as from policy-based and monitoring approaches developed



by the World Health Organisation (Age-friendly Cities, and Age-friendly Environments in Europe), UNECE and the European Commission (Active Ageing Index) and the European Innovation Partnership on Active and Healthy Ageing (Monitoring and Assessment Framework for the EIP AHA), as well as promising work in recent EU-funded projects, the working taxonomy has been shaped as a matrix in which an itinerary of user and other stakeholder perspectives on one axis is matched with a detailed breakdown of the home environment's main functions on the other. These functions have been broken down into five main clusters: Physical functions of the home, functions concerning Outdoor Access, Personal functions, Social functions, and Economic functions and aspects. After consideration of several other structuring principles, this perspectives and functions driven approach has been considered to fit best with the practical utility required of the taxonomy, which consisted in the following aspects:

- Create a common language, focusing on the universalities rather than the context-specific particularities of age-friendly homes
- Clarify who are the stakeholders involved in age-friendly homes and help identify their needs and concerns.
- Help stakeholders to understand and appreciate each other's viewpoints and find common ground
- Give a full view of the functions the home environment fulfils for its various stakeholders, taking especial care to move beyond the relatively narrow domain
- Support the adoption of a positive, value-based approach to ageing in place
- Present a comprehensive overview, yet be flexible enough to allow description, analysis and assessment in specific contexts and projects.

The report outlines the results of the development process of the working taxonomy. It also showcases a first test that has been done to get an idea of the actual utility of the working taxonomy as a canvas to map meanings, impacts and priorities: the definition of a set of what have been called Needs or Preferences (NoPs), which have been defined using the taxonomy descriptive framework. A total of 150 NoPs have been identified in this initial exercise. Both the working taxonomy and the outcomes of this initial verification exercise are presented in the report.

The report also details the development process and contents of the **KPI-framework** (D3.1). The decision to combine the two into a single report has been a conscious one. The development of working taxonomy and KPI-framework has constituted one integrated workstream. More importantly, the KPI-framework uses the taxonomy as its structuring principle and could not be easily understood without it. Finally, working taxonomy and KPI-framework are two connected practical tools to support the Homes4Life objectives, so it makes sense to create a single locus where those interested can find information.

What does a home actually have to do in order to be age-friendly? That is the central question that the Homes4Life KPI-framework sets out to answer. The KPI-framework represents the follow-on step in the transition from vision-based, high-level concepts to a comprehensive, "universal" (that is, not implementation context dependent) set of indicators that can form the basis for more specific requirement-setting and verification in the certification pilots in Work Package 4.



While called KPIs, the indicators developed for Homes4Life are better understood as Functional Performance Indicators (FPIs). They describe what a home, its components, its physical characteristics, its lay-out and design, its components, its location and settings, its connections to the outside world, and/or its financial and governance aspects need to be able to do in order to fulfill a Function (as defined in the Homes4Life taxonomy framework) that contributes to the creation or maintenance of an age-friendly environment that is enabling, fit for purpose, flexible and resilient. The KPIs or FPIs in Homes4Life are defined in terms of outcomes achieved and functionality provided for users and other stakeholders. This has been done in accordance with the objective of providing a framework that is relatively context-independent, with it or sections of it being tailored to more specific applications through requirement and verification process and value setting in specific certification application.

In developing the KPI-framework, most effort and ingenuity has been spent on developing indicators for the Functional clusters where current certification schemes, labels, standards and guidelines do not provide adequate answers. For these clusters, the Personal, Social and Economic clusters, an analysis of both academic and policy and advocacy literature has been conducted to identify and collect appropriate KPIs for inclusion. For the Physical and Outdoor Access cluster, full use has been made of the work done earlier in the Homes4Life project on the analysis of existing certification schemes (task 3.2). The material from this analysis has been integrated and condensed with the resulting shorter set of KPIs redefined in terms with the format and purposes of the Homes4Life KPI-framework. In total, 273 KPIs have been described, in a uniform format.

Neither the working taxonomy nor the KPI-framework are to be considered as the final word on the subject. Both represent pragmatic approaches designed to provide a sufficient base for the purposes and continuation of the Homes4Life project. As the project enters its second year, both deliverables will be tested against the demands of certification pilots and subjected to the scrutiny and input of the project's Community of Interest as well as wider groups of stakeholders. The feedback from practice and from a wide community of interested persons and organizations will serve to further refine, extend and update both instruments, appropriate to their intended status as flexible working tools.



1 Introduction

1.1 Aims and objectives

The present document gives an account of the content and development process of two of the Homes4Life deliverables: the working taxonomy of age-friendly housing (D2.4) and the KPI-framework (D3.1). The content of these deliverables for the purposes required for the continuation of the project has already been developed and shared with the other partners in the Homes4Life consortium and is already operational in supporting other project activities. The aim of this report is therefore to give an account of work done and to provide an accessible summary of the content of both deliverables.

Although deliverables D2.4 and D3.1 are formally distinct, and part of different work packages, their contents are closely interlinked, and their development has constituted one integrated process. Producing separate summary reports for these deliverables would have obscured the central conceptual principles underlying both deliverables and have led to considerable redundancy in reporting. Accordingly, it has been decided to produce one, integrated summary deliverable report.

1.2 Relations to other activities in the project

The developmental logic of the Homes4Life project works along a continuum from a high-level, long-term vision of age-friendly housing and age-friendly homes to practical, on the ground experimentation with the added value of certification-based approaches. The working taxonomy and KPI-framework together represent a transitional step in this development. Through the development of a taxonomy, high-level concepts and visions are broken down into a more, specific, structured descriptive framework of the meaning, components and effects of age-friendly homes, with the aim of establishing a basis for e.g. easier comparison of good practices between implementation contexts and more effective multi-stakeholder dialogue. The KPI-framework, using the taxonomy structure, goes one step further, through focussing on functional performance qualifications a home needs to meet to be fit-for-purpose as an age-friendly living environment.

On a more practical level, the taxonomy (D2.4) is partly based on and has been developed in dialogue with the desktop research carried out in D2.1. It is meant as a companion to the vision document (D2.3), giving those inspired by the vistas sketched a practical framework for engagement and implementation. In turn the taxonomy has helped pinpoint areas of exploration for the work in task 2.5 – Innovation Systems Analyses. Additionally, the taxonomy has been used as the framework for analysis in task 3.2: Analysis of existing certification schemes.

The KPI-framework (D3.1) has taken its structure directly from the taxonomy. Part of its content has been derived from the material produced in task 3.2: Analysis of existing Certification Schemes. The KPI-framework in its turn informs the work in task 3.4: Functional



brief for the certification scheme. Most importantly, it will form the basis for requirements setting and establishment of verification processes in work package 4.

1.3 Report structure

This report first describes the background to and rationale for the development of a taxonomy (Chapter 2), outlining what this term is taken to mean in the Homes4Life project context. After an account of objectives and limitations (Chapter 3), the developmental approach is described (Chapter 4), following which an account is given of the taxonomy's main context (Chapter 5).

As a test case for the taxonomy's utility, its structure (comprehensive description in Chapter 6) has been applied in a pilot exercise to define needs and preferences of different stakeholders involved with age-friendly homes, primarily older adults, but also taking in informal carers, public authorities et cetera. The execution of this pilot exercise and its outcomes are summarized in Chapter 7.

Chapter 8 focuses on the development of the KPI-framework. Starting with an outline of the background, rationale and specific meaning of the term within the Homes4Life project context, the chapter next outlines the framework's objectives, limitations and overall structure and logic. An account of the approach and development process is followed by an overview of KPIs covered by the framework.

The report rounds off with conclusions and recommendations for further development of taxonomy and KPI-framework within the Homes4Life project scope and beyond (Chapter 9). This includes some observations on the expected use of the KPI-framework in Work Package 4 of the project.

2 Taxonomy background and rationale

2.1 What do we mean by a taxonomy?

There is a great variety of models and definitions available for the concept of a “taxonomy”. Originally mostly a tool in biology, taxonomy development is now an established tool in most scientific disciplines, including social sciences and – increasingly – data science and ICT.

What all approaches have in common is that a taxonomy is taken to be a structured, systematic description of an entity, phenomenon or object, or class of such. While according to most definitions the purpose of a taxonomy is descriptive and not explanatory, a taxonomy can nevertheless contribute to better understanding, through making available structured descriptions not just of functions and components, but also of emergent properties (in the case of objects or phenomena) or behaviours (in the case of entities). Taxonomies can thus function as a basic descriptive language that aids effective academic and practical discourse.

2.2 Why a taxonomy in Homes4Life?

Age-friendly housing, age-friendly homes, age-friendly living environments, sheltered housing, extra care homes, inclusive dwellings, intergenerational living, senior homes... The profusion of terms encountered when reconnoitring the field of age-friendly homes (the primary term we'll adopt in this report) indicates that such a basic descriptive language is currently lacking. This is bad news. Without a usable descriptive framework it is very hard to understand what it means for a home to be age-friendly, which elements in and around the home contribute to age-friendliness (or not) and in what way, nor what the effects (in material and/or immaterial terms) may be if a home can be termed age-friendly. This in turn hinders efforts to improve the age-friendliness of the European stock of homes: without a usable framework it is very hard to identify which problems to tackle, which intervention strategies are likely to work, and/or how to incentivize improvements appropriately. The lack of and need for a common language has been highlighted by Peine and Arentshorst (2017) in their final report on the Age-friendly housing roadshow.

Given the previous, the utility for Homes4Life of a taxonomy of age-friendly homes is evident. To establish conceptual connections between long-term vision and short-term reality, to engage and connect stakeholders, and to create verifiable sets of criteria that capture the full breadth and value of age-friendly homes, a workable descriptive framework is an indispensable asset.

As a project focusing specifically on the home environment level contribution to ageing well, Homes4Life seeks to complement existing and emerging frameworks tackling other levels and or aspects of life, such as the WHO Age-Friendly Cities indicator framework, the



Active Ageing Index, and the MAFEIP framework of age-friendly indicators.¹ The development of a structured description of this particular domain fits with this project ambition, and will help clarify to potential users how Homes4Life approaches could be used in conjunction with these more established frameworks. In particular, it is hoped that the Homes4Life approach, supported by its working taxonomy, may suggest additional opportunities for policy development and practical action to the stakeholders united in the Covenant on Demographic Change - Towards an Age-Friendly Europe.²

¹ All sources not individually referenced can be found in Annex 4: Bibliographies

² <https://www.agefriendlyeurope.org/>



3 Objectives and limitations of the taxonomy

3.1 Objectives

The objectives pursued by the development of a taxonomy of age-friendly homes fall into three categories

- Agenda-setting
- Conceptual
- Practical

3.1.1 Agenda-setting objective

“Smart” and “integrated” are buzzwords, or trending terms, where age-friendly homes are concerned. They come to the fore in research, in policy development, in market activity, anywhere where the home environment and age-friendliness are mentioned in the same breath. In fact, both “smart” and “integrated” occur in the full title of the Homes4Life project.

Where they occur, the terms “smart” and “integrated” are associated almost exclusively with ICT. “Smart” is found in conjunction with eHealth, Smart Home systems, sensor-based monitoring, advanced data analysis and related topics, while “integrated” tends to refer to the integration of ICT components with each other, and to the integration of home-level and person-level systems with systems in the wider environment. The latter approach is particularly common in Smart Cities initiatives and projects. This ICT-based conceptualization of “smart” and “integrated” is also evident in recent EU-funded projects such as ACTIVAGE and PROGRESSIVE.³

It is the contention of Homes4Life that this interpretation of the meaning of “smart” and “integrated” is unhelpfully limitative, and in fact misconstrues the role and function of ICT in shaping age-friendly homes.

This contention has not been grasped from thin air. It can be inferred from established frameworks such as the WHO Age-Friendly Cities and Age-Friendly Environments frameworks, the Active Ageing Index, the Dublin declaration, the viewpoints and concerns brought together under the Covenant on Demographic Change Towards an Age-Friendly Europe. It is borne out by recent explorations such as the Age-friendly Housing Roadshow and the report produced in 2019 by the Agile Ageing Alliance. It emerges even more clearly from the application of approaches like salutogenesis, place making and gerontechnology to the home environment. It is obvious on the basis of the expertise brought together in the Homes4Life consortium. And it has been confirmed by the exploratory research done for the current project, as well as by the stakeholder consultation that has taken place.

³ <https://www.activageproject.eu> and <https://progressivestandards.org>



What is clear from these sources is that older adults (like most people) are not particularly interested in the sophistication and performance specifications of ICT systems and infrastructure in their homes. Rather, they are interested in how their homes can help them lead a good and fulfilling life. By analogy, other stakeholders are primarily interested how age-friendly homes can help them achieve outcomes relevant to them, be they policy objectives, health and care outcomes or market volume. This implies that a home environment is “smart” to the degree that it helps achieve these goals and allows adaptation to changing circumstances. “Integrated”, in this context, is most usefully understood not as technical ICT-issue, but as describing how well a home is embedded in its spatial and social context, and the extent to which it helps its occupants to maintain existing social networks and build new connections. To borrow a term from salutogenesis, an age-friendly home is smart and integrated if it helps occupants and other stakeholders establish a sense of coherence, by being controllable, understandable and meaningful. It makes sense, therefore, to reinterpret “smart” and “integrated” as terms referring not to ICT-considerations, but to socio-psychological, socio-cultural and socio-economic fitness for purpose.

By developing a descriptive framework that takes account of the interests of stakeholders centre stage explores which functions of the home environment help to further these interests, Homes4Life seeks to support the redefinition of “smart” and “integrated” for maximum utility in understanding and stimulating age-friendly homes.

This is not to say that ICT has no role to play. On the contrary, as in most areas of life, ICT has an important function as a facilitator and enabler. For the active and healthy ageing domain, this has been extensively addressed in the European Commission's Blueprint for Digital Innovation.⁴ But while ICT may facilitate the emergence of more and better age-friendly homes, it is human and organisational motives, desires and concerns that eventually determine their fitness-for-purpose. It is this shift of perspective that is encapsulated in Homes4Life's redefinition of “smart” and “integrated”.

3.1.2 Conceptual objective

It has emerged from the material collected on the state of affairs in several EU Member States in D2.1 and from the analysis of existing certification schemes, that current approaches to labelling and certification of age-friendly homes, as well as policies pursued in many Member States, exhibit a number of shortcomings. They are not mistaken as such, but they do tend to adopt a one-sided approach and are prone to overlook aspects and viewpoints that contribute to the meaning and significance of age-friendly homes. This is consistent with findings in the Age-Friendly Housing Roadshow and strangely at odds with approaches taking either a more community-based or more personal-based perspective on ageing. Typical problems include:

⁴ <https://ec.europa.eu/digital-single-market/en/blueprint-digital-transformation-health-and-care-ageing-society>



One-sided definition | Certification schemes in particular tend to equate “age-friendly” exclusively with aspects of the home environment pertaining to physical safety (including the provision of health and social care) and comfort. While these aspects are important, such a limited approach misses out on the full significance of the home environment in people’s lives.

Limited or unclear perspective | Many stakeholders are involved in age-friendly homes, and each brings its unique viewpoints and understandings to the table. Current approaches tend however, either to adopt a single perspective (which generally is not that of the (future) occupant), or do not clearly specify a perspective at all. In either case, intelligibility and relevance to most stakeholders is compromised.

Concern and cost-based view | While the use of the word “negative” would carry unwanted pejorative connotations, it is evident that much of current work in labels and certification, and much of policy-making on ageing in place, sees home adaptation primarily as a necessary step to cope with health problems, impairments and dependency, and focuses on the costs to be incurred. This not only leaves out of consideration the positive value (in both material and immaterial terms) that home adaptations can have for both occupants and other individuals and organisations, it also ignores the fact that these angles of approach are unhelpful in stimulating people to take action.

Focus on new builds | Policy documents especially tend to focus on the building of new homes as the prime stratagem to support ageing in place. This overlooks the fact that most of the homes in existence around 2040, when the percentage of older adults in the population peaks, have already been built: creating an age-friendly housing stock is primarily a matter of renovation and retrofitting. Equally, it ignores the fact, evinced by material from D2.1, that for most older adults, ageing in place literally means ageing in place. People overwhelmingly prefer to remain in their own homes and neighbourhoods over relocating, even when their current home – in the terms used by most current certification schemes – performs less well than a new build alternative.

The most pressing effect of these shortcomings is that opportunities for incentivizing investment in age-friendly homes go unrecognized and unutilized, because the relevant perspectives and functions do not form part of the operational apparatus for policy development and quality assessment. The conceptual objective for the Homes4Life taxonomy is to contribute towards redressing this state of affairs by developing a descriptive framework that is based on a positive vision of ageing, includes all major functions of the home, is sensitive to different perspectives, and can be used as a basis for exploring the positive potential value of investment.

3.1.3 Practical objective

The practical objective for the taxonomy is rooted in the objectives and project logic of Homes4Life. In the project set-up the taxonomy has a transitional, unifying role.



On the one hand, a structured descriptive framework is necessary to frame high-level, long-term visions and aspirations in terms that are interpretable to stakeholders on the ground and suitable for effective stakeholder dialogue and case analysis around concrete instances and examples. On the other hand, certification outcomes in different contexts and for different stakeholders can only be made consistent and mutually interpretable if they can be referred to one central conceptual framework on which they are based.

The practical objective for the taxonomy is, accordingly, to develop a reference framework that works to support and tie together the Homes4Life project objectives. The term “working taxonomy” has been chosen to reflect this objective.

The objective implies that the approach to the development of the taxonomy is first and foremost practical: project concerns take precedence over academic niceties and formal rigour.

3.2 Limitations

The limitations set and encountered in the development of the Homes4Life taxonomy fall into three categories:

- Delineation of scope
- Practical project priorities
- Maturity of outcomes

The scope of the Homes4Life taxonomy has largely been determined by the Homes4Life overall project set-up and priorities. Central to these is the notion that Homes4Life is about homes, that is to say the everyday living environment, primarily understood as the physical living environment. Though the home can be (indeed often is) a basis for the installation and use of products and the delivery of services, these products and services are not themselves in scope. For healthcare services, for instance, aspects such as room dimensions (to allow space for assistance) and the presence of ceiling hoists are in scope, but the quality of the healthcare services as such is not. In the case of (home) monitoring systems, these may be in scope if they are hardwired into the home and as such part of the physical ICT-infrastructure of the home environment. Person-based sensors and devices, as well as any other “loose” devices, on the other hand, are out of scope, as are all software applications such as eHealth apps.

A home does not exist in isolation but derives part of its meaning and quality from the quality and appropriateness of its surroundings and the access it affords to them. Accordingly, the physical, social and cultural outdoor environment up to the level of the neighbourhood or the village have been considered in scope, to the extent that their characteristics can be seen to be directly relevant to the classification of the home. The home, in other words, stays at the conceptual centre of things when its environment is explored, with elements of the environment for which a direct contribution to the home's quality and fitness for purpose cannot be demonstrated considered out of scope.



There is no simple distinction between independent living on one side, and institutional residency on the other. Rather, housing arrangements exist on a continuum with fully independent, “regular” housing at one end and specialized long-term care institutions at the other. While it has not always been possible to draw a clear, consistent line, the overall approach in developing the taxonomy has been to consider in scope those types of homes where residency is provided independently from care and other services, and residency does not presuppose purchase of such services. Types of homes where residency and service provision are integrated, such as low-complexity long-term care facilities, have been considered out of scope. The basic determinant here has been that for a property to be in scope, decision making authority on aspects of the home should lie with the occupant, and not be conditional on purchase of other products and services. For rental situations this translates to the requirement that arrangements made between tenant and property owner pertain to residential aspects only and are not dependent on contractual relations for provision of other services.

Practical project priorities Homes4Life is not a research project, but a Coordination and Support Action. Its purpose, accordingly, is not to develop new knowledge, but to create framework conditions enabling established knowledge to have an impact on markets and society. The study field of age-friendly homes is large and complex, and there is a variety of established and emerging academic approaches that could conceivably be applied and synthesized. However, for the purposes of Homes4Life such an approach would be not just over-elaborate, but inappropriate and counterproductive. It would be over-elaborate, and unfeasible, because the time and budget requirements for such a course of action far exceed the Homes4Life project limitations. It would be unsuitable and counterproductive, because the Homes4Life project objectives require the taxonomy to be practically oriented, suitable for supporting certification pilots in real market contexts within a short timeframe, and understandable and attractive to a wide audience, composed mostly of non-specialists in the field. The approach to developing the taxonomy has been accordingly pragmatic, borrowing freely from both scientific sources and policy / advocacy documents where these presented information seemed practically useful.

Maturity of outcomes In line with the previous considerations, the taxonomy is not considered as “the final word” on age-friendly homes, but rather as a reference framework that has been developed to a degree suitable for use in the second stage of the Homes4Life project, but no further. It is supposed and expected that the application in the project will yield feedback for further development and improvement. Equally the taxonomy will benefit from exposure to the opinions of a wide range of stakeholders. Accordingly, once the current deliverable has been consolidated and established as the version at the basis of the certification activity within the project scope, the taxonomy will be opened to scrutiny and comment through publication on the Homes4Life project website, with a simple mechanism put in place for submission of feedback and suggestions. Further it is expected, and indeed hoped, that the Homes4Life taxonomy may function as a stepping stone for research and innovation activity beyond the project scope.



4 Structuring the taxonomy

The first step in developing the taxonomy, after the identification of gaps and needs and the setting of objectives and limitations described in the previous chapters, has been to decide on the main principles for structuring the information in it. Which categories and domains need to be included, and how should the information in the taxonomy be organised in order to be meaningful and relevant to its intended users. Before settling on the structure described in 4.2, several alternative avenues were explored and discarded. These are briefly described in paragraph 4.1

4.1 Discarded approaches

4.1.1 Building typology

The first possible structuring principle for the taxonomy to be considered has been building typology. A segmentation of the European Housing stock on the basis of age, design, construction type and technical quality is well-attested in research and policy on energy sustainability, where it helps to gauge the scope, cost and effects of energy sustainability measures.

For the purposes of the present taxonomy a classification according to building type has been considered less useful. Although the building type of a home may – indeed will – have an effect on the age-friendly performance level to be achieved and the cost for getting there, the building typology says nothing about the age-friendly needs that occupants and other stakeholders have, nor about the functional performance characteristics required of the home to meet those needs. In short, building typology, has no intrinsic relevance for age-friendliness of the home environment.

This is not to say that building typology has no role to play in certification. The type of building may put an upper or lower limit on the quality that can be achieved, or it may mean that certain certification requirements are out of scope. These matters, however, are context-specific certification issues that do not properly fit into a taxonomy that purports to be a universal reference framework

4.1.2 Health system typology

In much health and health policy research, the typology of the health system in a country or region has been used as a framework structuring principle, often functioning as a proxy or shorthand for the presence or absence of certain system conditions. While classifications vary – the division into Bismarck and Beveridge systems is particularly well-known, common classification items include the degree of public sector versus private sector activity, financing of healthcare from insurance premiums or direct taxation, degree and scope of coverage, reimbursement principle (e.g. production-based or population-based) et cetera.

In a similar vein to building typology, while the typology of the health system pertaining can certainly have an effect on demand for certain types of housing, and may co-



determine financing streams, health system typology says nothing about the age-friendly needs that occupants and other stakeholders have, nor about the functional performance characteristics required of the home to meet those needs. Additionally, homes and housing are issues that take place largely outside the circles of formal health and social care. Indeed, one of the objectives of ageing in place is to keep people away from formal care. Like building typology, health system typology has no intrinsic relevance for age-friendliness of the home environment.

4.1.3 New build or retrofit

A final suggestion, made in early exploration of project directions within the consortium, has been to co-base the taxonomy on the distinction between new-build and retrofitted homes. Arguments put forward included differences in standards set in, for instance, national building codes, and the assumption of a difference in quality level that can realistically be achieved.

Like the other approaches in this paragraph, it has been dismissed as an ordering principle for the taxonomy on the basis of its lack of intrinsic relevance. Like building typology, it may prove to have some relevance in the context-specific certification pilots to be carried out.

4.2 Rationale for selected approach

In selecting the ordering approach for the taxonomy, the objectives set for it and its proposed role in the project have been put centre stage. The structuring of information in the taxonomy should help to:

- Create a common language, focusing on the universalities rather than the context-specific particularities of age-friendly homes
- Clarify who are the stakeholders involved in age-friendly homes and help identify their needs and concerns.
- Help stakeholders to understand and appreciate each other's viewpoints and find common ground
- Give a full view of the functions the home environment fulfils for its various stakeholders, taking especial care to move beyond the relatively narrow domain
- Support the adoption of a positive, value-based approach to ageing in place
- Present a comprehensive overview, yet be flexible enough to allow description, analysis and assessment in specific contexts and projects.

To meet these requirements as much as possible, a matrix structure has been adopted which on one axis lists all relevant stakeholder perspectives, and on the other lists the functions that the home performs for one or more of these stakeholder perspectives. A simplified representation can be found in figure 1.

TAXONOMY

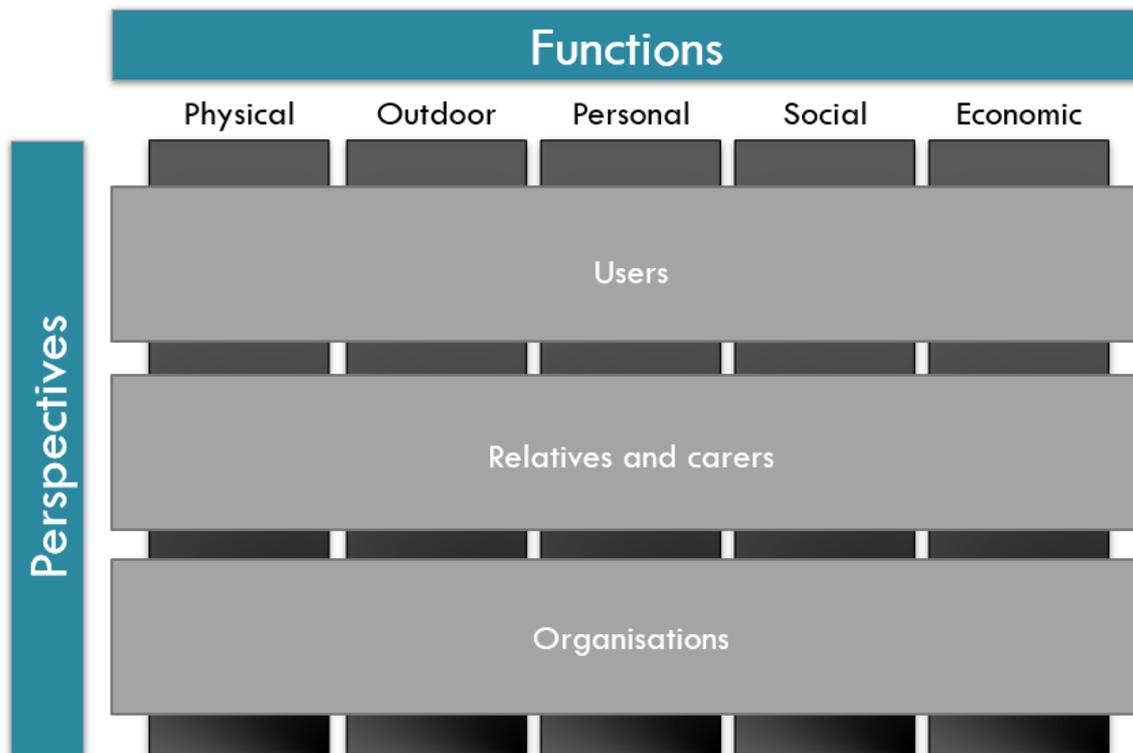


FIGURE 1: SIMPLIFIED REPRESENTATION OF HOMES4LIFE TAXONOMY

The representation has been simplified for clarity: each cluster of Perspectives and Functions has been subdivided into multiple Categories, Sub-categories and Items. A full breakdown with short descriptions of these can be found in chapter 6.

Meaning and content is created at the intersections between perspectives and functions. At these points, stakeholder needs and preferences can be defined, functional performance needs for the home environment established, and the value of creating better homes for ageing in place explored for and with different stakeholders.

The taxonomy thus provides a canvas on which different use cases can be painted. While there is a surprising degree of universality to the needs and preferences of stakeholders and to functional performance needs, the definition and discussion of these will often take place around local or regional implementation cases, as will the exploration of the economic and social business case for investment. The taxonomy allows these processes to utilize findings and insights from other cases described using the same taxonomy, to map their own findings onto an established gameboard which facilitates contextualization and interpretation of findings, and eases effective stakeholder discussions by providing an



agreed framework for describing and comparing different stakeholder needs and concerns. This way the taxonomy functions as 'working instrument' that can be enlisted for various purposes (primarily certification pilots and dissemination) for the Homes4Life project and beyond.

5 Developing the taxonomy

5.1 Departure points

While the development of the taxonomy has been mainly a pragmatic exercise, as described in chapter 3 above, the Homes4Life project has made use of a number of theoretical and policy-oriented conceptual approaches to take on board, and ground the taxonomy in, promising strains of current thinking. What these approaches have in common is that they adopt a holistic, user-driven, positively oriented approach to the potential contribution of the living environment to health, wellbeing and quality of life.

5.1.1 Theoretical approaches

Among the research-based approaches to the role of the living environment and more specifically the home and its components, three have proved particularly useful:

- Salutogenesis theory
- Place making theory
- Gerontechnology

Salutogenesis theory The *Handbook of Salutogenesis* (Mittelmark, M. et al (eds), 2017) provides a useful and recent overview of the field. Originating in work by the American Sociologist Aaron Antonovsky, salutogenesis theory is still an emerging field of enquiry, which is, however, very successful in finding new areas of application for its central tenets.

Foremost among these tenets is the Sense of Coherence, or SoC. Salutogenesis theory states that life events help shape a person's SoC, and that a strong SoC in turn enables people to maintain a (relatively) good level of health, wellbeing and quality of life in the face of external and personal developments. The SoC is thus strongly associated with successful coping and resilience. It's therefore logical that salutogenesis plays a defining role in recent approaches to "positive health".

Constituent elements of the Sense of Coherence are to which degree a person experiences their lives, health services, relationships, environment, in short, the context in which they find themselves and which co-determines their lives as Comprehensible, Manageable and Meaningful.

While application of the SoC to the home environment constitutes a fairly novel development, the relevance of the salutogenesis approach for the Homes4Life project and the taxonomy is obvious. The SoC and its constituent elements form an excellent framework for thinking about, particularly, the needs and preferences of older adults and informal carers. The SoC approach has the merits of being user-centric and positively



framed, through its emphasis on coping and resilience fits excellently with the long-term, life course view that is particularly necessary for issues around homes and housing, Recent years have seen application of salutogenesis to the broad topic of ageing and healthy ageing in the community.

Place making is a method that originated in the 1960s, with the work of authors like Jane Jacobs and William H. Whyte. In the decades since it has branched out into a multifaceted discipline. Some central tenets are recognizable in its manifold manifestations, however: place making investigates by which mechanisms and through which processes, spaces are invested with meaning and significance for the people using them, and thus become places. An important aspect in place making, and with particular relevance to the Homes4Life project, is place attachment: the drivers and mechanisms by which people build up and maintain historical and emotional connections to a certain space or place.

Most of place making work has been in urban and rural planning, designing and analyzing public spaces. Place making research zooms in on the emotional, psychological and cognitive aspects of space design. In research and practice on design implementation it takes a co-creative, user-driven perspective, examining how the community and individuals can be involved to create optimum spatial quality and fitness for purpose.

While place making has traditionally been a research and practice discipline focused on the design and utilization of public spaces, recent work has seen a growing interest in the everyday physical living environment. Place making is also particularly relevant for design for ageing in place because the field has recognized for some time that older adults exhibit stronger place attachment than younger people. Moreover, place making as a discipline is relevant for the Homes4Life approach because it offers insights how the home environment can be anchored to the immediate and neighborhood environment to contribute to its quality and fitness for ageing in place.

Many studies in the field of place making have been consulted in defining the Homes4Life KPI-framework (D3.1, see chapter 8 of this report). Two studies broadly in the field of place-making that have contributed as departure points in structuring the Homes4Life taxonomy have been those by Oswald and Wahl (2005), and by Bigonnesse et al (2014). Both recognize three types of functional categories that contribute to the meaning of home for older adults: Physical, Personal and Social aspects. The later study is an attempt at application of the framework developed by Oswald and Werner to a case study in Canada.

Gerontechnology according to the Herman Bouma Fund for Gerontechnology⁵ is an interdisciplinary field of scientific research in which technology is directed towards the aspirations and opportunities for older persons. Gerontechnology aims at good health, full

⁵ www.gerontechnologie.nl



social participation and independent living up to a high age, be it research, development or design of products and services to increase the quality of life.

Though gerontechnology research focusses primarily on design of products and devices, which are mostly not in scope for the Homes4Life taxonomy, it has nevertheless been influential in shaping the logic and approach not just for the taxonomy but also for future work has been its exploration how “hard”, “tangible” technological components of the living environment can be designed with and under the direction of older adults to support the pursuit of positive personal and social goals.

5.1.2 Policy-based approaches

The Homes4Life project fits naturally into a body of policy development, policy support and advocacy work in Active and Healthy Ageing aimed at better understanding, and marshalling, the effect of the physical and social living environment at different scale-levels to better health, quality of life, social and economic participation, and empowerment of older people, and at propagating approaches and tools to combat ageist attitudes and mechanisms. For the Homes4Life project use has been made of

- The WHO report *Measuring the Age-Friendliness of Cities: A Guide to Using Core Indicators* (2015)
- The WHO report *Age-friendly environments in Europe: A handbook of domains for policy action*
- The Active Ageing Index, a methodology developed as a joint project by the UNECE Population Unit together with the European Commission Directorate General for Employment, Social Affairs and Inclusion and the European Centre for Social Welfare Policy and Research in Vienna. The AAI is the basis for an annual survey of mostly country level indicators
- The final report (2017) of the Age-Friendly Housing Roadshow project, which summarizes findings from this European *tour d'horizon* of promising initiatives, attitudes, priorities and concerns in improving the fitness for purpose of the European housing stock, and formulates recommendations for further steps
- The principles and viewpoints brought together in the *Covenant on Demographic Change – Towards an Age-Friendly Europe*
- The MAFEIP set of indicators (under constant development), brought into being and still being developed to map and make comparable the results of age-friendly innovation in the action lines and concerns represented by the European Innovation Partnership on Active and Healthy Ageing and its six Action Groups.
- The Social, Economic and Environmental Impact Tool (SEE-IT) – A protocol for European Regions, Local Authorities and Communities (2015). The tool, basing itself among others on the WHO and Active Ageing Index framework, specifies a practical, co-creative methodology for setting and evaluating performance indicators for multi-stakeholder age-friendly environment initiatives

5.2 Development process and strategy

As a first step in the taxonomy, an analysis of some 45 documents was done, which were identified through a snowball process using the bibliographies of the WHO AFEE and the Age-Friendly Housing Roadshow reports as starting points. Policy documents, grey



literature, academic literature and more practical guides and guidelines were all considered in scope. The documents were scanned for material on

- Relevant individual and organisational stakeholder perspectives
- Needs and requirements from the home environment for these stakeholder perspectives
- Breakdown, structuring and content description of relevant functions and functional clusters of the home environment
- Material on methodologies for predicting and assessing effects, as well as possible structures and content for effect definition

Documents were analysed as they were accessed, the outcomes collected in MS Word. The search was based on qualitative grounds, with the objective of creating a representative overview, without the ambition either to achieve exhaustiveness in literature consulted or be able to make quantitative statements. Accordingly, the search for documents was halted when new documents identified no longer produced additions to the qualitative findings.

The literature search and analysis was done during February and March of 2019. The findings were used to produce an initial version of the taxonomy framework, listing proposed stakeholder perspectives and home environment functions. A text document summarizing and explaining the findings and outlining the proposed taxonomy content was produced.

The initial version of the taxonomy was presented to the rest of the Homes4Life consortium during a project meeting in Brussels on the 27th of March 2019. Initial comments were noted during the meeting. Following on from the meeting, the proposed structure and text document were shared with the project partners, for a more extensive round of feedback and review. Comments received together with the proposed response were collected in an overview document. Using this document, a summary proposal for changes and additions to the original structure was developed. The proposal and the adapted taxonomy structure and content were discussed during the April Project Steering Board meeting, and a dedicated Skype meeting (also in April) of the project partners participating in WP3. The further feedback and comments received were used to produce a final draft which was produced and presented for final discussion and intra-consortium validation in the May Project Steering board meeting.

This latter version of the taxonomy was adopted for the execution of three further Homes4Life tasks:

- The development of a pilot set of definitions specifying needs and preferences from the home environment for different stakeholders (also part of task 2.4, see chapter 7 of this report)
- The development of an initial set of Key Performance Indicators for age-friendly home environment (task 3.1, see chapter 8 of this report)
- The analysis of existing certification schemes (task 3.2, see relevant deliverable report)



As a final check, the taxonomy was presented at the Homes4Life stakeholder workshop, held in Brussels on the 11th of June 2019. An extensive report of this workshop has been produced as a separate deliverable under WP2 of Homes4Life (see D2.2 – Stakeholder workshop and the article on the project website⁶). For the taxonomy structure and content, the workshop did not lead to major adaptations, but did confirm both the importance of the focus on psychological, emotional and social significance and functions of the home environment, and the importance of end-user empowerment and co-creation in realizing age-friendly homes.

As a result of its application in the project tasks listed above, some minor modifications and additions were made to the taxonomy. These consisted of “tweaks”: some changes of phrasing, and the addition of a few items at the lower levels of granularity. The main structure and context of the taxonomy have not been affected by these changes.

⁶ <http://www.homes4life.eu/2019/06/20/successful-homes4life-stakeholder-workshop-in-brussels-thank-you/>

6 Description of the taxonomy

6.1 Overview of taxonomy structure

As shown in the summary structure presented in figure 2 below, the Homes4Life taxonomy of age-friendly homes recognizes three main groups of stakeholder perspectives and five main clusters of home environment functions.

Each main stakeholder Group has been segmented into Sub-groups. Where appropriate Sub-sub-groups have been introduced to further segment the taxonomy framework and add detailing.

Each main Cluster of home environment functions has been segmented into Categories and Sub-categories. Where appropriate, deeper levels of granularity have been defined (Items and Sub-items) within Sub-categories.

Appendix 1 gives an overview of the entire taxonomy structure. The following paragraphs list and briefly describe the Perspectives and Functions included in the Homes4Life taxonomy.

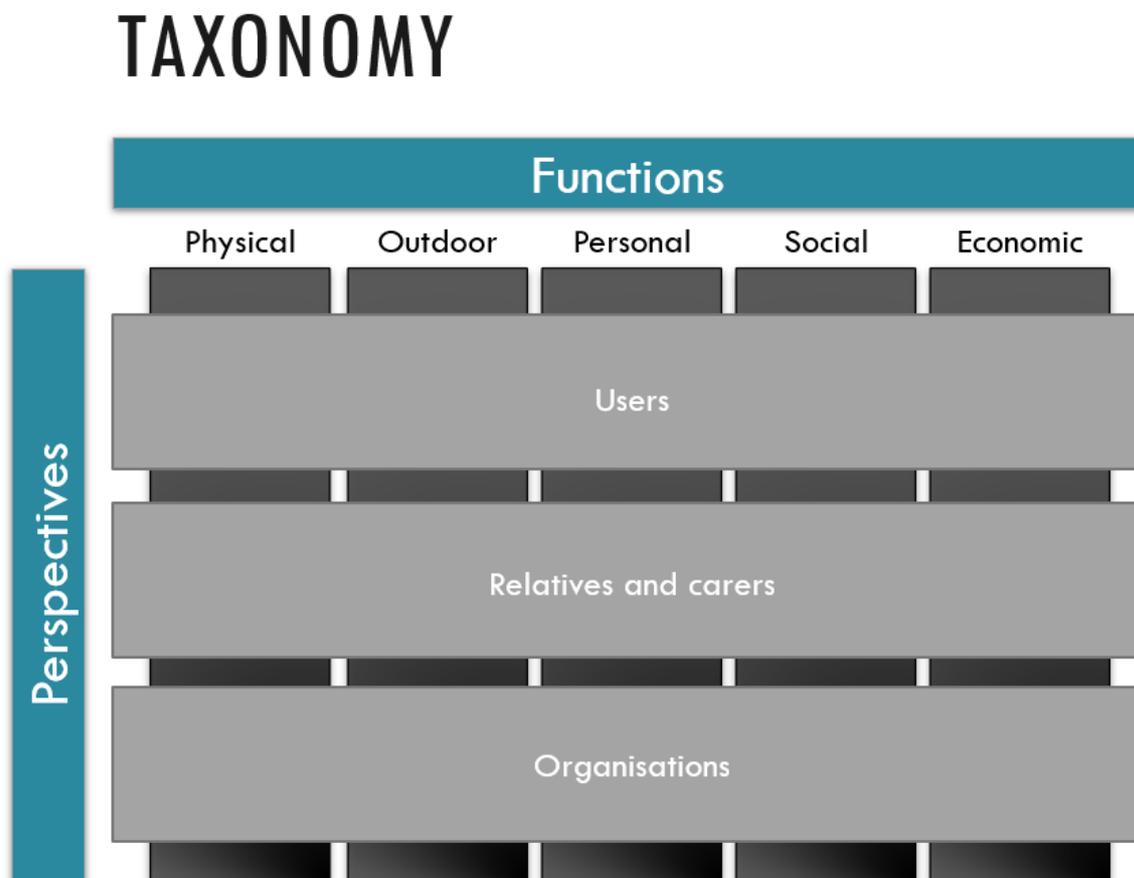


FIGURE 2: TAXONOMY STRUCTURE



6.2 Stakeholder perspectives

The stakeholder perspectives have been divided into three main groups.

1. Users
2. Relatives and carers
3. Organisations

Each main group is discussed in turn

6.2.1 Users' perspectives

The user perspectives found in the literature consulted are mostly defined on practical grounds, and tend to focus on impairments and limitations, as these can be assumed to lead to different needs and requirements from the home environment in – especially – the “harder” more “technical” performance areas. This approach has been followed in drafting the taxonomy, for two reasons: they relate directly to differences in performance requirements for at least some home functions; and these sub-groups tend to be recognizable across different national, cultural and systems context, and thus seem well-suited to a taxonomy dedicated to developing a universally and flexibly applicable reference framework. While other possible classification axes such as gender preferences, socio-economic status, education status and so on are far from irrelevant, the significance and impact of these characteristics are much more susceptible to context-specific variation. Moreover, the effect of these characteristics on the required functionality from age-friendly homes is often either indirect, extrinsic to the functional characteristics of the home, and/or hard to describe in a verifiable way. The Sub-groups included under the Users group are

- Anticipatory
- Visual impairments
- Early stage dementia
- Minor cognitive impairment
- Mobility restrictions
- Respiratory problems
- Hearing impairments

It must be noted that these user perspectives are NOT intended as realistic or nuanced characterisations of groups of people. This would be over simplistic and fall into the twin traps of stigmatization and problem fetishism. However, while it is definitely not good practice to typecast people based on their impairments, the life events for which the Sub-groups provide a convenient shorthand do co-determine how people view what they want from life, and (more specifically) the role of their home environments in making that happen. For that reason, the perspectives selected are well-placed in what needs to be a working taxonomy.

6.2.2 Relatives and carers' perspectives

The quality and fitness for purpose of the home environment affects the health, wellbeing and social participation not just of older adults, but also of their informal carers and of other people (relatives, friends) with whom they maintain close emotional ties. The needs



this group of Relatives and informal carers are partly derived from the needs of those in the Users group, as their health, wellbeing etc is psychologically and practically important for the Quality of life of relatives and informal carers. But relatives and carers also have autonomous needs and requirements, centred around their ability to e.g. pursue personal goals, maintain involvement in paid or unpaid employment, safeguard their personal identity and personal living space while living with a loved one requiring care, or simply wanting to be able to visit loved ones with special housing needs.

For the sake of conciseness, the division into Sub-groups and Sub-sub-groups has been based on two considerations only: whether the informal carer or relative co-habits with an older person requiring care, and whether or not the informal carer or relative is the partner of the older person requiring care. This leads to the following list of sub-groups and sub-sub-groups

- Co-habiting
 - Partner
 - Other
- Non co-habiting
 - Partner
 - Other

The very broad group of relatives, friends and acquaintances can be assumed to be subsumed under the Non co-habiting Other sub-sub-groups.

6.2.3 Organisational perspectives

Next to the individual perspectives, many types of organization have an interest in the availability, creation, quality and fitness for purpose of age-friendly homes. While the organisational angle of approach is overlooked or under-addressed in much of the literature consulted, awareness of the perspectives of different organisations and facilitation of effective dialogue between organisations and involving organisations and individuals is of crucial importance in stimulating investment in age-friendly homes. It is generally through organisational stakeholders that funding streams for investment become available or not, and business cases for age-friendly homes often involve a complex trade-off of costs and benefits between organisational stakeholders (and sometimes between organisations and individuals). Including organisational perspectives in the taxonomy is therefore both logical and important.

The basic breakdown into Sub-groups of the organisational perspectives is into For-profit and Not-for-profit organisations, with a further breakdown within each Sub-group. The total list of Organisational perspectives included in the taxonomy is as follows:

- Not-for-profit organisations
 - National government
 - Local or regional government
 - Health and social care providers
 - Social and public housing providers
- For-profit organisations



- Project developers and investment companies
- Construction and installations
- Service providers
- Private health insurance companies
- Private insurance companies and other innovative services

Since the logic of including organisational perspectives in the taxonomy is not widely recognized in the literature consulted, it is useful – based on what could be found in the literature - to give some indications of the needs from the home environment that can be directly attributed to the concerns and priorities of the organisations involved.

The needs of **national governments** centre around costs and cost containment of health and social care, the quality and safety of care, economic prosperity and sustainable employment, as well as accessibility to affordable, qualitatively acceptable housing for the national population. The needs of **local and regional governments** are largely comparable to those of national governments, with the proviso that they are focused more on the implementation of policies and on practical effects on the ground at the scale levels appropriate for their jurisdiction. The exact role and responsibilities of local and regional government (versus e.g. other levels of government, health care insurers and health care providers) is strongly dependent on national health system particularities.

The needs of **health and social care providers** revolve around costs and cost containment, availability and effective deployment of staff, safety and quality of care and the ability to offer safe and attractive working conditions to (ever scarcer) staff.

The needs of **social and public housing providers** focus on the ability to understand and anticipate longer-term requirements for the housing portfolio, which includes the need to be able to respond flexibly to shifting housing priorities. Their information need is further fed by the constant challenge of balancing portfolio against shifting demand patterns, and the financial sustainability of the portfolio.

On the **for-profit** side, the needs of all stakeholder Sub-groups revolve around understanding and satisfying business case and value creation parameters. Part of this is the nature and volume of demand. Further concerns pertain to understanding the key drivers for successful projects, and the selection of appropriate business and financing models, taking into account both ability to pay and willingness to pay on the part of purchasing parties. Further concerns touch on risk reduction and foreseeing the long-term effects of business decisions around age-friendly homes investment.

Among the for-profit sub-group, **private health insurance companies** take up a special position. For one thing, in multiple countries (such as the Netherlands) their position on the public interest – commercial interest scale is somewhere in between. Though private companies, they are lynchpins in healthcare systems driven by public sector priorities. In containing costs of healthcare their interests often coincide with those of not-for-profit sub-groups, and in many cases, they operate under restrictions on profit-making and permissible use of profits.

6.3 Age-Friendly home Functions

The functions that the home environment fulfils to cater to the needs of its various stakeholders have, for the purposes of the taxonomy, been divided into five broad functional Clusters

- Physical
- Outdoor access
- Personal
- Social
- Economic

In the remainder of this paragraph, the more specific content of each cluster (Categories, Sub-categories and deeper levels of granularity where appropriate) is described and briefly discussed.

6.3.1 Physical Cluster

This is a large cluster of functions, which comprises those elements and functions traditionally associated with age-friendliness and ageing in place in a narrow sense. It covers those elements of the home which contribute to the physical safety and comfort of the occupant. These elements tend to be relatively “hard” and tangible: they describe the physical and material characteristics of the home and its infrastructure and built-in and wired-in systems. Perhaps because of their “hard” nature, which makes them comparatively easy to assess, the functions in the Physical cluster feature largely in current labelling, certification, norms and standards and directives. An example is accessibility, for which most EU Member States have national codes or directives.

The Physical cluster is a large cluster of functions, which in the taxonomy has been structured into five categories

1. Personal safety
2. Comfort
3. Accessibility and orientation
4. Health and social care
5. Smart readiness

Each of these categories will be discussed in turn

6.3.1.1 Personal safety

This Category deals with those functions and elements of the home that enable occupants to remain safe and free from harm while dwelling in the home and going about their daily activities. The primary perspective in play for this category is older adults, with the demands made of the home environment becoming more stringent and specific as physical and/or cognitive impairments play a more prominent role. However, personal safety may also be an issue for co-occupants and visitors, as well as for professional operatives entering the home for specific tasks. Co-occupants and visitors may themselves have impairments; professional operatives may have specific requirements from the home environment to



make it into a suitable and safe working environment. The Category breaks down into the following sub-categories

- Accidents and calamities
- Safe use of amenities and facilities
- Safety around the home
- Safety from outside threats

The **Accidents and calamities** sub-category is an important especially for more vulnerable older people living independently. It covers home functionality needed for occupants to use the home and pursue their daily activities without coming to harm. The sub-category comprises both preventive elements, such as measures to prevent falls, and corrective elements such as alarm and registration systems. Required performance levels encountered in the literature, and gleaned from the analysis of existing certification schemes in task 3.2, vary according to target group, with the more complex solutions such as smart cameras, smart floor sensors, deployment of detection system for person-based sensor read-outs really only appropriate in specialized housing settings, where it directly replaces round the clock personal surveillance.

Bad or incompetent design of **in-home amenities and facilities** can lead to health hazards or discomfort for anyone. As old age progresses, and with the onset of impairments, norms for what constitutes good, fit-for-purpose design of e.g. stoves, hot water faucets, baths and showers et cetera, tend to become more stringent. Next to physical limitations (for instance reduced strength and agility, reduced acuity and light-sensitivity of sight), cognitive aspects may contribute to more stringent design requirements.

General **safety around the home** concerns the home's contribution to enabling its occupants to make their way safely and conveniently round it. Generally known measures to contribute to general safety around the home include non-slip flooring, interior emergency lighting and rounded corners on interior partitions.

Older people are especially vulnerable to **outside threats**, particularly when they live alone. Older people are disproportionately targeted by burglary, robbery, fraud and other unpleasant excrescences of contemporary society. It is moreover well-established that many older people feel unsafe in their everyday living environments, and that this lack of subjective safety negatively affects health, wellbeing and social potential. Home features associated with safety from outside threats in the literature consulted and in the existing certification schemes include hinges and locks, doorbells equipped with cameras and automatic alarm systems, but also e.g. sightlines to and zoning of entrance areas.

6.3.1.2 Comfort

Comfort concerns the home's ability to create an interior climate that is conducive to health and wellbeing and adaptable to the personal preferences of its occupants. Personalization is important. For instance, while it is well-established in physiology that the ability of the body to generate heat diminishes as we age, there is great variety, not just



between genders but between individuals, on what is experienced as a comfortable temperature bandwidth.

Some definitions of comfort take a comparatively narrow view, considering only **temperature regulation and air quality** as being in scope. In the Homes4Life taxonomy a broader definition has been chosen, that also includes **daylight and artificial light** quality and **acoustic properties**, taking “control over the environment” as its central notion. For that latter reason, the functionality of **home management systems** has also been considered in scope.

6.3.1.3 Accessibility and orientation

This category of home functions is likewise very well-established in the literature consulted, and existing certification, and is the subject of a wide range of norms, standards and guidelines at both national and international level. It encapsulates a long list of aspects that have been included in the taxonomy. The central principle of the category is that the functions of the home under this category contribute to people being able to go about their daily business with the maximum amount of freedom and the minimum amount of assistance required and hindrance experienced. This recognizes that intrinsic freedom of movement and action may change over the life course, but that the ambition to achieve a degree of freedom commensurate with personal preferences within that limit stays a constant.

Requirements associated with this category of functions encountered in the literature focus variously on the lay-out of the home, design and dimensions of spaces, widths of doors and corridors, lighting conditions, use of contrasting colouring, fixed mobility aids in WCs, bathrooms and bedrooms, positioning and design of home management and communications interfaces et cetera. The list of sub-categories defined under this category is as follows.

- Getting in and out of the house
- Getting around the house
- Performing daily in-house activities
- Getting in and out of bed
- Personal hygiene
- Using communications and entertainment features
- Doing work or hobbies
- Controlling home functions
- Orientating oneself in space and time

6.3.1.4 Health and social care

Intermittently over the course of our lives, more often and sometimes chronically as we age and/or impairments start to play a role, the home becomes an environment for care. How well it functions in fulfilling that function plays a major role in determining the extent to which people who experience health problems can continue to age in place. A logical element of the home contributing to its fitness for purpose is its location relative to community level health services such as GP, pharmacy and other community based and



primary care services. Accordingly, **proximity to services** has been included as a sub-category, with the items just mentioned belonging in it.

ICT-based alternatives to physical care delivery play an increasingly prominent role, hence the importance of the home environment's **options and facilities for eHealth and remote medicine**. But when health problems are more serious, the physical home environment must function as a fit for purpose care environment, which necessitates **facilities for care provision in the home**. Items listed under this sub-category in the taxonomy are sufficient space for manoeuvring and assistance; and availability of assistive apparatus (this may include ceiling hoists in some types of specialized housing). Perhaps less immediately obvious, but definitely important for health care professionals working in the home environment are the items safety and capacity of electrical and ventilation systems and safety of the working environment for the professionals involved.

6.3.1.5 Smart readiness

While non-fixed ICT-based products and ICT-services are outside the Homes4Life scope, a number of framework conditions apply to determine whether the home can function as a base for deployment and utilization of these products and services. These framework conditions have been included in the Smart readiness category.

It has been decided to include smart readiness under the Physical cluster for two main reasons. On conceptual grounds, most of the products and services enabled by smart readiness of the home serve purposes included in the Physical cluster (safety, monitoring, operating comfort systems, health care and health monitoring). On a more practical level for certification purposes, smart readiness features are “hard” home environment features which lend themselves to assessment in conjunction with other tangible home functions and components. The list of sub-categories included under Smart readiness is

- Wireless and wired connectivity
- Network infrastructure and interoperability
- IT infrastructure and API's
- Digital security and data protection

6.3.2 Outdoor access cluster

This is a much more compact cluster than the Physical cluster. Its importance in determining the quality, fitness for purpose and material and immaterial value of the home environment should not be underestimated. The quality of the outdoor environment is a central component in the WHO Age-Friendly Cities framework, and there is an extensive body of research and guidance in architecture, urban design, psychology and health to substantiate that the ability to be outdoors, in an environment that is independently accessible and that is experienced as attractive and safe by its users, contributes to health, wellbeing, and perceived quality of life. The importance of green spaces has been a topic of particular interest in urban design and landscaping, but the quality of outdoor spaces may also pertain to urban interests, to variety, to views and interaction with human activity, and even with the influence as such of being exposed to outdoor conditions such as fresh air and daylight. The outdoor access cluster breaks down into three scale-levels, which



have been included as categories: the **home and building**, the **immediate environment**, and the **neighbourhood or village**. Given the Homes4Life scope, the higher scale levels will be viewed from the perspective of the home, with its functions primarily defined as its proximity to outdoor environments.

At the level of the home and building, outdoor access pertains both to the availability, accessibility and privacy of outdoor spaces such as gardens, balconies and patios, as to the views available from the living areas in the home environment. Both at the level of the immediate environment and the neighbourhood or village, main determinants are accessibility, attractiveness and social safety. Attractiveness is variously associated with maintenance level, the presence and quality of street furniture, cleanliness and the absence or presence of graffiti, presence and maintenance of greenery, the architectural quality of surrounding buildings and protection from the elements.

It should be noted that the Outdoor access cluster pertains to the physical aspects of the home's outdoor spaces and wider outdoor environment. It does not include the network of social connections, services and activities that constitute the social environment of the home. This latter aspect is covered under the Social cluster of the Homes4Life taxonomy.

6.3.3 Personal cluster

In this cluster of the taxonomy there is a marked disconnect between on the one hand the policy and research literature, and on the other hand the world of label, certification, norms and standards.

The importance of the home environment to people's emotional well-being, sense of anchoring and sense of self is well-attested. The home is an important part of who and what people are, and this importance increases with age, as people spend more time in their home (up to 90% of the time in the "oldest old" i.e. those over 85 years of age), and as memories centred around the home continue to accrue. Sense of identity and emotional connectivity is a contributing factor to people's reluctance to move to a new house and even greater reluctance to leave their neighborhood. A deep-seated desire to remain in contact and continuity with one's own life history also contribute to this attachment to familiar surroundings. Negative identity associations can apply to adapted and specialized housing and impede people's willingness to contemplate moving to such facilities, quoting motivations such as: "This type of house is "not me""; "This type of house is for "oldies"; or "If I live here, people will believe I'm a "needy old so-and-so". These perceived negative effects on self-worth and self-perception and emotional connection also help explain many people's reluctance to accept adaptations to their current home, or the introduction into the home of assistive technologies. These adjustments carry negative connotations, with people stating that "This means I'm old" or "The house just won't be the same." These identity and emotion-based negative connotations also adversely affect the value people place on home adaptations and hence their willingness to invest in them. Thus, the Personal cluster of home functions, while it may appear "soft" compared to the more tangible elements in the Physical and Outdoor access clusters, has a very tangible effect on the business case for investment. The extent to which the home



environment is the subject of positive emotional attachment and its alignment with people's sense of identity, personal history, self-worth and self-reliance co-determines the value placed upon the home environment. For instance, a new build development that fails to take these into account will have a smaller potential market and even people for whom it is in scope may attach lower value to it. The home as a source of identity and emotional connection is also an explanatory factor in people's generally negative response when adaptations or preparatory measures are framed in terms of coping with future dependencies and health problems. People do not want to think of their future selves in this way.

It should be noted that identity and emotional connectivity are not just about safeguarding and preserving historical ties and continuities. Also relevant are the opportunities the home and the environment in which it sits offer for forging a new sense of identity and new emotional connections. This potential for positive redefinition of the self in later life may contribute to the success of self-organized and self-directed community living initiatives. Awareness of the importance of identity and emotional connectivity to the home and living environment may also encourage redevelopment and revitalization of urban and rural central areas, as these are natural loci of emotional attachment.

While the research literature and to an extent policy and advocacy are well aware of the importance of the home as a source of identity, emotional connection and self-worth, the current state of play in certification and standards and norms almost completely overlooks this aspect, as evinced most practically by the analysis of existing certification schemes. One of the central challenges for the Homes4Life project, therefore, is to find ways to make this crucial aspect of the home environment susceptible to practical assessment and verification.

In defining the content of the Personal cluster of the Homes4Life taxonomy, the theoretical departure points outlined in paragraph 5.1 have been particularly valuable and informative: the SoC from salutogenesis theory maps particularly well, while literature from place making offers not just corroborative material, but also insights how user-led, participatory design and decision making strategies help investment places and spaces with emotional meaning. Gerontechnology has offered insights on how good design of technology for ageing can contribute to higher self-worth and better utilization of technology, and what risks lie in using badly designed technology.

Next to the original analysis of literature conducted in February and March of 2019, literature analysis done for the purpose of defining Key Performance Indicators (see chapter 8) and Needs and Preferences (see chapter 7) has produced a great number of relevant studies that have served to confirm the broad structural choices for this Taxonomy cluster as well as to highlight some nuances and additional sub-categories which have been included in the version of the taxonomy presented in this report.



The Personal cluster is divided into two categories

- Identity and emotional connectivity
- Privacy and dignity

6.3.3.1 Identity and emotional connectivity

The title of this category is self-explanatory. It deals with those aspects of the home that support, maintain and create positive emotional attachment, support identity and keep people in touch with their former selves. In further structuring the category it has proven most practical to make a division according to scale, since home characteristics functioning for this purpose tend to operate at one of three scale levels:

- The home
- A larger complex or development (e.g. a communal living facility) if the home is part of such
- The neighborhood or village

Relevant elements at the level of the **home** are its outside appearance, whether or not inside or outside features can be experienced as stigmatizing or "labelling"; to what extent the home environment is perceived as recognizable and relatable by its occupants; and the flexibility the home offers to adapt spatial lay-out, furnishings and amenities to personal preferences and styles, and to be able to continue to do so over the life course of both person and home. Further relevant elements include the presence of dedicated spaces for activities important to the sense of self (e.g. hobbies), and the amount of autonomy and control occupants tend to experience.

Relevant elements at the level of the **larger complex or development** center around the questions whether occupants feel "at home" there, which involves as elements the mix of dwellings; mix of occupants; the designation or labelling of the complex or development; and the perceived relevance and suitability of on-site functions (e.g. community spaces)

Relevant elements at the level of the **neighbourhood or village** focus on the emotional and/or historical connections the area (re)presents for occupants and the proximity of significant others.

6.3.3.2 Privacy and dignity

This category focuses on those elements of the home environment that contribute to a sense of personal freedom, self-worth and decorum. A number of sub-categories has been deduced from the literature as being relevant to this aspect. They are:

- Control over the degree, nature, time and place of social interaction that occupants engage in
- Control over who accesses (parts of) the home and what they are allowed to do there
- Control over data collection and management, covering both transparency about what data is collected, and control over adjustments to data collection from situation to situation and space to space
- Control over look, feel and furnishings of the home environment



- To what extent the home environment offers spaces and times which are wholly private, and where occupants can be totally free from interaction with others if they so desire
- The extent to which the home environment offers spatial opportunity for seclusion for the provision of health and ADL care. This is not only relevant for the decorum and comfort of occupants requiring care; this sub-category also comprises spatial opportunities for informal carers to seclude themselves from care processes (e.g. an extra bedroom)

On the basis of the literature analysis for the definition of KPIs and NoPs, two more subcategories have been defined

- Long-term security on the (financial) ability to stay in the home environment and/or keep the home environment fit for purpose over the life course. Research into the wellbeing of tenants and low-income home owners has shown that housing precariousness has a negative effect on health, emotional wellbeing and self-worth
- The degree to which the home environment supports self-determination of actions and movement

6.3.4 Social cluster

What has been said above for the Personal cluster also substantially holds true for the Social cluster of age-friendly home functions: an extensive base in research, policy and advocacy, but little or no available material in current work in certification, labelling and standards. The challenge is accordingly similar: find ways to translate these insights into terms that lend themselves to practical assessment and verification.

Under the social cluster are subsumed all those functions of the home environment that are in some way relevant to occupants' ability to stay socially active. That includes the ability to receive visitors in the home; to maintain existing social networks and find opportunities to build new connections; to engage in social activities of one's own choice and at times and places suited to one's personal needs and preferences; to self-direct and self-organize activity; to satisfy the need for access to both more practical services such as shops as well as to find a supportive environment for immersion in arts and culture, if one's tastes run that way. And functions of the home environment that support people in engaging in meaningful activity and remain a contributing member of society, as this particularly has been shown (for instance in analysis of the so-called "Blue zones") to contribute to better health, better wellbeing, higher resilience in the face of adverse life events and the extent to which people experience their own lives as worthwhile. Social isolation, meanwhile, is a growing problem with a profound negative effect on nearly all relevant aspects of health and well-being.

While much of research and policy on social aspects focuses on the primary user group of older people, many of the functions and elements touched upon in this cluster are just as relevant from the perspective informal carers. When it comes to aspects of maintaining involvement in paid or unpaid employment, these latter are the primary beneficiaries. At the same time, it should not be forgotten that for the primary group as well the ability to keep involved in work and work-like activities is of great value in maintaining quality of life.



In developing the taxonomy, the Social cluster of home functions has been subdivided into two categories:

- Social activity
- Employment

6.3.4.1 Social activity

The Social activity category has been further sub-divided into four sub-categories

- Ability to have social contacts in the home
- Proximity to activities and facilities
- Ability to find social contacts outside the home
- Online connectivity

The category of **social contacts in the home** covers aspects such as: can the home be conveniently reached by others? Is there sufficient parking space? Is the home close to public transport? Is the route from the public transport stop accessible? Is there sufficient space in the home to entertain visitors? Is there a spare bedroom to accommodate overnight visitors?

Proximity to activities and facilities describes to what extent the home environment is a suitable base to access practical, social, cultural and hobby services and facilities. Next to formalized social activity, the opportunity to find spaces and opportunities to engage with others informally, without prior plan or organization emerges from the literature as an important component of the home environment in allowing gradual self-directed build-up of social connectivity.

The **ability to find social contacts outside the home** also encapsulates these informal social engagement opportunities, while the extent to which the home's environment is a happy hunting ground for social connection is due in large part to its demographic composition

The inclusion of an **online connectivity** categories recognizes that increasingly, ICT technology and applications play a supporting role in maintaining contacts with friends and family, connecting to social groups and networks and accessing entertainment and activity services.

6.3.4.2 Employment

The Employment category has been further subdivided into two sub-categories

- Suitability of the home as a place of work
- Connection to place of employment

The sub-category **suitability of the home as a place of work** describes functions and elements of the home that determine to what extent it can be used as a working environment by its occupants. While not exclusively relevant for informal carers, this perspective shows the clearest need: many informal carers are faced with the need to do all or part of their work from home, or from the home of the person they care for if they live elsewhere themselves. A home environment that supports this contributes to sustainable



employment and helps avoid loss of income and social isolation among informal carers. Availability of work spaces and the general lay-out of the house contribute, as do the availability of technical facilities and digital connectivity.

The sub-category **connection to place of employment** primarily looks the situation of the home relative to place of employment (travel distance) and the presence nearby of suitable accessible transport options.

6.3.5 Economic cluster

Including an Economic cluster of functions in the Homes4Life taxonomy makes eminent sense. First of all, the purpose of the Homes4Life project is to stimulate investment in age-friendly homes, for which a structured understanding of the aspects that contribute to the feasibility and attractiveness of such investment is a prerequisite. But economic considerations also more directly co-determine the quality and fitness for purpose of the home environment for ageing in place. This is particularly true for the many older people with lower incomes for whom good quality housing, adequate maintenance and heating are simply out of reach, to say nothing of the costs associated with home adaptations. Age-friendly housing for all requires that appropriate housing is available within price ranges to suit different budgets. For this it is necessary to know what those budgets are and what percentage of income is realistically available for housing costs. Affordability considerations and cost-benefit trade-offs are also instrumental for decision making by both public sector and private sector organizations. Next to objective affordability, the value that the home environment and investments in it represent to both its intended users and those with a stake in making it available, is instrumental in constructing viable investment propositions, so the aspects of the home environment that are relevant to this consideration deserve a place in the Homes4Life taxonomy.

In the Economic cluster, money isn't everything. Also relevant are those market conditions that determine to what extent those with different budgets and support needs can choose between different options for the type of home, type of living environment and living arrangement they prefer, the type of neighbors and co-occupants who will form part of their social circle, and the ageing in place technologies and adaptations they do or do not want. Not only choice as such, also the authority to make it and the availability of sufficient information to base it on, are potentially relevant structural elements in the Homes4Life taxonomy.

The inclusion of a Choice category in the taxonomy is, admittedly, slightly speculative, because there is not a great deal of material on which to base verifiable characteristics that are directly tied to the home environment as such. It has been included nevertheless, because one of the objectives of the Homes4Life taxonomy is to present a broad and comprehensive overview of functions. From that perspective, Choice certainly qualifies.

To summarize, then, the breakdown of the Economic cluster into categories and sub-categories is as follows:



- Affordability
 - Objective affordability
 - Willingness to pay
- Choice
 - Dwelling type
 - Living environment type
 - Living arrangement type
 - Neighbours and/or co-occupants
 - Solutions
 - Decision-making authority
 - Choice information



7 Putting the taxonomy to work: Needs and preferences

Chapter 6 has described the structure and content of the Homes4Life taxonomy framework. As has been explained in Chapter 3 of the present report, an important objective of developing the taxonomy has been to provide a consistent reference framework as a canvas on which and a common language in which different stakeholders' needs from and priorities for age-friendly homes can be mapped and contextualized, effective dialogue between stakeholders aimed at improving mutual understanding of different stakeholders concerns and priorities and the discovery of common ground can be conducted, and the potential value of improving the age-friendliness of individual homes and of the housing stock can be explored.

The "working" taxonomy of Homes4Life is thus not an end in itself, but is intended as a tool for further work. A tool to facilitate on the one hand the definition and cataloguing of stakeholder needs and preferences (NoPs), and on the other the identification and cataloguing of functional performance indicators, designated as KPIs for short. Of these two, the definition of KPIs has the greater immediate relevancy to the progress of the Homes4Life project, as the set of KPIs to be defined must form the basis for development and testing of certification functionality in Work Package 4. This task has accordingly claimed the greater part of resources. Its approach and outcomes are described in chapter 8 of the report.

However, needs and preferences are the starting point for thinking about age-friendly homes, as they provide the underlying reasons that drive or inhibit change. Also, although a one-to-one correspondence often cannot be established, the needs and preferences of stakeholders are the *raison d'être* why KPIs need to be defined in the first place. A correspondence, incidentally, that seems under-addressed in much current certification work.

For these reasons, and to test the suitability of the taxonomy framework, it was considered useful to dedicate a workstream to the development of a first batch of NoPs, as a proof of concept and to provide a starting point at this stage of the project. This chapter outlines the approach taken and gives an overview of the outcomes.

7.1 Approach

7.1.1 Process

The workstream involved the efforts of the project partners AGE, EUCa, TEC, UNIVPM, UU and TNO. The latter acted as coordinator and workstream leader.

Each partner was asked to provide a description of circa 10 NoPs, basing themselves on their specific experience and expertise and referencing research literature, or policy / advocacy material. Each partner was assigned an indicative area of interest based on their expertise profile, but was permitted and encouraged to also define NoPs in other



areas where they felt a useful contribution could be made. For uniform definition of KPIs, TNO constructed an Excel-based form which was supplied to the other partners together with an instruction file clarifying the information need per NoP and issuing step-by-step instructions for using the form and storing filled-out NoPs.

Partners were asked to provide the following information for each NoP:

- The relevant Perspective adopted. The minimum granularity required was to indicate the main perspective group, but the form offered the possibility to more specifically select one or more sub-groups and/or sub-sub-groups if the defining partner felt this feasible and useful
- The relevant Function from the taxonomy. The minimum granularity required for this information was to indicate the relevant functional Cluster and Category, but respondents were free to more specifically select one or more sub-categories and/or such items and sub-items as had provisionally been included in the taxonomy at the time of definition of the NoP.
- A title designation for the NoP, freeform other than a restriction of maximum 100 characters
- A brief description offering context and background to the NoP defined. Brevity was called for: a maximum limit of 500 characters applied.
- Respondents were strongly encouraged, though it was not made compulsory, to provide 1 to 3 literature references. A broad definition of "literature" was provided, including policy documents, white papers, position papers, practical guidance, popular articles etc.
- Where the respondent had specified more than sub-group or sub-sub-group to which the NoP applied, the option was offered to nuance the NoP description in case it applied to different sub-groups in slightly different ways. Text field with a maximum length of 200 characters were provided for this purpose and an extra literature reference could be introduced for each text box. Respondents were instructed to use this functionality only in case of minor differences. In case of more substantial divergence between sub-groups they were encouraged to define one or more extra NoPs.
- Finally, the respondents were asked to identify possible effects of the NoP being met, selecting from a pre-defined list of qualitatively phrased possible effects, but with the option to define another effect if they felt the predefined list missed relevant options. The list of effects was compiled by TNO for the purposes of the NoP-inventory, taking cues for its organisations and methodology for definition from the SEE-IT tool (2015). Respondents were encouraged to select no more than five effects, selecting those they considered most immediately and specifically relevant.

NoPs were defined in two phases. The initial phase ran from June 2019 through to August 2019. Partners provided initial versions of NoPs to TNO. These were reviewed by TNO and feedback and suggestions for adaptation and improvement provided. Second versions of the NoPs were subsequently submitted, and consolidated for acceptance after a final round of review and editing. This phase of NoP definition led to the cataloguing of 150 NoPs.



A second, more substantial round of inventorying made use of the literature analysis performed for task 3.1. The bulk of this analysis was carried out by TNO (see description in paragraph 8.6), with additional material provided by the other partners involved in that task (AGE, EUCa, TEC, UU). The inventory of NoPs on the basis of the available literature and the KPIs defined was carried out entirely by TNO. This second phase of inventorying led to the definition of 150 NoPs.

The NoPs have been collected in an overview file. A comprehensive overview of the NoPs defined is presented in Annex 2 of this report. Summary tables of NoPs are presented in paragraph 7.3.

7.2 Effects

The SEE-IT tool for the evaluation of the Social, Economic and Environmental impact (Bond, R. et al, 2015) of age-friendly environment initiatives provides a framework for predicting, setting and evaluation of impacts and effects of implementation of initiatives. The SEE-IT is primarily a process tool, so the framework offers guidance on how to structure expected impacts according to policy areas affected, scale-level and stakeholders involved, as well as indicating how, during a specific project, evaluation can proceed from setting of qualitatively defined, exploratory targets and impacts to more specific, context-sensitive data gathering and quantification.

Because of its broad conceptual scope (the SEE-IT aims to address all the policy areas addressed in the WHO Age-Friendly Cities framework, as well as environmental impacts), and its intended use for evaluation of local, often grassroots initiatives, the SEE-IT was considered a suitable departure point for the definition of an indicative list of qualitatively defined effects for use in the collection of NoPs based on the Homes4Life taxonomy framework. A further reason for borrowing the SEE-IT approach is the analogy of the SEE-IT process with the Homes4Life project logic. The setting of exploratory, qualitative impact expectations and targets corresponds to the broad, inclusive framework established by the Homes4Life taxonomy and its attendant NoP and KPI inventories, while the further specification, quantification and assessment of impacts on the basis of project-specific concerns and context in the SEE-IT corresponds to the development and implementation of context-sensitive Homes4Life certification functionality.

Accordingly, the definition of effects for the NoPs has been qualitative and framed in relatively general terms. In the context of certification pilots, it is hoped that the list of effect will serve as a tool for stakeholder discussion of expected impacts at the initial stage of the project, with specification, quantification and evaluation taking place as the test certification process progresses. Accordingly, it is expected that feedback from the certification pilots will serve add to the list of effects and refine its formulation.

In structuring and defining the effects, it has proved necessary to strike a balance between the SEE-IT approach and the Homes4Life taxonomy logic. The SEE-IT structure could not be copied entirely. The SEE-IT's focus is narrower in that it primarily adopts the viewpoint of local and regional authorities, while it is wider in the sense that it does not focus specifically



on the home environment but looks at neighbourhood level, municipality level and community impacts. Accordingly, input from the SEE-IT has been rearranged to fit the Homes4Life Functional cluster structure.

The resulting list of effects that could be selected for NoP definition was as presented in the table below. It should be noted that in each Functional cluster, respondents had the opportunity to define extra or alternative effects if they felt the pre-defined effects did not adequately describe their expected impacts.

Overview of NoP-effects	
Physical cluster	
<ul style="list-style-type: none"> • Improved self-reported health and wellbeing • Improved rate and range of indoor activity • Lowered dependence on ADL-assistance and aids • Lowered risk of falls and accidents • Improved access to care • Lowered dependency on institutionalized care • Improved sense of comfort at home • Lower non-renewable energy consumption • Improved sense of safety at home • Lower incidence of crime and abuse directed at older people 	
Outdoor access cluster	
<ul style="list-style-type: none"> • Better reported satisfaction with home environs and neighbourhood • Improved rate and range of outdoor activity • Improved sense of safety in home environs and neighbourhood • Lower incidence of crime and abuse directed at older people • Lower dependency on ADL-assistance and aids in outdoor environment • Improved self-reported health and wellbeing 	
Personal cluster	
<ul style="list-style-type: none"> • Improved self-reported mental health and happiness • Improved sense of self-worth and self-reliance • Improved sense of agency • Reduced incidence of anxiety and depression • Lowered demand for formal mental health care 	
Social cluster	
<ul style="list-style-type: none"> • Lower rates of loneliness and isolation • Improved rate and range of social activities • Improved sense of social connection with others • Improved satisfaction with opportunities for social engagement in the home • Improved satisfaction with opportunities for social engagement outside the home 	



<ul style="list-style-type: none"> • Higher percentage of older persons in paid or voluntary employment • Higher percentage of informal carers in fulltime or part-time employment
<p>Economic cluster</p> <ul style="list-style-type: none"> • Better availability of financial means for investments in the home environment • Improved income and wealth position for older people and carers • Improved willingness to invest in home environments by citizens • Increased investment in housing by private sector • Increased investment in housing by social and public housing • Increased investment in services and products by private sector • Increased investment in services and products by public sector • Reduction of public sector housing costs • Reduction of public sector health and social care costs • Reduction of costs for healthcare providers and contractors • Increase in local/regional economic turnover • Increase in local/regional property values

7.3 Summary table of NoPs

The table below provides summary information on the NoPs defined. A fuller presentation of the material collected can be found in Annex 2.

TABLE 7-1 SUMMARY OVERVIEW OF NOPs

Title	Taxonomy Cluster	Taxonomy Perspective
Adequate spaces for home care services providers	2 PHYSICAL	1.3 Organisational profiles
Essential services	2 PHYSICAL	1.1 User profiles
Design	2 PHYSICAL	1.1 User profiles
Indoor climate	2 PHYSICAL	1.1 User profiles
Gerontechnology & independent living	2 PHYSICAL	1.1 User profiles
Air quality	2 PHYSICAL	1.1 User profiles
Connectivity	2 PHYSICAL	1.3 Organisational profiles
Thermal comfort	2 PHYSICAL	1.1 User profiles
Lighting	2 PHYSICAL	1.1 User profiles
Falls prevention	2 PHYSICAL	1.1 User profiles



Maintenance	2 PHYSICAL	1.1 User profiles
Physical and IT infrastructure to provide e-health and telemedicine services	2 PHYSICAL	1.3 Organisational profiles
The home should be kept comfortably and affordably warm and cool.	2 PHYSICAL	1.2 Relatives and informal carers profiles
Many carers are homebound so access to relevant information digitally is increasingly important	2 PHYSICAL	1.2 Relatives and informal carers profiles
Access to services	2 PHYSICAL	1.1 User profiles
Home should help carers access information about existing home care services and service providers	2 PHYSICAL	1.2 Relatives and informal carers profiles
Home should be barrier-free and support older carers in their care provision activities	2 PHYSICAL	1.2 Relatives and informal carers profiles
The home should be kept comfortably and affordably warm and cool.	2 PHYSICAL	1.2 Relatives and informal carers profiles
Artificial intelligence and robotics for health at home	2 PHYSICAL	1.3 Organisational profiles
Living space	2 PHYSICAL	1.1 User profiles
safety from outside threats	2 PHYSICAL	1.1 User profiles
Home should be safe and prevent individuals from falling	2 PHYSICAL	1.2 Relatives and informal carers profiles
Safe homes to minimize domestic accidents.	2 PHYSICAL	1.3 Organisational profiles
Design and construction rules for age friendly safety	2 PHYSICAL	1.3 Organisational profiles
Age friendly industrialised building life cycle adaptability	2 PHYSICAL	1.3 Organisational profiles
Digital Infrastructure to support new digital services at home	2 PHYSICAL	1.3 Organisational profiles
Adequate home environment to provide the services	3 OUTDOOR ACCESS	1.3 Organisational profiles
Home environment should give access to services to allow mobility of their care-recipients	3 OUTDOOR ACCESS	1.2 Relatives and informal carers profiles
Easy access to public transport	3 OUTDOOR ACCESS	1.1 User profiles
Living space	3 OUTDOOR ACCESS	1.1 User profiles
An extra bedroom for cohabiting carer	4 PERSONAL	1.2 Relatives and informal carers profiles



Access to ICT solutions to enable remote monitoring of older/ frail person	4 PERSONAL	1.2 Relatives and informal carers profiles
Possibility for carer to move into home of person they are caring for	4 PERSONAL	1.2 Relatives and informal carers profiles
Possibility to arrange for 24 hour care support/palliative care in the home	4 PERSONAL	1.2 Relatives and informal carers profiles
Home should enable inhabitants to remain independent and in control of their lives.	4 PERSONAL	1.2 Relatives and informal carers profiles
The home should help the carer to feel a sense of achievement, fulfilment and personal growth	4 PERSONAL	1.2 Relatives and informal carers profiles
Sense of Attachment to one's home	4 PERSONAL	1.1 User profiles
Feeling of safety and security in the home	4 PERSONAL	1.1 User profiles
Connection with personal history	4 PERSONAL	1.1 User profiles
Connection with personal history	4 PERSONAL	1.1 User profiles
Personal history connection to environment	4 PERSONAL	1.1 User profiles
Autonomy in activities	4 PERSONAL	1.1 User profiles
Autonomy in activities	4 PERSONAL	1.1 User profiles
Self-fulfillment through lifestyle	4 PERSONAL	1.1 User profiles
Dying with dignity at home	4 PERSONAL	1.1 User profiles
Dying with dignity at home	4 PERSONAL	1.2 Relatives and informal carers profiles
Dying with dignity at home	4 PERSONAL	1.2 Relatives and informal carers profiles
Private spaces for informal carers	4 PERSONAL	1.2 Relatives and informal carers profiles
Assistive technologies that work for occupants	4 PERSONAL	1.1 User profiles
Autonomy in interaction with others	4 PERSONAL	1.1 User profiles
Availability of privileged spaces	4 PERSONAL	1.1 User profiles
Autonomy in place management	4 PERSONAL	1.1 User profiles
Occupant co-creation of home environments	4 PERSONAL	1.1 User profiles
Base for meaningful activity and engagement	4 PERSONAL	1.1 User profiles
Access to places with spiritual significance	4 PERSONAL	1.1 User profiles



Access to facilities with emotional meaning	4 PERSONAL	1.1 User profiles
Pets allowed	4 PERSONAL	1.1 User profiles
Continuity of long-term relationships	4 PERSONAL	1.1 User profiles
Emotional attachment to neighbourhood	4 PERSONAL	1.1 User profiles
Plenty of daylight	4 PERSONAL	1.1 User profiles
Items and furnishings with special meaning	4 PERSONAL	1.1 User profiles
Adequate protection from noise pollution	4 PERSONAL	1.1 User profiles
Emotional wellbeing outdoors	4 PERSONAL	1.1 User profiles
Financial security	4 PERSONAL	1.1 User profiles
An environment that can be customized to personal tastes	4 PERSONAL	1.1 User profiles
An environment that accommodates changing preferences	4 PERSONAL	1.1 User profiles
Dying with dignity at home	4 PERSONAL	1.1 User profiles
A sense of security in the living environment	4 PERSONAL	1.1 User profiles
A sense of security in the living environment	4 PERSONAL	1.1 User profiles
Support services for carer needs	4 PERSONAL	1.2 Relatives and informal carers profiles
Information and ICT support for carers	4 PERSONAL	1.2 Relatives and informal carers profiles
Privacy from surveillance in the home	4 PERSONAL	1.1 User profiles
Privacy in an outdoor context	4 PERSONAL	1.1 User profiles
Privacy in an outdoor context	4 PERSONAL	1.1 User profiles
Ability to engage in meaningful activity	4 PERSONAL	1.1 User profiles
Availability of meaningful activity for informal carers	4 PERSONAL	1.2 Relatives and informal carers profiles
Ability to participate in pleasurable and meaningful activities	4 PERSONAL	1.1 User profiles
Feeling of social embedding in and around the home	4 PERSONAL	1.1 User profiles
Feeling of social embedding in and around the home	4 PERSONAL	1.1 User profiles
Social embedding in the neighbourhood	4 PERSONAL	1.1 User profiles



Social embedding in the neighbourhood	4 PERSONAL	1.1 User profiles
Social embedding of carers	4 PERSONAL	1.2 Relatives and informal carers profiles
Availability of healthy food in the living environment	4 PERSONAL	1.1 User profiles
Access to social, health and financial services	4 PERSONAL	1.1 User profiles
Ability to work from home and/or proximity to employment to be reconcile work and care	5 SOCIAL	1.2 Relatives and informal carers profiles
Home needs to be sufficiently spacious, functional to receive visitors e.g. friends and relatives	5 SOCIAL	1.2 Relatives and informal carers profiles
Easy access to socially-oriented activities that care recipients and carers can attend together	5 SOCIAL	1.2 Relatives and informal carers profiles
Home environs should promote creation of informal support networks (neighbors, friends etc).	5 SOCIAL	1.2 Relatives and informal carers profiles
cater for ethnic diversity	5 SOCIAL	1.3 Organisational profiles
Opportunity to co-habit with self-selected others	5 SOCIAL	1.1 User profiles
Regulate level and conditions of social contact in the home	5 SOCIAL	1.1 User profiles
Control over access and flow of visitors	5 SOCIAL	1.1 User profiles
Opportunities for organized social activity in the living environment	5 SOCIAL	1.1 User profiles
Opportunities for informal and spontaneous social activity in the living environment	5 SOCIAL	1.1 User profiles
Opportunities for personally significant social activity in the living environment	5 SOCIAL	1.1 User profiles
Preservation of personal dignity in social engagement	5 SOCIAL	1.1 User profiles
Receiving visitors and visiting	5 SOCIAL	1.1 User profiles
Receiving visitors and visiting	5 SOCIAL	1.1 User profiles
Autonomous choices in social activity	5 SOCIAL	1.1 User profiles
Autonomous choices in social activity	5 SOCIAL	1.2 Relatives and informal carers profiles
Gender-specific social activity preferences	5 SOCIAL	1.1 User profiles
Engagement with significant others	5 SOCIAL	1.1 User profiles
Social history and identity	5 SOCIAL	1.1 User profiles



Availability of shops and services	5 SOCIAL	1.1 User profiles
Social safety	5 SOCIAL	1.1 User profiles
A living environment that is socially enabling	5 SOCIAL	1.1 User profiles
Living environment imbued with spiritual significance	5 SOCIAL	1.1 User profiles
Living environment socially enabling for carers	5 SOCIAL	1.2 Relatives and informal carers profiles
Reciprocity of social networks	5 SOCIAL	1.1 User profiles
Social technology that works for people	5 SOCIAL	1.1 User profiles
Opportunities to work at home	5 SOCIAL	1.2 Relatives and informal carers profiles
Access to employment for informal carers	5 SOCIAL	1.2 Relatives and informal carers profiles
Access to (volunteer) work for vulnerable older adults	5 SOCIAL	1.2 Relatives and informal carers profiles
Affordability of appropriate housing	6 ECONOMIC	1.1 User profiles
Affordable housing	6 ECONOMIC	1.1 User profiles
Home Modifications	6 ECONOMIC	1.1 User profiles
Affordable housing for informal carers	6 ECONOMIC	1.2 Relatives and informal carers profiles
Acceptable business case for public and private sector investors	6 ECONOMIC	1.3 Organisational profiles
Long-term security on housing costs	6 ECONOMIC	1.1 User profiles
Long-term security on housing costs for informal carers	6 ECONOMIC	1.2 Relatives and informal carers profiles
Long-term security on market conditions	6 ECONOMIC	1.3 Organisational profiles
Access to finance for older adults	6 ECONOMIC	1.1 User profiles
Access to finance for informal carers	6 ECONOMIC	1.2 Relatives and informal carers profiles
Economic enabling of innovative industry activity	6 ECONOMIC	1.3 Organisational profiles
Enabling of occupant economic activity	6 ECONOMIC	1.1 User profiles
Enabling of informal carer economic activity	6 ECONOMIC	1.2 Relatives and informal carers profiles
Choice and choice information	6 ECONOMIC	1.1 User profiles
Corporate Social Responsibility	6 ECONOMIC	1.3 Organisational profiles



Affordable communications infrastructure	6 ECONOMIC	1.1 User profiles
Viable public sector business case	6 ECONOMIC	1.3 Organisational profiles
Viable return on investment for private sector operatives	6 ECONOMIC	1.3 Organisational profiles
Contribution to market leadership and brand image	6 ECONOMIC	1.3 Organisational profiles
ROI between +/- 10% of non- age friendly homes	6 ECONOMIC	1.3 Organisational profiles
proven demand of construction products for age friendly housing	6 ECONOMIC	1.3 Organisational profiles
ROI of renting between +/- 10% of non- age friendly homes	6 ECONOMIC	1.3 Organisational profiles
Rights for carers to access to affordable housing	6 ECONOMIC	1.2 Relatives and informal carers profiles
Should have choice to either adapt current home or to relocate to a more suitable alternative	6 ECONOMIC	1.2 Relatives and informal carers profiles
Proved demand of this profile of homes	6 ECONOMIC	1.3 Organisational profiles
equity	6 ECONOMIC	1.3 Organisational profiles
stimulate innovation	6 ECONOMIC	1.3 Organisational profiles
reduce healthcare costs	6 ECONOMIC	1.3 Organisational profiles
Regulatory certainty	6 ECONOMIC	1.3 Organisational profiles
public Incentives	6 ECONOMIC	1.3 Organisational profiles
standardized approach for ICT infrastructure	6 ECONOMIC	1.3 Organisational profiles
BIM (Building information modelling) for Age friendly Environment	6 ECONOMIC	1.3 Organisational profiles
standardized retrofitting solutions	6 ECONOMIC	1.3 Organisational profiles
Incentives	6 ECONOMIC	1.3 Organisational profiles
Home and building certification	6 ECONOMIC	1.3 Organisational profiles
Insurance scheme for AFE	6 ECONOMIC	1.3 Organisational profiles
Local epidemiological data	6 ECONOMIC	1.3 Organisational profiles
A system based on certain and shared rules and information	6 ECONOMIC	1.3 Organisational profiles



7.4 Practical evaluation points

This paragraph presents some practical observations from the collection and definition process.

Respondents have been mostly positive about the **utility of the taxonomy framework**. No major problems have been reported in allocating the NoPs to the Perspectives and Functions defined in the taxonomy.

The **granularity of allocation to Perspectives** has varied considerably from NoP to NoP and from respondent to respondent. On balance, however, the level of granularity used has been the Group for the primary users' perspective, and the Sub-group for the Relatives and Informal Carers and Organizational perspectives. This is consistent with the observation earlier in this report that the deeper levels of granularity of the taxonomy described on the basis of a primarily desk-top based process are necessarily provisional as well as subject to context-dependent variation, and will benefit from input from both the feedback from the certification pilots and the expected commentary from a wider stakeholder community in the second phase of the Homes4Life project (and beyond).

The **granularity of allocation to Functions** has likewise varied. Overall, however, the deepest level of granularity that has been selected frequently has been the Sub-category. The same considerations on deeper levels of details as outlined above apply.

In terms of distribution of NoPs over perspectives, the Primary users' perspective dominates, which is consistent with the focus of much of the documentation available for the analysis, and with the primary aim of initiatives to enable ageing in place.

Distribution of NoPs over functions is considerably skewed towards the Personal and Social clusters. This can be explained in large part by the fact that about 60% of NoPs were defined as a by-product of the literature search activity for KPI-definition in the Personal, Social and Economic clusters. About half of Economic cluster NoPs also come from this work stream. But the distribution across Functions may also point to a more fundamental problem in current age-friendly home certification, namely that they function on aspects of the home environment that play a relatively minor role in motivational mechanisms for investment.



TABLE 7-2 NOPs PER CLUSTER AND PERSPECTIVE GROUP

Functional Cluster	NoPs	Perspective group	NoPs
Physical	26	Users	83
Outdoor Access	4	Relatives and Informal carers	34
Personal	54	Organizational profiles	33
Social	29		
Economic	37		



8 Putting the taxonomy to work: KPI-framework

What does a home actually have to do in order to be age-friendly? That is the central question that the Homes4Life KPI-framework sets out to answer. As more fully explained in earlier chapters, the KPI-framework facilitates the transition from the vision-based, high-level concepts developed in tasks 2.1 and 2.3 and captured in a formal framework in task 2.4, to a comprehensive, "universal" (that is, not implementation context dependent) set of indicators that can form the basis for more specific requirement-setting and verification in the certification pilots in Work Package 4.

8.1 Status of the deliverable

The substantive content of deliverable 3.1 is captured in a series of Excel-files that have been made available intra-consortium and from which material will be collected for the purposes of certification activity. In this sense, the outcome of task 3.1 is a distinct deliverable, The considerable amount of resources directed to it, and its importance in the Homes4Life project approach also merits its status as a discrete deliverable.

However, both in conceptual and in practical terms, development of the KPI-framework has constituted a single workstream with the development of the taxonomy. Since, moreover, the KPI-framework is entirely based on the taxonomy structure, presentation of the two in separate deliverable reports would lead to considerable redundancy of information and could hinder interpretability of the KPI-framework content, because the conceptual basis on which it is predicated would not be conveniently to hand.

8.2 Link with other deliverables

Next to its organic linkage to task 2.4, the KPI-framework is linked to tasks 3.2, 3.4 and Work Package 4 of the Homes4Life project.

The inventory of existing certification schemes (task 3.2) has provided the basis material from which KPIs for the Physical and Outdoor Access clusters can be deduced. The functional brief for the certification scheme (task 3.4) describes the use that will be made of the KPI-framework in the setting of requirements and evaluation levels for the Homes4Life certification functionality and its application in certification pilots. As has been explained before, the KPI-framework will provide the comprehensive, relatively context-independent framework on the basis of which more specific sub-sets of requirements and verification process will be defined for use in the certification pilots in Work Package 4.

8.3 What is understood by a KPI in Homes4Life?

In Homes4Life, a KPI is more properly to be taken as a Functional Performance Indicator (FPI). That is to say that it describes what a home, its components, its physical characteristics, its lay-out and design, its components, its location and settings, its connections to the outside world, and/or its financial and governance aspects need to be able to do in order to fulfill a Function (as defined in the Homes4Life taxonomy framework) that contributes to the creation or maintenance of an age-friendly environment that is enabling, fit for purpose, flexible and resilient.



The KPIs or FPIs in Homes4Life are defined in terms of outcomes achieved and functionality provided for users and other stakeholders. This has been done in accordance with the objective of providing a framework that is relatively context-independent, with it or sections of it being tailored to more specific applications through requirement and verification process and value setting in specific certification application.

Accordingly, in defining the Homes4Life KPIs, it has mostly proved unadvisable to include specific quantitative information on spatial, functional and/or technical characteristics. Especially in the case of “harder” functions of the home, the relevant values to be used depend largely on codes, standards and regulations operative at national or even regional level, so that verification can take usefully take place only in context. Additionally, for specific verification it will often be more efficient, and reduce administrative burdens for users of Homes4Life certification products, to refer wholesale to these national or regional level sources rather than replicating substantial swathes of content in the Homes4Life application.

Where sources for KPI-definition have indicated relatively context-independent measurement values or approaches, these have been noted in the relevant descriptive section of the KPI in question.

8.4 A word on objectives

It has already been noted that objectives in defining a Homes4Life KPI-framework have included the wish to provide a broad, inclusive, balanced and context-independent framework of indicators to accompany and make suitable for practical application the Homes4Life taxonomy, and the wish to present an overall framework that can serve as the basis for development of more specific Homes4Life certification products, as well as contributing to the comparability of individual certification outcomes, as these can be understood and compared using the same broader framework.

To these must be added a third objective, which stems from the finding most emphatically brought to the fore in task 3.2, that there is already a considerable volume of current certification and labelling in the Physical and Outdoor Access clusters of the Homes4Life taxonomy. Any ambition to develop new, original certification work in these areas was therefore likely to be both unfeasible and redundant. Unfeasible because it would require harmonization of often very disparate certification approaches and requirement sets into a coherent, independent whole, which – if possible, at all – would require a degree of effort significantly beyond the reach of the project’s resources. Redundant in that our “new” work would inevitably duplicate much of what is already available. Not unimportantly, it should be noted that the problems in stimulating investment in age-friendly homes that are the *raison d’être* of the current project, persist despite the availability of these certification schemes. New work on certification in these Physical and Outdoor access clusters is therefore unlikely to be effective. The third objective for task 3.1 has accordingly been to contribute to the availability of KPIs in precisely those Functional clusters that have been shown to contribute substantially to the age-friendliness of the home but are underserved in current labelling and certification.



8.5 Limitations

The limitations regarding practical project priorities and maturity of outcomes described in paragraph 3.2 for the taxonomy have also applied to the KPI-framework, as have restraints imposed by the temporal, budget and typological constraints governing the project. The goal and ambition for the KPI-framework has therefore primarily been to establish a workable structure, and deliver a workable starting point for the second phase of the project, with the possibility and indeed the expectation calculated in that feedback from certification pilots, and input from a wider community of interested organizations and individuals will enrich and refine its contents. As a practical sign of this, the KPI-framework will be opened to comments through the Homes4Life website once the deliverable has been ratified.

8.6 Development process

In developing the KPI-framework, separate development processes were followed for KPIs in the Physical and Outdoor Access clusters on the one hand, and for KPIs in the Personal, Social and Economic clusters on the one hand.

8.6.1 Physical and outdoor access KPIs

Lead partner TNO and contributing partners Certivea and Tecnalía were involved in this part of the work. The inventories of content of existing certification schemes compiled for the purpose of task 3.2 were used as the basis for identification and selection of KPIs. The following steps were taken.

- The inventories of material for each of the certification schemes were collected in a single Excel file
- The taxonomy classification for each item was reviewed by the lead partner and the classification adjusted and/or completed to Sub-category level where necessary
- The judgements provided on the relevance (in scope) and importance for Homes4Life were likewise reviewed and where necessary changed and completed by the lead partner
- A first selection was made by including only those items from the 3.2 inventory that, after adjustments, were considered in scope for Homes4Life and of high importance
- The resulting reduced list of items was then scanned for duplicate and multiple items covering the same aspect or component of the home. The item judged to give the best description was included, the other items were excluded. This task was carried out by Certivea for the Categories 2.2 Comfort and 2.5 Smart readiness, by Tecnalía for the other Categories in the Physical and Outdoor Access clusters.
- The thus condensed list of items was then scanned again to eliminate items which, while in scope and potentially important, would pose problems in terms of practical applicability in Homes4Life certification functionality. These problems might be to do with the amount of data or technical knowledge required for verification, the cost and time requirements for verification, and the specific applicability to the type of objects likely to be the subject of Homes4Life certification, that is to say residential properties in general and single dwellings or



groupings of single dwellings in particular. This led to reduction of the number of items in all Categories, but specifically so in the Smart Readiness category.

- As a final step, partners Certivea and Tecnalía rephrased the remaining items (which mostly were defined in terms of context-specific certification requirements) in terms consistent with the format and purposes of the Homes4Life KPI-framework. This led to the merger of a limited number of items.

8.6.2 Personal, Social and Economic KPIs

The lead partner for this inventory was TNO, contributions were made by AGE, EUCa, TEC and UU. An Excel-based inventarisation format was developed. Each contributing partner was asked to select, on the basis of the organization's experience and expertise, a list of 10-20 relevant publications and scan these for usable material for the definition of KPIs. AGE and EUCa were asked to primarily scan policy and advocacy documents for Personal and Social cluster KPI-material. TEC and UU were asked to scan relevant literature for Economic cluster KPIs.

As the lead partner, TNO took it upon itself to do a comprehensive literature search of academic literature to identify potential KPIs. The primary focus of the search was on KPI-material for the Personal cluster, with secondary focus on KPIs for the Social cluster, with the search terms and strategy framed accordingly. Any material encountered with a relevance for the Economic cluster was also included. The search methodology is described in paragraph 8.6.2.1.

For each potential KPI identified through the literature search, partners were asked to provide the following information.

- A proposed title for the KPI
- An explanatory paragraph outlining the rationale and background from the literature search
- A proposed classification in terms of the functional clusters of the Homes4Life taxonomy. The granularity was limited to cluster level for the initial inventory. However, partners were invited to consider the possibility that potential KPIs encountered could be relevant for multiple clusters. Accordingly, the list of cluster specifications partners could choose from for the initial inventory was
 - Personal
 - Personal and Social
 - Personal, Social and Economic
 - Social
 - Social and Economic
 - Economic
- A literature reference to the source from which the potential KPI was derived
- An assessment of the quality of the study (only applicable to academic literature). Since most of the academic literature concerned qualitative research, traditional assessments of degrees of evidence didn't apply and partners were invited to use a common-sense approach based primarily on the sturdiness of the study methodology and the size of the study population
- An assessment in principle whether the potential KPI identified would lend itself to verification and, if so, whether this verification would be qualitative or quantitative



- Any other observations that partners considered useful for processing of the potential KPIs

The KPI-material collected by the partners involved in this first step was collected into a single file by TNO. Separate listings were compiled for each of the Personal, Social and Economic clusters, with items proposed under more than one cluster listed in each relevant inventory. At this stage each proposed KPI was classified in taxonomy terms down to the level of sub-categories.

Subsequently an effort was made to reduce the number of KPIs proposed. Those items obviously not suitable for verification were deleted, and obvious duplicates were removed. To reduce the number of KPIs involved, an effort was made to merge similar KPIs with identical taxonomy classifications into a single item. Next to the taxonomy classification, the proposed KPIs were organized into thematic groupings, which were used for the purpose of NoP definition (see chapter 7).

8.6.2.1 Search strategy literature search

The search for academic literature was conducted using the Scopus database of academic publications. Scopus was selected because it has a strong record literature from fields relevant to the Homes4Life approach: construction, engineering and ICT, but also in e.g. public health, social sciences and humanities. This was considered appropriate to the set-up and objectives of the search: the latter aimed at building up a broad and representative overview of relevant insights from academia, without aspiring to either exhaustiveness or the rigour of systematic review.

For the search, a fixed set of search terms was iteratively combined with a series of search terms relevant to the query at hand, in the following general search syntax

```
( ( ABS ( home* OR "home environment" OR hous* OR dwelling* AND {Variable search term} AND age* OR old* OR elder* ) AND PUBYEAR > 2010 ) AND ( ageing ) ) AND ( ( ageing ) ) AND ( home ) AND ( LIMIT-TO ( SUBJAREA , "SOCI" ) OR LIMIT-TO ( SUBJAREA , "ENGI" ) OR LIMIT-TO ( SUBJAREA , "ARTS" ) OR LIMIT-TO ( SUBJAREA , "MULT" ) )
```

To limit the number of search results to manageable proportions, the following limitations were imposed.

- Publication date 2010 or later
- Published in English
- Search limited to the subject areas "Social Sciences", "Engineering", "Arts and humanities" and "Multidisciplinary"

The following variable search terms were introduced in turn

- autonom*
- privacy
- dignity
- "self-esteem"
- emotional*



- attachment*
- stigmatization
- affect*
- "social interaction"
- customiz*
- recognizab*
- recogni*
- identity
- salutogen*
- "sense of coherence"
- "positive health"

A total of 3.930 studies were retrieved. After removing of duplicates, they were scanned on the basis of title (+key words were necessary, using the following inclusion criteria:

- Study includes elements/characteristics of the home in scope for Homes4Life
- Study is primarily focused on the home environment, or at the least the home environment is included in the study as a meaningful domain, vantage point and/or departure point
- The home environment is considered in an instrumental role in the study: it is not just a coincidental environment for a study of other, unrelated phenomena
- The study covers one or more items in the Personal and/or Social clusters of the Homes4Life taxonomy
- The scope of the study includes independent living: studies looking exclusively at residential care environments were considered out of scope
- Scope of the study includes older people as part of the study population

134 studies were included on the basis of title + key word. For these 134 studies, the abstracts were received and inclusion / exclusion re-determined on the basis of the fuller information thus available.

This resulted in 69 studies for which the full texts were retrieved. These were analysed and KPI-information from them collected using the methodology outlined in 8.6.2.

8.7 Overview of KPIs

The inventory work outlined in paragraph 8.6 resulted in the following numbers of KPIs being identified

- Physical cluster: 84 KPIs
- Outdoor access cluster: 12 KPIs
- Personal cluster 91 KPIs
- Social cluster 66 KPIs
- Economic cluster 30 KPIs

The total of 273 KPIs may seem large. However, it should be remembered that these KPIs represent the total reference framework for Homes4Life and that in each certification instance only a sub-set will be in play for translation into verifiable requirements.

The tables below represent summary information on the KPIs defined in each cluster. Annex 3 has a fuller overview of KPIs, definitions and sources.



TABLE 8-1 PHYSICAL CLUSTER KPIS

Title	Cluster	Category	Sub-category
Identifiable handrail in stair cases	_2_PHYSICAL	_2.1_Personal_Safety	2.1.1_Accidents_and_calamities
Non-slip stair covering	_2_PHYSICAL	_2.1_Personal_Safety	2.1.1_Accidents_and_calamities
Adapted lighting/lighting controls	_2_PHYSICAL	_2.1_Personal_Safety	2.1.1_Accidents_and_calamities
Non-slip flooring	_2_PHYSICAL	_2.1_Personal_Safety	2.1.1_Accidents_and_calamities
Presence of a shower w/ handrails (COMPULSORY)	_2_PHYSICAL	_2.1_Personal_Safety	2.1.1_Accidents_and_calamities
Fire protection	_2_PHYSICAL	_2.1_Personal_Safety	2.1.1_Accidents_and_calamities
Lighting	_2_PHYSICAL	_2.1_Personal_Safety	2.1.2_Safe_use_of_amenities_and_facilities
Presence of thermostatic mixer in the shower	_2_PHYSICAL	_2.1_Personal_Safety	2.1.2_Safe_use_of_amenities_and_facilities
Presence of raised toilet	_2_PHYSICAL	_2.1_Personal_Safety	2.1.2_Safe_use_of_amenities_and_facilities
Arrangements	_2_PHYSICAL	_2.1_Personal_Safety	2.1.2_Safe_use_of_amenities_and_facilities
Safety requirement in the toilets	_2_PHYSICAL	_2.1_Personal_Safety	2.1.2_Safe_use_of_amenities_and_facilities
Lighting	_2_PHYSICAL	_2.1_Personal_Safety	2.1.3_Safety_around_the_home
Floor covering for outside circulation	_2_PHYSICAL	_2.1_Personal_Safety	2.1.3_Safety_around_the_home
Burglary protection	_2_PHYSICAL	_2.1_Personal_Safety	2.1.4_Safety_from_outside_threats
Direct sightline from street	_2_PHYSICAL	_2.1_Personal_Safety	2.1.4_Safety_from_outside_threats
Social safety requirements for access doors	_2_PHYSICAL	_2.1_Personal_Safety	2.1.4_Safety_from_outside_threats
Proper layout to ensure satisfactory thermal comfort conditions for tenants	_2_PHYSICAL	_2.2_Comfort	2.2.1_Temperature_regulation



Design conditions related to thermal comfort, both in summer and winter	_2_PHYSICAL	_2.2_Comfort	2.2.1_Temperature_regulation
Operability and control of HVAC (heating, ventilation and air conditioning) systems	_2_PHYSICAL	_2.2_Comfort	2.2.1_Temperature_regulation
Assessment on thermal comfort	_2_PHYSICAL	_2.2_Comfort	2.2.1_Temperature_regulation
Occupant's perception and satisfaction on thermal comfort	_2_PHYSICAL	_2.2_Comfort	2.2.1_Temperature_regulation
Outdoor air quality of the environment around the building	_2_PHYSICAL	_2.2_Comfort	2.2.2_Air_quality
Identification and treatment of pollution sources on the site	_2_PHYSICAL	_2.2_Comfort	2.2.2_Air_quality
Indoor air quality - materials	_2_PHYSICAL	_2.2_Comfort	2.2.2_Air_quality
Indoor air quality - ventilation	_2_PHYSICAL	_2.2_Comfort	2.2.2_Air_quality
Operability and control of HVAC (heating, ventilation and air conditioning) systems	_2_PHYSICAL	_2.2_Comfort	2.2.2_Air_quality
Indoor air quality - assessment	_2_PHYSICAL	_2.2_Comfort	2.2.2_Air_quality
Occupant's perception and satisfaction on IAQ	_2_PHYSICAL	_2.2_Comfort	2.2.2_Air_quality
Proper layout to ensure satisfactory lighting conditions for tenants	_2_PHYSICAL	_2.2_Comfort	2.2.3_Lighting
Daylighting and access to natural light, especially in winter	_2_PHYSICAL	_2.2_Comfort	2.2.3_Lighting



Visual comfort: surface design and color quality	_2_PHYSICAL	_2.2_Comfort	2.2.3_Lighting
Lighting systems	_2_PHYSICAL	_2.2_Comfort	2.2.3_Lighting
Operability and control of natural and artificial lighting systems	_2_PHYSICAL	_2.2_Comfort	2.2.3_Lighting
Assessment on lighting conditions	_2_PHYSICAL	_2.2_Comfort	2.2.3_Lighting
Occupant's perception and satisfaction on lighting comfort	_2_PHYSICAL	_2.2_Comfort	2.2.3_Lighting
Proper layout to ensure satisfactory acoustic conditions for tenants: insulation from the outside of the building	_2_PHYSICAL	_2.2_Comfort	2.2.4_Acoustics
Acoustic comfort: insulation between dwellings and with common spaces	_2_PHYSICAL	_2.2_Comfort	2.2.4_Acoustics
Acoustic comfort: insulation inside dwelling	_2_PHYSICAL	_2.2_Comfort	2.2.4_Acoustics
Assessment on acoustics performance	_2_PHYSICAL	_2.2_Comfort	2.2.4_Acoustics
Occupant's perception and satisfaction on acoustic comfort	_2_PHYSICAL	_2.2_Comfort	2.2.4_Acoustics
Flat exterior circulation, or with limited ramps if site constraints	_2_PHYSICAL	_2.3_Accessibility_and_orientation	2.3.1_Getting_in_and_out_of_the_house
Adequate exterior circulations	_2_PHYSICAL	_2.3_Accessibility_and_orientation	2.3.1_Getting_in_and_out_of_the_house
Main access worthy	_2_PHYSICAL	_2.3_Accessibility_and_orientation	2.3.1_Getting_in_and_out_of_the_house
Doors of the main entrances usable by all	_2_PHYSICAL	_2.3_Accessibility_and_orientation	2.3.1_Getting_in_and_out_of_the_house



Levels of service served by elevator	_2_PHYSICAL	_2.3_Accessibility_and_orientation	2.3.1_Getting_in_and_out_of_the_house
Adequate lifts	_2_PHYSICAL	_2.3_Accessibility_and_orientation	2.3.1_Getting_in_and_out_of_the_house
Adequate interior circulations	_2_PHYSICAL	_2.3_Accessibility_and_orientation	2.3.1_Getting_in_and_out_of_the_house
Horizontal and vertical circulations without obstacles	_2_PHYSICAL	_2.3_Accessibility_and_orientation	2.3.1_Getting_in_and_out_of_the_house
Presence of safety devices in case of risk of falling	_2_PHYSICAL	_2.3_Accessibility_and_orientation	2.3.1_Getting_in_and_out_of_the_house
Characteristics of the stairs	_2_PHYSICAL	_2.3_Accessibility_and_orientation	2.3.1_Getting_in_and_out_of_the_house
Presence of parking spaces for people with specific needs.	_2_PHYSICAL	_2.3_Accessibility_and_orientation	2.3.1_Getting_in_and_out_of_the_house
Signage around the building	_2_PHYSICAL	_2.3_Accessibility_and_orientation	2.3.1_Getting_in_and_out_of_the_house
Signage and visual cues in the corridors	_2_PHYSICAL	_2.3_Accessibility_and_orientation	2.3.1_Getting_in_and_out_of_the_house
Lighting in the corridor	_2_PHYSICAL	_2.3_Accessibility_and_orientation	2.3.1_Getting_in_and_out_of_the_house
Motorization of the garage door	_2_PHYSICAL	_2.3_Accessibility_and_orientation	2.3.1_Getting_in_and_out_of_the_house
Access and circulation in the toilets	_2_PHYSICAL	_2.3_Accessibility_and_orientation	2.3.2_Getting_around_the_house
Entry thresholds	_2_PHYSICAL	_2.3_Accessibility_and_orientation	2.3.2_Getting_around_the_house
Physical accessibility inside the home	_2_PHYSICAL	_2.3_Accessibility_and_orientation	2.3.2_Getting_around_the_house
Accessibility and visibility of controls	_2_PHYSICAL	_2.3_Accessibility_and_orientation	2.3.2_Getting_around_the_house
Accessibility	_2_PHYSICAL	_2.3_Accessibility_and_orientation	2.3.2_Getting_around_the_house



Minimum dimensions of the different home rooms	_2_PHYSICAL	_2.3_Accessibility_and_orientation	2.3.2_Getting_around_the_house
Maneuverability of the annex room door	_2_PHYSICAL	_2.3_Accessibility_and_orientation	2.3.3_Performing_daily_in_house_activities
Accessibility of mailboxes	_2_PHYSICAL	_2.3_Accessibility_and_orientation	2.3.3_Performing_daily_in_house_activities
Lighting in the kitchen	_2_PHYSICAL	_2.3_Accessibility_and_orientation	2.3.3_Performing_daily_in_house_activities
Height of power outlets	_2_PHYSICAL	_2.3_Accessibility_and_orientation	2.3.3_Performing_daily_in_house_activities
Sliding doors on closets	_2_PHYSICAL	_2.3_Accessibility_and_orientation	2.3.3_Performing_daily_in_house_activities
Adaptability requirements bathroom	_2_PHYSICAL	_2.3_Accessibility_and_orientation	2.3.3_Performing_daily_in_house_activities
Spatial requirements second bedroom	_2_PHYSICAL	_2.3_Accessibility_and_orientation	2.3.4_Getting_in_and_out_of_bed
Equipment in cabins and sanitary spaces adapted for disabled people	_2_PHYSICAL	_2.3_Accessibility_and_orientation	2.3.5_Personal_hygiene
Sliding door or opening on the outside (bathroom / toilet)	_2_PHYSICAL	_2.3_Accessibility_and_orientation	2.3.5_Personal_hygiene
Communication and access control devices usable by all	_2_PHYSICAL	_2.3_Accessibility_and_orientation	2.3.6_Using_communication_and_entertainment_features
Intercom / videophone system (private entrance)	_2_PHYSICAL	_2.3_Accessibility_and_orientation	2.3.6_Using_communication_and_entertainment_features
Office at home	_2_PHYSICAL	_2.3_Accessibility_and_orientation	2.3.7_Doing_work_or_hobbies
Presence of a signal in flight of descending stairs.	_2_PHYSICAL	_2.3_Accessibility_and_orientation	2.3.9_Orientating_oneself_in_space_and_time
Access to Medical care	_2_PHYSICAL	_2.4_Health_and_social_care	2.4.1_Proximity_to_services
Physical Activity Spaces	_2_PHYSICAL	_2.4_Health_and_social_care	2.4.1_Proximity_to_services
Fitness Equipment	_2_PHYSICAL	_2.4_Health_and_social_care	2.4.1_Proximity_to_services



Health and Wellness awareness	_2_PHYSICAL	_2.4_Health_and_social_care	2.4.2_Options_and_facilities_for_eHealth_and_remote_medicine
Predisposition of cabling of the building and common spaces	_2_PHYSICAL	_2.5_Smart_readiness	
Predisposition of cabling of the dwelling	_2_PHYSICAL	_2.5_Smart_readiness	
Minimal connected devices	_2_PHYSICAL	_2.5_Smart_readiness	
Interoperability - Interfaces	_2_PHYSICAL	_2.5_Smart_readiness	2.5.3_IT_infrastructure_APIs
Digital Security - Security and protection of personal data	_2_PHYSICAL	_2.5_Smart_readiness	2.5.4_Digital_security_and_data_protection
Digital Security - Security in case of cyber attack or hacking	_2_PHYSICAL	_2.5_Smart_readiness	2.5.4_Digital_security_and_data_protection
Occupant's perception and satisfaction on digital equipment and services	_2_PHYSICAL	_2.5_Smart_readiness	

TABLE 8-2 OUTDOOR ACCESS CLUSTER KPIS

Title	Cluster	Category	Sub-category
Access to outdoor areas	_3_OUTD._AC C.	_3.1_Home_and_building	3.1.1_Outdoor_spaces
Conditions outdoor spaces	_3_OUTD._AC C.	_3.1_Home_and_building	3.1.1_Outdoor_spaces
View quality	_3_OUTD._AC C.	_3.1_Home_and_building	3.1.1_Outdoor_spaces
Easy accessibility	_3_OUTD._AC C.	_3.2_Immediate_environment	3.2.1_Accessibility
Vacancy rate	_3_OUTD._AC C.	_3.2_Immediate_environment	3.2.3_Social_safety



Options for transportation	_3_OUTD._ACC.	_3.3_Neighbourhood_or_village	3.3.1_Accessibility
Frequency and proximity of public transport	_3_OUTD._ACC.	_3.3_Neighbourhood_or_village	3.3.1_Accessibility
Safe pedestrian routes	_3_OUTD._ACC.	_3.3_Neighbourhood_or_village	3.3.1_Accessibility
Alternative ways of transport (bikes)	_3_OUTD._ACC.	_3.3_Neighbourhood_or_village	3.3.1_Accessibility
Parks and open spaces	_3_OUTD._ACC.	_3.3_Neighbourhood_or_village	3.3.2_Attractiveness
Shopping	_3_OUTD._ACC.	_3.3_Neighbourhood_or_village	3.3.2_Attractiveness
Basic services	_3_OUTD._ACC.	_3.3_Neighbourhood_or_village	3.3.2_Attractiveness

TABLE 8-3 PERSONAL CLUSTER KPIS

Title	Cluster	Category	Sub-category
Adequate maintenance for affective ties to home environment financially viable	_4_PERSONAL	_4.1_Identity_and_emotional_connectivity	4.1.1_Home
Home environment must allow keeping pets	_4_PERSONAL	_4.1_Identity_and_emotional_connectivity	4.1.1_Home
home environments for older women living alone must offer private outdoor spaces	_4_PERSONAL	_4.1_Identity_and_emotional_connectivity	4.1.1_Home
Home environment promotes creation of informal support networks e.g neighbours, and sense of safety and security is reassured	_4_PERSONAL	_4.1_Identity_and_emotional_connectivity	4.1.1_Home
Space for deployment of personal history objects	_4_PERSONAL	_4.1_Identity_and_emotional_connectivity	4.1.1_Home



Daylight access for positive connection with home environment	_4_PERSONAL	_4.1_Identity_and_emotional_connectivity	4.1.1_Home
Home environment allows older people to pursue activities independently	_4_PERSONAL	_4.1_Identity_and_emotional_connectivity	4.1.1_Home
Spaces and features for views and interaction with nature	_4_PERSONAL	_4.1_Identity_and_emotional_connectivity	4.1.1_Home
Availability of places and features for personalization of home environment	_4_PERSONAL	_4.1_Identity_and_emotional_connectivity	4.1.1_Home
Personalization of kitchen spaces	_4_PERSONAL	_4.1_Identity_and_emotional_connectivity	4.1.1_Home
Opportunities for meaningful social activity	_4_PERSONAL	_4.1_Identity_and_emotional_connectivity	4.1.1_Home
Easy and affordable access to specific "carer" support needs	_4_PERSONAL	_4.1_Identity_and_emotional_connectivity	4.1.1_Home
Home offers dedicated space for pursuing activities for self-fulfillment and social engagement.	_4_PERSONAL	_4.1_Identity_and_emotional_connectivity	4.1.1_Home
Opportunity for deployment of items and furnishings with special meaning	_4_PERSONAL	_4.1_Identity_and_emotional_connectivity	4.1.1_Home
Assistive technologies in the dwelling take account of heirloom status	_4_PERSONAL	_4.1_Identity_and_emotional_connectivity	4.1.1_Home
Opportunities for social activities and networks continuity	_4_PERSONAL	_4.1_Identity_and_emotional_connectivity	4.1.2_Apartment_building_complex
Home environment promotes creation of informal support networks e.g neighbours, and sense of safety and security is reassured	_4_PERSONAL	_4.1_Identity_and_emotional_connectivity	4.1.2_Apartment_building_complex
Home environment and neighbourhood contain 'third place thresholds'	_4_PERSONAL	_4.1_Identity_and_emotional_connectivity	4.1.2_Apartment_building_complex
Home has quality private outdoor spaces	_4_PERSONAL	_4.1_Identity_and_emotional_connectivity	4.1.2_Apartment_building_complex



Home environment allows views of and interaction with nature	_4_ PERSONAL	_4.1_Identity_and_emotional_connectivity	4.1.2_Apartment_building_complex
Assistive technologies take account of occupant activity patterns and rituals	_4_ PERSONAL	_4.1_Identity_and_emotional_connectivity	4.1.2_Apartment_building_complex
Access to general/indirect "carer" needs such as home care/home support services (primary target: care recipient)	_4_ PERSONAL	_4.1_Identity_and_emotional_connectivity	4.1.3_Neighbourhood_or_village
Home is situated in a neighbourhood that scores above average on security and solidarity items.	_4_ PERSONAL	_4.1_Identity_and_emotional_connectivity	4.1.3_Neighbourhood_or_village
Home environment facilitates recognition and training of informal carer skills	_4_ PERSONAL	_4.1_Identity_and_emotional_connectivity	4.1.3_Neighbourhood_or_village
Home within range of neighbourhood 'third places'	_4_ PERSONAL	_4.1_Identity_and_emotional_connectivity	4.1.3_Neighbourhood_or_village
Access to personalised tailored support services or tools informal carers	_4_ PERSONAL	_4.1_Identity_and_emotional_connectivity	4.1.3_Neighbourhood_or_village
Self-organization of social interaction	_4_ PERSONAL	_4.1_Identity_and_emotional_connectivity	4.1.3_Neighbourhood_or_village
Emotional attachment and alignment	_4_ PERSONAL	_4.1_Identity_and_emotional_connectivity	4.1.3_Neighbourhood_or_village
Dwelling is situated in proximity to likeminded others	_4_ PERSONAL	_4.1_Identity_and_emotional_connectivity	4.1.3_Neighbourhood_or_village
Social living environment is sensitive to specific socio-cultural needs	_4_ PERSONAL	_4.1_Identity_and_emotional_connectivity	4.1.3_Neighbourhood_or_village
Home environment within reach of community activities and engagement	_4_ PERSONAL	_4.1_Identity_and_emotional_connectivity	4.1.3_Neighbourhood_or_village
Home environment within reach of shops and services	_4_ PERSONAL	_4.1_Identity_and_emotional_connectivity	4.1.3_Neighbourhood_or_village
Emergency Preparedness	_4_ PERSONAL	_4.1_Identity_and_emotional_connectivity	4.1.3_Neighbourhood_or_village



Availability, accessibility and affordability of healthy food suppliers	_4_ PERSONAL	_4.1_Identity_and_emotional_connectivity	4.1.3_Neighbourhood_or_village
The home should be situated in an area that facilitates establishment of reciprocal social relationships with e.g. neighbours	_4_ PERSONAL	_4.1_Identity_and_emotional_connectivity	4.1.3_Neighbourhood_or_village
Dwelling has meaningful destinations within walking distance	_4_ PERSONAL	_4.1_Identity_and_emotional_connectivity	4.1.3_Neighbourhood_or_village
Availability of places with spiritual significance	_4_ PERSONAL	_4.1_Identity_and_emotional_connectivity	4.1.3_Neighbourhood_or_village
Mobility	_4_ PERSONAL	_4.1_Identity_and_emotional_connectivity	4.1.3_Neighbourhood_or_village
The neighbourhood around the dwelling satisfies walkability requirements	_4_ PERSONAL	_4.1_Identity_and_emotional_connectivity	4.1.3_Neighbourhood_or_village
Public spaces and buildings in the home's neighbourhood satisfy accessibility criteria	_4_ PERSONAL	_4.1_Identity_and_emotional_connectivity	4.1.3_Neighbourhood_or_village
Home environment must allow keeping pets	_4_ PERSONAL	_4.2_Privacy_and_dignity	4.2.1_Control_over_social_interaction
Housing options for single older women must enable occupants to live alone (as opposed to sharing accommodation with other tenants)	_4_ PERSONAL	_4.2_Privacy_and_dignity	4.2.1_Control_over_social_interaction
Elected co-habitation	_4_ PERSONAL	_4.2_Privacy_and_dignity	4.2.1_Control_over_social_interaction
Home environment has multiple 'third place thresholds'	_4_ PERSONAL	_4.2_Privacy_and_dignity	4.2.1_Control_over_social_interaction
Home plus environment offer opportunity for pleasurable and meaningful activities	_4_ PERSONAL	_4.2_Privacy_and_dignity	4.2.1_Control_over_social_interaction
Home and environment offer free choice in social activity participation	_4_ PERSONAL	_4.2_Privacy_and_dignity	4.2.1_Control_over_social_interaction



Home environment social and physical infrastructure supports social participation/ preventing social exclusion	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.1_Control_over_social_interaction
Control over level of social interaction while in the home	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.1_Control_over_social_interaction
Secured housing, including perceived safety at home	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.2_Control_over_access
Occupant has discriminatory control over access to (parts of) dwelling	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.2_Control_over_access
Home occupants have access to housing programmes and resources	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.2_Control_over_access
Monitoring systems assume and accommodate occupant agency	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.3_Control_over_data_collection_and_management
ICT solutions such as remote sensor and monitoring systems can support caregiving by carers and independent living of care-recipient.	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.3_Control_over_data_collection_and_management
Monitoring systems situationally adjustable according to wishes of and through actions of occupants.	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.3_Control_over_data_collection_and_management
Principles / data flows monitoring systems transparent to occupants.	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.3_Control_over_data_collection_and_management
Adjustments to home (systems) offer sense of autonomy and control	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.3_Control_over_data_collection_and_management
Technologies and interfaces designed for use by occupants	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.3_Control_over_data_collection_and_management
Home and home systems accommodate variety of short term and long-term occupant routines	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.3_Control_over_data_collection_and_management
Surveillance devices and systems in the home adjustable to	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.3_Control_over_data_collection_and_management



occupant needs and preferences by occupants themselves			
Monitoring and care platforms deployed in the home environment of people living with dementia should incorporate in their design the five key concern areas / themes	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.3_Control_over_data_collection_and_management
Information and support needs of carers are easily accessible and understandable	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.3_Control_over_data_collection_and_management
Assistive technologies take account of occupant activity patterns and rituals	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.3_Control_over_data_collection_and_management
Space and facilities for personal history and sense of self	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.4_Control_over_look_and_feel_and_furnishings
Home maintenance controlled and engaged in by older people	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.4_Control_over_look_and_feel_and_furnishings
Adjustments to the home respect long-term familiarity with and emotional attachment to dwelling	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.4_Control_over_look_and_feel_and_furnishings
Occupant can customize living environment according to personal history and identity	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.4_Control_over_look_and_feel_and_furnishings
Occupants can reorder use and furnishing of space to suit (changing) personal preferences	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.4_Control_over_look_and_feel_and_furnishings
Personalisation of kitchen spaces	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.4_Control_over_look_and_feel_and_furnishings
Physical cluster features in specialist housing types have unobtrusive, non-institutionalized design	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.4_Control_over_look_and_feel_and_furnishings
Home functions, elements and furnishings can be rearranged without (major) constructive or technical adaptations	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.4_Control_over_look_and_feel_and_furnishings
Separate extra bedroom for carer	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.5_Availability_of_private_spaces_and_times



The home environment for older women living alone must offer adequate privacy and private spaces	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.5_Availability_of_private_spaces_and_times
home environments for older women living alone must offer private outdoor spaces	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.5_Availability_of_private_spaces_and_times
Adequate protection from noise pollution	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.5_Availability_of_private_spaces_and_times
Home offers opportunity to create personal, "safe" spaces for occupants with MCI/early-stage dementia	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.5_Availability_of_private_spaces_and_times
Private space for each occupant	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.5_Availability_of_private_spaces_and_times
Spaces and design features contribute to autonomy and space for transition	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.5_Availability_of_private_spaces_and_times
In-home technologies / systems should be equipped with privacy awareness systems tailored to the concerns and tech awareness level of users	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.5_Availability_of_private_spaces_and_times
Opportunity for claiming and crafting personal territory	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.5_Availability_of_private_spaces_and_times
Palliative care/ End-of-life	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.6_Seclusion_for_health_and_ADL_care_provision
Information and support needs of carers are easily accessible and understandable	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.6_Seclusion_for_health_and_ADL_care_provision
Formal and personalised social and health services are available, accessible and affordable in the home's neighbourhood	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.6_Seclusion_for_health_and_ADL_care_provision
Flexible home tenureship rules	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.7_Secure_fture_prospects
Affordable housing	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.7_Secure_fture_prospects



Long-term security affordable housing arrangements	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.7_Secure_future_prospects
Financing mechanisms for age-friendly housing should enable as many people as possible to remain or become home owners	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.7_Secure_future_prospects
Home environment must provide spaces and design features that contribute to autonomy and space for transition.	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.7_Secure_future_prospects
Home environment promotes sense of autonomy and purpose for informal carers	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.8_Self-determination_autoomy_of_moveemnt
Occupants as co-creators of home environments	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.8_Self-determination_autoomy_of_moveemnt
Progressive privacy approaches in complexes/configurations of homes	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.8_Self-determination_autoomy_of_moveemnt
Home component settings controllable by occupants	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.8_Self-determination_autoomy_of_moveemnt

TABLE 8-4 SOCIAL CLUSTER KPIS

Title	Cluster	Category	Sub-category
Home environment offers opportunities for active engagement in social spaces	_5_SOCIAL	_5.1_Social_activity	5.1.1_Ability_to_have_social_contacts_in_the_home
Availability of space in the home to receive visitors, including overnight visitors	_5_SOCIAL	_5.1_Social_activity	5.1.1_Ability_to_have_social_contacts_in_the_home
The home environment allows free choice in manner and level of social engagement	_5_SOCIAL	_5.1_Social_activity	5.1.1_Ability_to_have_social_contacts_in_the_home
The home environment enables occupants to access those in their social group	_5_SOCIAL	_5.1_Social_activity	5.1.1_Ability_to_have_social_contacts_in_the_home



Home offers sufficient personal space in co-habitation situations	_5_SOCIAL	_5.1_Social_activity	5.1.1_Ability_to_have_social_contacts_in_the_home
Home must offer opportunity to co-habit with self-selected others	_5_SOCIAL	_5.1_Social_activity	5.1.1_Ability_to_have_social_contacts_in_the_home
The home's immediate environment has multiple 'third place thresholds'	_5_SOCIAL	_5.1_Social_activity	5.1.1_Ability_to_have_social_contacts_in_the_home
Home enables social dignity by providing access to seven essential conditions	_5_SOCIAL	_5.1_Social_activity	5.1.1_Ability_to_have_social_contacts_in_the_home
Home environment has spaces and design features that contribute to autonomy and space for transition	_5_SOCIAL	_5.1_Social_activity	5.1.1_Ability_to_have_social_contacts_in_the_home
Home environment has spaces and design features that allow expression of family history	_5_SOCIAL	_5.1_Social_activity	5.1.1_Ability_to_have_social_contacts_in_the_home
Homes environment provides spaces and design features conducive to spontaneous, proposed and organized interaction	_5_SOCIAL	_5.1_Social_activity	5.1.1_Ability_to_have_social_contacts_in_the_home
Home environment offers adequate spatial provisions for pets, hobbies, socialising and storage	_5_SOCIAL	_5.1_Social_activity	5.1.1_Ability_to_have_social_contacts_in_the_home
Home environment promotes informal carers' sense of autonomy and purpose	_5_SOCIAL	_5.1_Social_activity	5.1.1_Ability_to_have_social_contacts_in_the_home
The home and its immediate environment offer opportunities to engage in meaningful social activity	_5_SOCIAL	_5.1_Social_activity	5.1.1_Ability_to_have_social_contacts_in_the_home
Home offers dedicated space for pursuing activities for self-fulfilment and social engagement.	_5_SOCIAL	_5.1_Social_activity	5.1.1_Ability_to_have_social_contacts_in_the_home
Occupants have control over access to home	_5_SOCIAL	_5.1_Social_activity	5.1.1_Ability_to_have_social_contacts_in_the_home



Spatial lay-out of the home environment allows control over level of social interaction.	_5_SOCIAL	_5.1_Social_activity	5.1.1_Ability_to_have_social_contacts_in_the_home
The home should be situated in a neighbourhood that is perceived as safe by the home's occupants.	_5_SOCIAL	_5.1_Social_activity	5.1.2_Proximity_to_activities_and_facilities
The immediate environment of the home and the neighbourhood offer accessible opportunities for engagement with others in meaningful activity and social contacts	_5_SOCIAL	_5.1_Social_activity	5.1.2_Proximity_to_activities_and_facilities
The direct environment of the home offers suitable spaces for engagement in organized social and learning activities.	_5_SOCIAL	_5.1_Social_activity	5.1.2_Proximity_to_activities_and_facilities
The home environment and immediate neighbourhood support social participation/ preventing social exclusion.	_5_SOCIAL	_5.1_Social_activity	5.1.2_Proximity_to_activities_and_facilities
Home environment within short and accessible reach of shops and services	_5_SOCIAL	_5.1_Social_activity	5.1.2_Proximity_to_activities_and_facilities
Home environment supports sense of autonomy and purpose of informal carers	_5_SOCIAL	_5.1_Social_activity	5.1.2_Proximity_to_activities_and_facilities
Housing programmes and resources	_5_SOCIAL	_5.1_Social_activity	5.1.2_Proximity_to_activities_and_facilities
Home environment provides easy and affordable access to specific "carer" support needs	_5_SOCIAL	_5.1_Social_activity	5.1.2_Proximity_to_activities_and_facilities
Meaningful destinations within walking distance	_5_SOCIAL	_5.1_Social_activity	5.1.2_Proximity_to_activities_and_facilities
Home within easy reach of accessible and affordable public and individualizes transport services	_5_SOCIAL	_5.1_Social_activity	5.1.2_Proximity_to_activities_and_facilities
Home's neighbourhood offers opportunities for engagement in	_5_SOCIAL	_5.1_Social_activity	5.1.2_Proximity_to_activities_and_facilities



socio-cultural-religious and/or life-long learning activities			
Meaningful destinations within walking distance	_5_SOCIAL	_5.1_Social_activity	5.2.2_Connection_to_place_of_employment
Home's immediate environment supports continuation of existing social activities, networks and contexts	_5_SOCIAL	_5.1_Social_activity	5.1.3_Ability_to_find_social_contacts_outside_the_home
The home should be situated in a neighbourhood that is perceived as safe by the home's occupants.	_5_SOCIAL	_5.1_Social_activity	5.1.3_Ability_to_find_social_contacts_outside_the_home
The neighbourhood offers opportunities for social interaction, within range of the home and by accessible routes.	_5_SOCIAL	_5.1_Social_activity	5.1.3_Ability_to_find_social_contacts_outside_the_home
The home environment allows free choice in manner and level of social engagement	_5_SOCIAL	_5.1_Social_activity	5.1.3_Ability_to_find_social_contacts_outside_the_home
Home enables social dignity by providing access to seven essential conditions	_5_SOCIAL	_5.1_Social_activity	5.1.3_Ability_to_find_social_contacts_outside_the_home
The home's immediate environment offers opportunities for engagement in (organized) social activities	_5_SOCIAL	_5.1_Social_activity	5.1.3_Ability_to_find_social_contacts_outside_the_home
Green spaces present in home environment	_5_SOCIAL	_5.1_Social_activity	5.1.3_Ability_to_find_social_contacts_outside_the_home
Home is close to established social networks	_5_SOCIAL	_5.1_Social_activity	5.1.3_Ability_to_find_social_contacts_outside_the_home
Home is situated in direct proximity to and easy reach of likeminded others	_5_SOCIAL	_5.1_Social_activity	5.1.3_Ability_to_find_social_contacts_outside_the_home
Dwelling's immediate environment offers opportunities for informal social interaction	_5_SOCIAL	_5.1_Social_activity	5.1.3_Ability_to_find_social_contacts_outside_the_home
Home's neighbourhood supports self-organization of social interaction	_5_SOCIAL	_5.1_Social_activity	5.1.3_Ability_to_find_social_contacts_outside_the_home



Home environment and neighbourhood support social participation/ help prevent social exclusion	_5_SOCIAL	_5.1_Social_activity	5.1.3_Ability_to_find_social_contacts_o outside_the_home
Home environment provides spaces and design features conducive to spontaneous, proposed and organized interaction	_5_SOCIAL	_5.1_Social_activity	5.1.3_Ability_to_find_social_contacts_o outside_the_home
The social living environment of older people from migrant communities, is sensitive to their specific socio-cultural needs and preferences, and supports trust building and development of social capital	_5_SOCIAL	_5.1_Social_activity	5.1.3_Ability_to_find_social_contacts_o outside_the_home
The home and its environment (up to neighbourhood/village level) offer accessible opportunities for engagement in meaningful activity and social contacts.	_5_SOCIAL	_5.1_Social_activity	5.1.3_Ability_to_find_social_contacts_o outside_the_home
Appropriate social contact opportunities and services available within reachable distance of the home	_5_SOCIAL	_5.1_Social_activity	5.1.3_Ability_to_find_social_contacts_o outside_the_home
Home is situated in an area that facilitates establishment of reciprocal social relationships with e.g. neighbours	_5_SOCIAL	_5.1_Social_activity	5.1.3_Ability_to_find_social_contacts_o outside_the_home
Home accommodates gendered differences in activity preferences	_5_SOCIAL	_5.1_Social_activity	5.1.3_Ability_to_find_social_contacts_o outside_the_home
Availability of places with spiritual significance within accessible walking distance	_5_SOCIAL	_5.1_Social_activity	5.1.3_Ability_to_find_social_contacts_o outside_the_home
Home's neighbourhood offers variety of spaces for socializing with other community dwellers	_5_SOCIAL	_5.1_Social_activity	5.1.3_Ability_to_find_social_contacts_o outside_the_home
Home's immediate environment has sitting spaces to enable social interaction.	_5_SOCIAL	_5.1_Social_activity	5.1.3_Ability_to_find_social_contacts_o outside_the_home
Home is situated in a walkable neighbourhood with accessible public spaces and buildings	_5_SOCIAL	_5.1_Social_activity	5.1.3_Ability_to_find_social_contacts_o outside_the_home
The home environment gives occupants virtual access to those in their social group	_5_SOCIAL	_5.1_Social_activity	5.1.4_Online_connectivity
Home offers physical and/or virtual opportunities for social engagement	_5_SOCIAL	_5.1_Social_activity	5.1.4_Online_connectivity
The home and any assistive devices and monitoring systems	_5_SOCIAL	_5.1_Social_activity	5.1.4_Online_connectivity



deployed in it, are designed to allow occupants the opportunity to shape and alter their daily routines both in the short term and as regards longer term changes			
Home environment supports sense of autonomy and purpose of informal carers	_5_SOCIAL	_5.1_Social_activity	5.1.4_Online_connectivity
Monitoring and care platforms deployed in the home environment of people living with dementia incorporate in their design the five key concern areas / Themes	_5_SOCIAL	_5.1_Social_activity	5.1.4_Online_connectivity
Information and support needs of carers are easily accessible and understandable, and include personalised tailored support services or tools	_5_SOCIAL	_5.1_Social_activity	5.1.4_Online_connectivity
The home environment enables the use of social technology software and systems to support occupants in fulfilling their social needs.	_5_SOCIAL	_5.1_Social_activity	5.1.4_Online_connectivity
The home provides affordable internet access	_5_SOCIAL	_5.1_Social_activity	5.1.4_Online_connectivity
Home employment workers can easily and legally be accessed	_5_SOCIAL	_5.2_Employment	5.2.1_Suitability_of_the_home_as_a_place_of_work
The home supports informal carers' work-life-care balance	_5_SOCIAL	_5.2_Employment	5.2.1_Suitability_of_the_home_as_a_place_of_work
The home environment offers opportunities for engagement in volunteer activity	_5_SOCIAL	_5.2_Employment	5.2.1_Suitability_of_the_home_as_a_place_of_work
Housing is affordable for informal carers	_5_SOCIAL	_5.2_Employment	5.2.2_Connection_to_place_of_employment
The home supports informal carers' work-life-care balance	_5_SOCIAL	_5.2_Employment	5.2.2_Connection_to_place_of_employment
Home environment offers opportunities for paid employment	_5_SOCIAL	_5.2_Employment	5.2.2_Connection_to_place_of_employment
Availability of accessible transportation options	_5_SOCIAL	_5.2_Employment	5.2.2_Connection_to_place_of_employment



TABLE 8-5 ECONOMIC CLUSTER KPIS

Title	Cluster	Category	Sub-category
Acceptable earn-back time for investments in age-friendly housing	_6_ ECONOMIC	_6.1_Affordability	6.1.1_Objective_affordability
Adequate maintenance must be possible within reasonable limits for housing cost expenditure	_6_ ECONOMIC	_6.1_Affordability	6.1.1_Objective_affordability
Housing must be affordable for informal carers	_6_ ECONOMIC	_6.1_Affordability	6.1.1_Objective_affordability
Age-friendly homes must be affordable to all.	_6_ ECONOMIC	_6.1_Affordability	6.1.1_Objective_affordability
The home environment must allow tailoring of adjustments and features to suit individual needs and preferences	_6_ ECONOMIC	_6.1_Affordability	6.1.1_Objective_affordability
Occupants must have long-term security on costs of housing	_6_ ECONOMIC	_6.1_Affordability	6.1.1_Objective_affordability
Housing programmes and resources	_6_ ECONOMIC	_6.1_Affordability	6.1.1_Objective_affordability
Availability of a choice of affordable housing, supported by programmes and resources	_6_ ECONOMIC	_6.1_Affordability	6.1.1_Objective_affordability
Financial instruments in place for home ownership among less affluent older adults.	_6_ ECONOMIC	_6.1_Affordability	6.1.1_Objective_affordability
Private and public sector operatives should have long-term security on market conditions. Proved demand of this profile of homes	_6_ ECONOMIC	_6.1_Affordability	6.1.1_Objective_affordability
Affordable internet access	_6_ ECONOMIC	_6.1_Affordability	6.1.1_Objective_affordability
Viable public sector business case	_6_ ECONOMIC	_6.1_Affordability	6.1.2_Willingness_to_pay



The home environment must allow tailoring of adjustments and features to suit individual needs and preferences	_6_ ECONOMI C	_6.1_Affordability	6.1.2_Willingness_to_pay
ROI between +/- 10% of non- age friendly homes, for both ownership and tenancy markets	_6_ ECONOMI C	_6.1_Affordability	6.1.2_Willingness_to_pay
Viable business case in terms of nursing home and other healthcare cost savings	_6_ ECONOMI C	_6.1_Affordability	6.1.2_Willingness_to_pay
Proved demand of need of specific materials for age-friendly homes	_6_ ECONOMI C	_6.1_Affordability	6.1.2_Willingness_to_pay
Housing must be affordable for informal carers	_6_ ECONOMI C	_6.2_Choice	6.2.1_Dwelling_type
Availability of affordable housing is guaranteed in cases of upgrading/gentrification	_6_ ECONOMI C	_6.2_Choice	6.2.1_Dwelling_type
Affordable rental accommodation needs to be situated within reach of social and healthcare services	_6_ ECONOMI C	_6.2_Choice	6.2.2_Living_environment_type
The home and its environment enable economic activity for its occupants, through access to transport	_6_ ECONOMI C	_6.2_Choice	6.2.2_Living_environment_type
Access to general/indirect "carer" needs such as home care/home support services (primary target: care recipient)	_6_ ECONOMI C	_6.2_Choice	6.2.3_Living_arrangement_type
Home employment workers can easily and legally be accessed	_6_ ECONOMI C	_6.2_Choice	6.2.3_Living_arrangement_type
Home must offer opportunity to co-habit with self-selected others	_6_ ECONOMI C	_6.2_Choice	6.2.4_Neighbours_co_occupants
Positive attitude towards older people (or more widely: society cohesion)	_6_ ECONOMI C	_6.2_Choice	6.2.4_Neighbours_co_occupants
Age-friendly housing projects contribute to market leadership and a positive brand image	_6_ ECONOMI C	_6.2_Choice	6.2.6_Decision_making_authority
Housing support awareness	_6_ ECONOMI C	_6.2_Choice	6.2.6_Decision_making_authority



Tenancy contracts must allow modifications to homes on the initiative of tenants.	_6_ ECONOMI C	_6.2_Choice	6.2.6_Decision_making_authority
Corporate Social responsibility	_6_ ECONOMI C	_6.2_Choice	6.2.6_Decision_making_authority
Availability of information about home adaptation options (?)	_6_ ECONOMI C	_6.2_Choice	6.2.7_Choice_information
Housing programmes and resources must be widely available	_6_ ECONOMI C	_6.2_Choice	6.2.7_Choice_information



9 Conclusions and recommendations for further development

The delivery of the working taxonomy and KPI-framework marks the halfway point of the Homes4Life project. Looking back over the work done on these tasks in the first year, it is apparent that the decision to adopt an approach based on interlocking views of the functions of the home environment and the needs and priorities of users and other stakeholders has resulted in a conceptual framework that can be used relatively independent of geographical, socio-cultural and health systems context, and can be applied across different types of housing and investment projects. The initial test of the taxonomy as a mapping tool has proved successful, with an initial batch of 150 NoPs defined within its framework. In developing a conceptual framework that covers a broad scope of age-friendly home topics and aspects, the Homes4Life taxonomy has addressed the gaps and omissions in current discourse on age-friendly homes and ageing well as identified in paragraph 3.1.2. In particular, the work done in the first year has served to highlight the particular importance of the personal, emotional and social aspects of the home environment in defining its fitness for purpose and perceived worth, as well as the lack of coverage of these aspects in current certification and labelling. In this light it is particularly encouraging to note that it has proved possible to define a large number of KPIs in the Personal and Social clusters of the Homes4Life taxonomy.

In the second year, the transition will be made from concept and tools development to development and piloting of certification, and to the marshalling of sufficient interest to create a viable avenue for exploitation and further development of Homes4Life-based certification products.

The working taxonomy and KPI-framework will play an important role in this second phase of the project. The working taxonomy as a tool, or canvas, to facilitate stakeholder discussion and to help identify and contextualize concerns, priorities and social and economic opportunities in specific pilot cases. The KPI-framework as a source for the definition of more context and project typology specific sub-sets of requirements, scores and verification methods to be used in specific certification applications. The KPI-framework will also have to demonstrate its worth as a tool to help understand the outcomes of individual certification pilots and improve the comparability of projects and solutions across geographical, socio-cultural and health systems borders.

Challenges remain, which will have to be addressed as part of the work that now awaits in the project. What will prove to be the best way to handle and integrate requirements from national codes, guidelines and standards into the more generic assessment methodology chosen for Homes4Life? Challenges await to translate the KPI-material in the Personal, Social and Economic clusters, culled from sources not oriented towards certification, to requirements satisfying the demands of objective verifiability associated with certification contexts? These items will be addressed as the Homes4Life Certification



Scheme takes shape in Work Package 4, and will lead to adjustments and refinements to what are, after all, intended to be flexible working instruments.

Both deliverables, but especially the taxonomy, are not just summaries of current thinking and innovation on age-friendly homes, they are also shaped by it. Taxonomy and KPI-framework in this sense are instruments that collect and make available for scrutiny the collective wisdom and experience of stakeholders in the field. As experience and wisdom continue to develop, it is logical that the taxonomy will also continue to evolve. To facilitate this further development, both taxonomy and the KPI-framework as they now stand will be opened to the feedback and input of the interested persons and organisations in the project's Community of Interest through publication of the material on the project website. As this website is accessible to all with an interest in age-friendly homes, an even wider group than the current Community of Interest will be able to contribute. In this way, those who are the instruments' intended users and beneficiaries are encouraged to become co-creators of future, improved versions.

Within the scope of the project, the feedback from certification pilots and the feedback and input on the taxonomy will be consolidated in a second version of both tools, which will be established and made publicly available at project's end.

Ageing well in place, and the role of the home in making that possible, will continue to be crucial societal and economic themes well beyond the scope of the project. The central ambition for both the taxonomy and the KPI-framework is that they will establish a place for themselves as valued tools to shape and support discourse around both practical and research avenues, opportunities and priorities. In this way, the need for a common language, keenly felt in current work on age-friendly homes, could be fulfilled on a structural basis.



Appendix 1: Taxonomy overview

Main Perspectives		Group	Sub-group
1. PERSPECTIVES	1.1 User profiles	1.1.1 Anticipatory	
		1.1.2 Visual impairments	
		1.1.3 Early stage dementia	
		1.1.4 Minor cognitive impairment	
		1.1.5 Mobility restrictions	
		1.1.6 Respiratory problems	
		1.1.7 Hearing impairments	
	1.2 Relatives and informal carers profiles	1.2.1 Co-habiting	1.2.1.1 Partner
			1.2.1.2 Other
		1.2.2 Non co-habiting	1.2.2.1 Partner
			1.2.2.2 Other
	1.3 Organisational profiles	1.3.1 Not-for-profit	1.3.1.1 National government
			1.3.1.2 Local or regional government
			1.3.1.3 Health and social care providers
			1.3.1.4 Social and public housing providers
		1.3.2 For-profit	1.3.2.1 Project developers_investment companies
			1.3.2.2 Construction and installations
			1.3.2.3 Service providers
			1.3.2.4 Private health insurance companies
			1.3.2.5 Private insurance companies and other innovative services



Functions

Cluster	Category	Sub-category	Items			
2	2.1	Personal Safety	2.1.1	Accidents and calamities		
			2.1.2	Safe use of amenities and facilities		
			2.1.3	Safety around the home		
			2.1.4	Safety from outside threats		
	2.2	Comfort	2.2.1	Temperature regulation		
			2.2.2	Air quality	2.2.3.1	Daylight access
			2.2.3	Lighting	2.2.3.2	Artificial lighting
			2.2.4	Acoustics		
			2.2.5	Home management systems		
	2.3	Accessibility and orientation	2.3.1	Getting in and out of the house		
			2.3.2	Getting around the house		
			2.3.3	Performing daily in_house activities		
			2.3.4	Getting in and out of bed		
			2.3.5	Personal hygiene		
			2.3.6	Using communication and entertainment features		
			2.3.7	Doing work or hobbies		
			2.3.8	Controlling home functions		
			2.3.9	Orientating oneself in space and time		



Cluster	Category	Sub-category	Items	
	2.4 Health and social care	2.4.1 Proximity to services	2.4.1.1 GP	
			2.4.1.2 Pharmacy	
			2.4.1.3 Other community based and primary care services	
		2.4.2 Options and facilities for eHealth and remote medicine	2.4.3.1 Sufficient space for maneuvering and assistance	
	2.4.3 Facilities for care provision in the home	2.4.3.2 Availability of assistive apparatus		
	2.5 Smart readiness		2.5.1 Wireless and wired connectivity	2.4.3.3 Safety and capacity of electrical and ventilation systems
			2.5.2 Network infrastructure and interoperability	2.4.3.4 Safe working environment
2.5.3 IT infrastructure APIs				
2.5.4 Digital security and data protection				



Functions

Cluster	Category	Sub-category	Items	
3	<u>OUTDOOR ACCESS</u>	<u>3.1 Home and building</u>	<u>3.1.1 Outdoor spaces</u>	3.1.1.1 Quality
				3.1.1.2 Choice
				3.1.1.3 Privacy
		<u>3.2 Immediate environment</u>	<u>3.1.2 Views</u>	3.2.1 Accessibility
				3.2.2 Attractiveness
				3.2.3 Social safety
		<u>3.3 Neighbourhood or village</u>	<u>3.3.1 Accessibility</u>	3.3.1 Accessibility
				3.3.2 Attractiveness
				3.3.3 Social safety



Functions

Cluster	Category	Sub-category	Items	Sub-items	
4	PERSONAL	4.1 Identity and emotional connectivity	4.1.1 Home	4.1.1.1 Outside appearance	
				4.1.1.2 labelling_stigmatization	
				4.1.1.3 Recognizability	
				4.1.1.4 Flexibility	4.1.1.4.a Spatial layout
					4.1.1.4.b Furnishings
					4.1.1.4.c Amenities
			4.1.2 Apartment building complex	4.1.1.5 Space and functions	
				4.1.1.6 Autonomy and control	
				4.1.2.1 Mix of dwellings	
				4.1.2.2 Mix of occupants	
				4.1.2.3 Designation_labelling	
				4.1.2.4 On-site functions	4.1.2.4.a Community spaces
	4.1.2.4.b Shops				
	4.1.2.4.c Other				
4.1.3 Neighbourhood or village	4.1.3.1 Emotional_historical connections				
	4.1.3.2 Proximity of significant others				



Cluster	Category	Sub-category	Items	Sub-items
	4.2	<u>Privacy and dignity</u>		
		4.2.1	<u>Control over social interaction</u>	
		4.2.2	<u>Control over access</u>	
		4.2.3	<u>Control over data collection and management</u>	
		4.2.4	<u>Control over look and feel and furnishings</u>	
		4.2.5	<u>Availability of private spaces and times</u>	
		4.2.6	<u>Seclusion for health and ADL care provision</u>	
		4.2.6	<u>Secure future prospects</u>	
		4.2.6	<u>Self determination autonomy of movement</u>	



Functions

Cluster	Category	Sub-category	Items	
5	SOCIAL	5.1.1 <u>Ability to have social contacts in the home</u>	5.1.1.1 Reachability by visitors	
			5.1.1.2 Space to entertain	
			5.1.1.3 Overnight accommodation	
		5.1.2 <u>Proximity to activities and facilities</u>	5.1.2.1 Shops	
			5.1.2.2 Bars and restaurants	
			5.1.2.3 Museums and galleries	
			5.1.2.4 Theatres and concert halls	
	5.2	EMPLOYMENT	5.2.1 <u>Suitability of the home as a place of work</u>	5.2.1.1 Space and layout
				5.2.1.2 Technical facilities
				5.2.1.3 Digital connectivity
5.1.3 <u>Ability to find social contacts outside the home</u>	5.1.3.1 Demographics of the immediate environment and neighbourhood			
	5.1.4 <u>Online connectivity</u>	5.1.4.1 Maintaining contact with friends and family		
		5.1.4.2 Connectivity to social groups and networks		
5.1.4.3 Connectivity to entertainment and activity providers				
5.2.2 <u>Connection to place of employment</u>	5.2.2.1 Travel distance			
	5.2.2.2 Transport			



Cluster	Category	Sub-category	Items	
6	ECONOMIC	6.1 Affordability	6.1.1 Objective affordability	6.1.1.1 Maximum periodic housing costs
				6.1.1.2 Maximum one-off costs
				6.1.1.3 Access to finance
		6.1.2 Willingness to pay	6.1.2.1 Maximum investment	
			6.1.2.2 Value creation requirements	
		6.2 Choice	6.2.1 Dwelling type	6.2.2 Living environment type
				6.2.2.2 Neighbourhood_village
	6.2.3 Living arrangement type		6.2.3.1 Independent	
			6.2.3.2 Group	
			6.2.3.3 Intergenerational	
			6.2.3.4 Assisted	
			6.2.3.5 Other	
	6.2.4 Neighbours co occupants			
	6.2.5 Solutions	6.2.5.1 Range		
6.2.5.2 Local availability				
6.2.5.3 Price ranges				
6.2.5.4 Modularity				
6.2.6 Decision_making authority				
6.2.7 Choice information	6.2.7.1 Availability			
	6.2.7.2 Accessibility			
	6.2.7.3 Quality			
	6.2.7.4 Interpretability			
	6.2.7.5 User_centredness			



EFFECTS	Category/Domain	Effect when met/Difference made
7 EFFECT WHEN MET	7.1 Physical safety and health	<ul style="list-style-type: none"> 7.1.1 Improved self_reported health and wellbeing 7.1.2 Improved rate and range of indoor activity 7.1.3 Lower dependence on ADL_assistance and aids 7.1.4 Lowered risk of falls and accidents 7.1.5 Improved access to care 7.1.6 Lowered dependency on institutionalized care 7.1.7 Improved sense of comfort at home 7.1.8 Lower nonrenewable energy consumption 7.1.9 Improved sense of safety at home 7.1.10 Lower incidence of crime and abuse directed at older people
	7.2 Surrounding area	<ul style="list-style-type: none"> 7.2.1 Better reported satisfaction with home environs and neighbourhood 7.2.2 Improved rate and range of outdoor activity 7.2.3 Improved sense of safety in home environs and neighbourhood 7.2.4 Lower incidence of crime and abuse directed at older people 7.2.5 Lower dependency on ADL_assistance and aids in outdoor environment
	7.3 Psychological and emotional wellbeing	<ul style="list-style-type: none"> 7.2.6 Improved self_reported health and wellbeing 7.3.1 Improved self_reported mental health and happiness 7.3.2 Improved sense of self-worth and self-reliance 7.3.3 Improved sense of agency 7.3.4 Reduced incidence of anxiety and depression 7.3.5 Lowered demand for formal mental health care 7.1,2,3 <i>Other... (please specify)</i>



EFFECTS	Category/Domain	Effect when met/Difference made
7 EFFECT WHEN MET		7.4.1 Lower rates of loneliness and isolation
	7.4 Social life and meaningful activity	7.4.2 Improved rate and range of social activities 7.4.3 Improved sense of social connection with others 7.4.4 Improved satisfaction with opportunities for social engagement in the home 7.4.5 Improved satisfaction with opportunities for social engagement outside the home 7.4.6 Higher percentage of older persons in paid or voluntary employment 7.4.7 Higher percentage of informal carers in fulltime or part-time employment 7.4.8 <i>Other... (please specify)</i>
	7.5 Economic aspects	7.5.1 Better availability of financial means for investments in the home environment 7.5.2 Improved income and wealth position for older people and carers 7.5.3 Improved willingness to invest in home environments by citizens 7.5.4 Increased investment in housing by private sector 7.5.5 Increased investment in housing by social and public housing 7.5.6 Increased investment in services and products by private sector 7.5.7 Increased investment in services and products by public sector 7.5.8 Reduction of public sector housing costs 7.5.9 Reduction of public sector health and social care costs 7.5.10 Reduction of costs for healthcare providers and contractors 7.5.11 Increase in local_regional economic turnover 7.5.12 Increase in local_regional property values 7.5.13 <i>Other... (please specify)</i>



Appendix 2: Overview of NoPs

Title	Description	Effect Cat.	Effect nr.	Effect description	Perspective	Groups	Sub Groups	Function	Category	Sub-category	Items
Adequate spaces for home care services providers	Dwelling characteristics have to be adequate to allow the best possible home care service , and to guarantee a safe working environment for the formal caregivers.	7.1	7.1.1	Improved self_reported health and wellbeing	1.3 Organisational profiles	1.3.2	1.3.2.3	2 PHYSICAL	2.4	2.4.3	2.4.3.1
		7.3	7.1.3	Lower dependence on ADL_assistance and aids							2.4.3.4
		7.4	7.1.4	Lowered risk of falls and accidents							
		7.5	7.1.5	Improved access to care							
		7.1.6	7.1.6	Lowered dependency on institutionalized care							
		7.1.7	7.1.7	Improved sense of comfort at home							
		7.1.9	7.1.9	Improved sense of safety at home							
		7.3.1	7.3.1	Improved self_reported mental health and happiness							
		7.3.4	7.3.4	Reduced incidence of anxiety and depression							
		7.3.5	7.3.5	Lowered demand for formal mental health care							
		7.4.1	7.4.1	Lower rates of loneliness and isolation							
		7.4.4	7.4.4	Improved satisfaction with opportunities for social engagement in the home							
		7.5.6	7.5.6	Increased investment in services and products by private sector							
		7.5.9	7.5.9	Reduction of public sector health and social care costs							
7.5.10	7.5.10	Reduction of costs for healthcare providers and contractors									
Essential services	Essential services (electricity, gas or water supply) should be adequate, affordable and well provided.	7.1	7.1.4	Lowered risk of falls and accidents	1.1 User profiles			2 PHYSICAL	2.4		
		7.3	7.1.7	Improved sense of comfort at home							
		7.4	7.1.8	Lower non_renewable energy consumption							
		7.5	7.1.9	Improved sense of safety at home							
		7.3.1	7.3.1	Improved self_reported mental health and happiness							
		7.3.4	7.3.4	Reduced incidence of anxiety and depression							



Title	Description	Effect Cat.	Effect nr.	Effect description	Perspective	Groups	Sub Groups	Function	Category	Sub-category	Items
			7.4.4	Improved satisfaction with opportunities for social engagement in the home							
			7.5.2	Improved income and wealth position for older people and carers							
			7.5.9	Reduction of public sector health and social care costs							
			7.5.12	Increase in local_regional property values							
			7.5.13	Link with affordable housing: 'High housing costs can compel people to cut back on other essentials that are connected to health, including food, energy and health care' (WHO, 2018)							
Design	Several aspects of housing design are considered to affect the ability of older people to live comfortably at home. While the various aspects relating to physical safety and comfort are adequately covered in the literature and in existing labels and schemes, it should be remembered that the NEED that older people experience is for a comfortable home they can get around in, not for any specific technical alteration	7.1	7.1.2	Improved rate and range of indoor activity	1.1	User profiles		2 PHYSICAL	2.2		
		7.3	7.1.3	Lower dependence on ADL_assistance and aids							
		7.4	7.1.4	Lowered risk of falls and accidents							
			7.1.6	Lowered dependency on institutionalized care							
			7.1.7	Improved sense of comfort at home							
			7.1.9	Improved sense of safety at home							
			7.1.11.11	Improved resilience of the building to adapt over time: 'Life span housing can accommodate changes in human functioning over a person's life span' (WHO, 2018)							
			7.3.1	Improved self_reported mental health and happiness							
			7.3.2	Improved sense of self_worth and self_reliance							
			7.3.6	Reduced level of stress if good design permits to avoid crowding (WHO, 2018)							
			7.4.4	Improved satisfaction with opportunities for social engagement in the home							
			7.4.8	... incl. engagement with (long-term) visitors: 'The level of crowding relates to the size and design of the dwelling, incl. size of the rooms, type, size and needs of the household' (WHO, 2018)							
indoor climate		7.1	7.1.1	Improved self_reported health and wellbeing					2.2	2.2.1	



Title	Description	Effect Cat.	Effect nr.	Effect description	Perspective	Groups	Sub Groups	Function	Category	Sub-category	Items
	ability to foster a comfortable home climate, including adjustable temperature, but also comfortable humidity levels and good air quality. To foster the latter two requires adequate ventilation (often at odds with boosting heat insulation required for sustainable housing)		7.1.7	Improved sense of comfort at home	1.1 User profiles			2 PHYSICAL		2.2.2 2.2.5	
Gerontechnology & independent living	Gerontechnology can support older people to stay at home safely. It consists of creating a technological environment to facilitate mobility, health and communication. Central in the concept of gerontechnology as a need is that the technology is designed to empower and enable older people and employs a user-centric perspective	7.1 7.4	7.1.2 7.1.3 7.1.4 7.1.7 7.1.9 7.4.1 7.4.3 7.4.5	Improved rate and range of indoor activity Lower dependence on ADL_assistance and aids Lowered risk of falls and accidents Improved sense of comfort at home Improved sense of safety at home Lower rates of loneliness and isolation Improved sense of social connection with others Improved satisfaction with opportunities for social engagement outside the home	1.1 User profiles			2 PHYSICAL			
Air quality	A risk for health problems is arguably inadequate ventilation. Breathlessness & cough were associated w/ higher carbon dioxide. Relative humidity was inversely related to wheeze in the past year & usual cough. Older subjects (80+) were at higher risk. Pollutant effects were more pronounced in the case of poor ventilation. Indoor air quality affected respiratory health in older people permanently living in nursing homes, w/ frailty increasing with age.	7.1	7.1.1 7.1.2 7.1.7	Improved self_reported health and wellbeing Improved rate and range of indoor activity Improved sense of comfort at home	1.1 User profiles			2 PHYSICAL	2.2	2.2.2	
Connectivity	The environment will need to have a reliable Internet connection to access data and provide services	7.5	7.5.9 7.5.10	Reduction of public sector health and social care costs Reduction of costs for healthcare providers and contractors	1.3 Organisational profiles		1.3.2.3	2 PHYSICAL		2.5.1 2.5.2 2.5.3	
Thermal comfort		7.1	7.1.1	Improved self_reported health and wellbeing					2.2	2.2.1	



Title	Description	Effect Cat.	Effect nr.	Effect description	Perspective	Groups	Sub Groups	Function	Category	Sub-category	Items					
	Cold indoor temperature are often a consequence of outdoor temperature, structural deficiencies, including a lack of insulation and airtightness, and lack of heating. Cold indoor temperatures have been associated with increased blood pressure, asthma symptoms and poor mental health. Cold homes contribute to excess winter mortality and morbidity. Too much heat is not safe for anyone. It is even riskier if you are older or have health problems.	7.3 7.4 7.5	7.1.2 7.1.4 7.1.7	Improved rate and range of indoor activity Lowered risk of falls and accidents Improved sense of comfort at home	1.1 User profiles			2 PHYSICAL		2.2.2						
		7.1.8	Lower non_renewable energy consumption	2.2.5												
		7.1.9	Improved sense of safety at home													
		7.3.1	Improved self_reported mental health and happiness													
		7.4.2	Improved rate and range of social activities													
		7.4.4	Improved satisfaction with opportunities for social engagement in the home													
		7.5.9	Reduction of public sector health and social care costs													
		7.5.12	Increase in local_regional property values													
Lighting	Lighting plays an important role in daily life, including in terms of health (e.g. when people are exposed to artificial light at night increasing risks for obesity, depression, sleep disorders, diabetes, breast cancer and more). Lighting (both natural and artificial) helps people perform daily activities independently and safely. Poor lighting in the dwellings of older adults has been associated with falls, depression, and reduced visual performance.	7.1 7.3 7.4	7.1.1 7.1.2 7.1.4	Improved self_reported health and wellbeing Improved rate and range of indoor activity Lowered risk of falls and accidents						1.1 User profiles				2 PHYSICAL	2.2	2.1.1
		7.1.7	Improved sense of comfort at home	2.1.2	2.2.3.2											
		7.1.8	Lower non_renewable energy consumption	2.2.3												
		7.1.9	Improved sense of safety at home	2.3.2												
		7.3.1	Improved self_reported mental health and happiness	2.3.3												
		7.3.3	Improved sense of agency	2.3.4												
		7.3.4	Reduced incidence of anxiety and depression	2.3.9												
		7.3.5	Lowered demand for formal mental health care													
		7.3.6	Improved feeling of safety at home													
		7.4.2	Improved rate and range of social activities													
		7.4.6	Higher percentage of older persons in paid or voluntary employment													
Falls prevention	According to WHO, 28–35% of 65+ fall at least once a year with serious consequences	7.1 7.4	7.1.2 7.1.4	Improved rate and range of indoor activity Lowered risk of falls and accidents	1.1 User profiles			2 PHYSICAL	2.3							



Title	Description	Effect Cat.	Effect nr.	Effect description	Perspective	Groups	Sub Groups	Function	Category	Sub-category	Items
	(incl. death). Because we tend to lose balance due to age or polypharmacy, it is important that environments are designed or adapted to avoid hazardous features. A preventing approach to falls is all the more important that hospitalisation can easily lead to institutional care settings after long periods away from home with care staff taking over daily activities.	7.5	7.1.7 7.1.9 7.4.2 7.4.4 7.5.9	Improved sense of comfort at home Improved sense of safety at home Improved rate and range of social activities Improved satisfaction with opportunities for social engagement in the home Reduction of public sector health and social care costs							
Maintenance	Being unable to maintain one's home is as a major barrier for some older people: costs of maintenance; timely repairs. An understanding of the specific challenges that older adults face in maintaining their homes can guide redesign efforts and interventions to effectively support older adults' desire to age in place. Home maintenance is essential to ensure a safe and healthy environment; in fact, over one hour of every day is spent doing home maintenance	7.1 7.3 7.5	7.1.1 7.1.3 7.1.4 7.1.7 7.1.8 7.1.9 7.3.1 7.5.12	Improved self_reported health and wellbeing Lower dependence on ADL_assistance and aids Lowered risk of falls and accidents Improved sense of comfort at home Lower non_renewable energy consumption Improved sense of safety at home Improved self_reported mental health and happiness Increase in local_regional property values	1.1 User profiles			2 PHYSICAL	2.1		
Physical and IT infrastructure to provide e-health and telemedicine services	More and more private health insurance companies are offering telemedicine and e-health services , that makes possible to receive remote medical assistance.	7.1	7.1.1 7.1.3 7.1.5 7.1.6 7.1.9	Improved self_reported health and wellbeing Lower dependence on ADL_assistance and aids Improved access to care Lowered dependency on institutionalized care Improved sense of safety at home	1.3 Organisational profiles	1.3.2	1.3.2.4	2 PHYSICAL	2.4	2.4.2 6.1.1	6.1.1.1 6.1.1.2 6.1.1.3 6.1.2.1 6.1.2.2
The home should be kept comfortably and affordably warm and cool.	Housing investment which improves thermal comfort in the home can lead to health improvements, especially where the improvements are targeted at those with inadequate warmth and those with chronic respiratory disease. But younger co-habiting informal carers may experience these temperatures as uncomfortable or unhealthy. They need parts of the home to be at lower temperatures.	7.1	7.1.1 7.1.2 7.1.7	Improved self_reported health and wellbeing Improved rate and range of indoor activity Improved sense of comfort at home	1.2 Relatives and informal carers profiles	1.2.1		2 PHYSICAL	2.2	2.2.1	



Title	Description	Effect Cat.	Effect nr.	Effect description	Perspective	Groups	Sub Groups	Function	Category	Sub-category	Items	
Many carers are homebound so access to relevant information digitally is increasingly important	Carers have a lot of informational and support needs. Web-based support networks if well designed can facilitate carers in their role of caregiving by connecting peers, staff and knowledge if needs about on IT safety, accessibility, usability and flexibility are integrated.	7.1	7.1.1	Improved self_reported health and wellbeing	1.2 Relatives and informal carers profiles	1.2.1	1.2.1.1	2 PHYSICAL		2.5.1	4.1.1.2	
		7.3	7.1.6	Lowered dependency on institutionalized care			1.2.2			1.2.1.2	2.5.2	4.1.1.6
			7.3.3	Improved sense of agency						1.2.1.1	2.5.4	
			7.3.4	Reduced incidence of anxiety and depression						1.2.1.2	4.1.1	
Access to services	The provision of public, commercial and religious or spiritual services to older people in/close to their homes is particularly important. Difficulty in obtaining services at home, including their cost, is considered a disadvantage. (cleaning, gardening). Occupants need their living environments to offer easy access to these services	7.1	7.1.1	Improved self_reported health and wellbeing	1.1 User profiles			2 PHYSICAL	2.4			
		7.2	7.1.5	Improved access to care								
		7.4	7.1.6	Lowered dependency on institutionalized care								
		7.5	7.1.7	Improved sense of comfort at home								
			7.2.1	Better reported satisfaction with home environs and neighbourhood								
			7.2.2	Improved rate and range of outdoor activity								
			7.4.1	Lower rates of loneliness and isolation								
			7.4.2	Improved rate and range of social activities								
			7.4.3	Improved sense of social connection with others								
			7.4.5	Improved satisfaction with opportunities for social engagement outside the home								
			7.4.8	The above especially concerns the case of transports services: prevents depressive symptoms (Namkee, 2016)								
			7.5.1	Better availability of financial means for investments in the home environment								
			7.5.9	Reduction of public sector health and social care costs								
	7.5.13	But intervention must be multifactorial: reducing crowding, connecting with services, and improving housing reduces hospitalization, and had a positive benefit to cost ratio of 1.15 (WHO, 2018)										
Home should help carers access	Carers, especially older cohabiting ones, may be homebound as a result of their caring	7.1	7.1.1	Improved self_reported health and wellbeing		1.2.1	1.2.1.1	2 PHYSICAL	2.4	2.4.2		
		7.3	7.1.5	Improved access to care			1.2.2			1.2.1.2	2.4.3	



Title	Description	Effect Cat.	Effect nr.	Effect description	Perspective	Groups	Sub Groups	Function	Category	Sub-category	Items
information about existing home care services and service providers	tasks and declining health. They are less inclined and reluctant to request support and even unaware of services. It is vital they are enabled to remotely and easily access information about available services for their own needs as well as that of the care recipients e.g.: rehabilitation services, homecare and home maintenance services, specific equipment, respite care, counselling, day care		7.3.1 7.3.3 7.3.5	Improved self_reported mental health and happiness Improved sense of agency Lowered demand for formal mental health care	1.2 Relatives and informal carers profiles		1.2.1.1 1.2.1.2				
Home should be barrier-free and support older carers in their care provision activities	Common barriers in the home should be avoided to improve wellbeing. Typical barriers in the home indoors are often found in kitchen and/or hygiene area. In the close exterior the most prevalent environmental barriers in the total sample were "irregular walking surface" (85.2%), "landscape furniture placed in the path of travel" (69.3%) and "narrow parking spaces" (67.1%). Absence of barriers alleviates informal carer burden and frees up time for other care tasks	7.1	7.1.1 7.1.2 7.1.3 7.1.7 7.1.9	Improved self_reported health and wellbeing Improved rate and range of indoor activity Lower dependence on ADL_assistance and aids Improved sense of comfort at home Improved sense of safety at home	1.2 Relatives and informal carers profiles	1.2.1 1.2.2	1.2.1.1 1.2.1.2 1.2.1.1 1.2.1.2	2 PHYSICAL	2.3	2.3.1 2.3.2 2.3.3 2.3.5 2.3.8	
The home should be kept comfortably and affordably warm and cool.	Housing investment which improves thermal comfort in the home can lead to health improvements, especially where the improvements are targeted at those with inadequate warmth and those with chronic respiratory disease. Body temperature regulation deteriorates with advancing age, making older adults more including older carers vulnerable to external temperature conditions. Also relevant: climate change and associated extreme weather events.	7.1	7.1.1 7.1.2 7.1.7	Improved self_reported health and wellbeing Improved rate and range of indoor activity Improved sense of comfort at home	1.2 Relatives and informal carers profiles	1.2.1		2 PHYSICAL	2.2	2.2.1	
Artificial intelligence and	AI is getting increasingly sophisticated at doing what humans do, but more efficiently, more quickly and at a lower cost. The	7.1 7.5	7.1.5 7.1.7 7.5.9	Improved access to care Improved sense of comfort at home Reduction of public sector health and social care costs	1.3 Organisational profiles		1.3.2.3 1.3.2.5	2 PHYSICAL	2.4	2.4.2 2.4.3	2.4.3.2



Title	Description	Effect Cat.	Effect nr.	Effect description	Perspective	Groups	Sub Groups	Function	Category	Sub-category	Items
robotics for health at home	potential for both AI and robotics in healthcare is vast. Just like in our every-day lives, AI and robotics are increasingly a part of our healthcare eco-system.		7.5.10	Reduction of costs for healthcare providers and contractors							
Living space	It is important for older people to have sufficient space and privacy at home, to be able to move around without assistive support from a third party.	7.1	7.1.1	Improved self_reported health and wellbeing	1.1	User profiles		2 PHYSICAL	2.2		
		7.2	7.1.2	Improved rate and range of indoor activity							
		7.3	7.1.4	Lowered risk of falls and accidents							
		7.4	7.1.5	Improved access to care							
			7.2.1	Better reported satisfaction with home environs and neighbourhood							
			7.2.2	Improved rate and range of outdoor activity							
			7.2.3	Improved sense of safety in home environs and neighbourhood							
			7.2.5	Lower dependency on ADL_assistance and aids in outdoor environment							
			7.1.1	Improved self_reported health and wellbeing							
			7.3.1	Improved self_reported mental health and happiness							
			7.3.2	Improved sense of self_worth and self_reliance							
			7.3.3	Improved sense of agency							
			7.3.4	Reduced incidence of anxiety and depression							
			7.4.1	Lower rates of loneliness and isolation							
			7.4.2	Improved rate and range of social activities							
			7.4.3	Improved sense of social connection with others							
			7.4.4	Improved satisfaction with opportunities for social engagement in the home							
			7.4.5	Improved satisfaction with opportunities for social engagement outside the home							
safety from outside threats	Measures have been taken in some cities to improve the security in older people's	7.1	7.1.1	Improved self_reported health and wellbeing	1.1	User profiles		2 PHYSICAL	2.1		
		7.3	7.1.2	Improved rate and range of indoor activity							



Title	Description	Effect Cat.	Effect nr.	Effect description	Perspective	Groups	Sub Groups	Function	Category	Sub-category	Items
	homes: emergency call monitoring devices to keep older people safe; safe from natural disasters.	7.4	7.1.4 7.1.7 7.1.9 7.3.1 7.3.2 7.3.4 7.3.6 7.4.2 7.4.8	Lowered risk of falls and accidents Improved sense of comfort at home Improved sense of safety at home Improved self_reported mental health and happiness Improved sense of self_worth and self_reliance Reduced incidence of anxiety and depression See also references to affordability (financial insecurity) Improved rate and range of social activities Sense of freedom: 'Bringing down rent levels and improving security of tenure, could offer older people more social and financial freedom.' (Age UK, p. 38)							
Home should be safe and prevent individuals from falling	Most fall-related injuries (55%) occur inside the home, including falls on stairs and in rooms throughout the house. An additional 23% of injuries experienced by older adults as a result of falls occur outside but near the home, as on curbs and sidewalks, and other familiar routes. Carers need reassurance the person they care for can move safely about the home. For older carers, risk of falling to themselves may be relevant	7.1	7.1.4 7.1.7 7.1.9	Lowered risk of falls and accidents Improved sense of comfort at home Improved sense of safety at home	1.2 Relatives and informal carers profiles	1.2.1	1.2.1.1 1.2.1.2	2 PHYSICAL	2.1	2.1.3	
Safe homes to minimize domestic accidents.	Reduce the insurance companies risks due to claim from older adults living at home. A high percentage of the accidents inside the homes comes because of the lack of safety measures adapted to the changing needs of the residents.	7.1	7.1.1 7.1.4 7.1.6 7.1.9 7.1.10	Improved self_reported health and wellbeing Lowered risk of falls and accidents Lowered dependency on institutionalized care Improved sense of safety at home Lower incidence of crime and abuse directed at older people	1.3 Organisational profiles	1.3.2	1.3.2.5	2 PHYSICAL	2.1	2.1.1 2.1.3 2.1.4	
Design and construction rules for age friendly safety	Eurocodes are the design codes for the Member States https://eurocodes.jrc.ec.europa.eu/ . EN 1990 is intended to be used with EN 1991 to EN	7.1 7.5	7.1.4 7.1.5	Lowered risk of falls and accidents Improved access to care	1.3 Organisational profiles	1.3.2	1.3.2.1	2 PHYSICAL	2.1	2.1.1	



Title	Description	Effect Cat.	Effect nr.	Effect description	Perspective	Groups	Sub Groups	Function	Category	Sub-category	Items
	1999 for the structural design of buildings and other civil engineering works, including geotechnical aspects, structural fire design, situations involving earthquakes, execution ... There is not exists this level of harmonisation to consider the specificity of safe environments for age related safety, i.e. evacuation time for fire safety engineering.		7.1.9 7.1.11.11 7.5.5 7.5.6 7.5.13	Improved sense of safety at home Evacuation in case of accidental actions such as fire, explosions... Increased investment in housing by social and public housing Increased investment in services and products by private sector _ lower failure costs, _ less need for last minute adjustment _ less risk of liability							
Age friendly industrialised building life cycle adaptability	Open Building is the design of buildings to be made explicit that both stability and change are realities in contemporary built environment. Buildings - and the neighbourhoods they occupy - are not static artefacts and need adjustment in some measure to remain attractive, safe and useful. There is clearly potential for the industrial production of open buildings, buildings where the parts which are designed to allow a high degree of freedom for layout, construction and adaptation.	7.5	7.5.3 7.5.4 7.5.6 7.5.8 7.5.10	Improved willingness to invest in home environments by citizens Increased investment in housing by private sector Increased investment in services and products by private sector Reduction of public sector housing costs Reduction of costs for healthcare providers and contractors	1.3 Organisational profiles		1.3.2.2	2 PHYSICAL	2.2	2.2.1 2.2.2 2.2.3 2.2.4 2.2.5	2.2.3.1 2.2.3.2
Digital Infrastructure to support new digital services at home	The IoT is the next step in convergence between ICTs and the economy, more than 25 billion devices will be connected by 2020. Network connectivity, widespread sensor placement and sophisticated data analytics enable applications to aggregate and act on large amounts of data generated by devices in homes, work places and the natural world. This aggregated data can drive innovation, research and marketing to substantially contribute to further economic growth and social prosperity.	7.1 7.5	7.1.5 7.1.9 7.2.3 7.5.6 7.5.10	Improved access to care Improved sense of safety at home Improved sense of safety in home environs and neighbourhood Increased investment in services and products by private sector Reduction of costs for healthcare providers and contractors	1.3 Organisational profiles		1.3.2.2	2 PHYSICAL		2.5.1 2.5.2 2.5.3 2.5.4	



D2.4 and D3.1 | Working Taxonomy and KPI-framework for Smart age friendly living environments

Adequate home environment to provide the services	For those service providers that involve to have access to the building where the home is , it's mandatory to have an adequate and accesible home environment to deploy the service.	7.1 7.1.1 Improved self_reported health and wellbeing 7.4 7.1.5 Improved access to care 7.2.2 Improved rate and range of outdoor activity 7.4.1 Lower rates of loneliness and isolation	1.3 Organisational profiles	1.3.2 1.3.2.3	3 OUTDOOR ACCESS	3.2		
Home environment should give access to services to allow mobility of their care-recipients	Safe mobility is essential to continued engagement in civic, social, and community life, and to the human interactions necessary for health, well-being, and quality of life. Carers should be supported in knowing there are available and affordable transport services available for themselves and their care-recipient.	7.1 7.1.1 Improved self_reported health and wellbeing 7.2 7.2.1 Better reported satisfaction with home environs and neighbourhood 7.3 7.2.2 Improved rate and range of outdoor activity 7.4 7.2.5 Lower dependency on ADL_assistance and aids in outdoor environment 7.3.3 Improved sense of agency 7.4.1 Lower rates of loneliness and isolation 7.4.2 Improved rate and range of social activities	1.2 Relatives and informal carers profiles	1.2.1 1.2.1.1 1.2.1.2	3 OUTDOOR ACCESS	3.3	3.2.1	
Easy access to public transport	More transportation options might allow for older adults to remain in their own homes, or where they want to live, while still allowing for community participation. An Age-friendly house with easy access to transportation allows for participation in civic, social and economic lives of my community.	7.1 7.1.1 Improved self_reported health and wellbeing 7.2 7.1.5 Improved access to care 7.3 7.1.7 Improved sense of comfort at home 7.4 7.2.1 Better reported satisfaction with home environs and neighbourhood 7.5 7.2.2 Improved rate and range of outdoor activity 7.3.1 Improved self_reported mental health and happiness 7.3.3 Improved sense of agency 7.3.4 Reduced incidence of anxiety and depression 7.4.1 Lower rates of loneliness and isolation 7.4.2 Improved rate and range of social activities 7.4.3 Improved sense of social connection with others 7.4.5 Improved satisfaction with opportunities for social engagement outside the home 7.5.12 Increase in local_regional property values	1.1 User profiles		3 OUTDOOR ACCESS	3.3		



D2.4 and D3.1 | Working Taxonomy and KPI-framework for Smart age friendly living environments

Living space	Healthy housing also relies on the immediate housing environment, and the extent to which this provides access to safe green space, clean environments, where adequate public toilets, safe pedestrian crossing, sidewalks and sufficient seating are available.	<p>7.1 7.1.1 Improved self_reported health and wellbeing</p> <p>7.2 7.1.2 Improved rate and range of indoor activity</p> <p>7.3 7.1.4 Lowered risk of falls and accidents</p> <p>7.4 7.1.5 Improved access to care</p> <p>7.2.1 Better reported satisfaction with home environs and neighbourhood</p> <p>7.2.2 Improved rate and range of outdoor activity</p> <p>7.2.3 Improved sense of safety in home environs and neighbourhood</p> <p>7.2.5 Lower dependency on ADL_assistance and aids in outdoor environment</p> <p>7.3.1 Improved self_reported mental health and happiness</p> <p>7.3.2 Improved sense of self_worth and self_reliance</p> <p>7.3.3 Improved sense of agency</p> <p>7.3.4 Reduced incidence of anxiety and depression</p> <p>7.4.1 Lower rates of loneliness and isolation</p> <p>7.4.2 Improved rate and range of social activities</p> <p>7.4.3 Improved sense of social connection with others</p> <p>7.4.4 Improved satisfaction with opportunities for social engagement in the home</p> <p>7.4.5 Improved satisfaction with opportunities for social engagement outside the home</p>	1.1 User profiles		3 OUTDOOR ACCESS	3.2	3.2.1 3.2.2 3.2.3	
An extra bedroom for cohabiting carer	Cohabiting carer may need access to a separate bedroom when partner has incontinence or sleep-related disorders	<p>7.1 7.1.1 Improved self_reported health and wellbeing</p> <p>7.3 7.1.7 Improved sense of comfort at home</p> <p>7.3.4 Reduced incidence of anxiety and depression</p> <p>7.3.5 Lowered demand for formal mental health care</p>	1.2 Relatives and informal carers profiles	1.2.1 1.2.1.1 1.2.1.2	4 PERSONAL	4.2		



D2.4 and D3.1 | Working Taxonomy and KPI-framework for Smart age friendly living environments

<p>Access to ICT solutions to enable remote monitoring of older/ frail person</p>	<p>ICT tools can be a great enabler in supporting carers to cope with many of the challenges, as that improves the quality of life of carers. ICT tools can facilitate caregiving by enabling the carer to remotely monitor relevant variables, whilst at the same time empowering the older person to live at home with greater autonomy and independence.</p>	<p>7.1</p>	<p>7.1.1 Improved self_reported health and wellbeing 7.3 7.1.7 Improved sense of comfort at home 7.4 7.1.9 Improved sense of safety at home 7.3.2 Improved sense of self_worth and self_reliance 7.3.4 Reduced incidence of anxiety and depression 7.4.2 Improved rate and range of social activities</p>	<p>1.2 Relatives and informal carers profiles 1.2.1 Co-habiting 1.2.2 Non co-habiting 1.2.1.1 Partner 1.2.1.2 Other 1.2.2.1 Partner 1.2.2.2 Other</p>	<p>1.2.1 1.2.1.1 1.2.2 1.2.1.2 1.2.1.1 1.2.1.2</p>	<p>4 PERSONAL</p>	<p>4.2</p>		
<p>Possibility for carer to move into home of person they are caring for</p>	<p>Carers may decide to move into the home of person in order to provide (possibly round-the-clock) care. They may not only need a room of their own, but it should also be possible to do so under existing tenureship-rules of the dwelling etc.</p>	<p>7.1</p>	<p>7.1.1 Improved self_reported health and wellbeing 7.2.1 Better reported satisfaction with home environs and neighbourhood 7.3.1 Improved self_reported mental health and happiness 7.3.2 Improved sense of self_worth and self_reliance 7.3.4 Reduced incidence of anxiety and depression 7.5.3 Improved willingness to invest in home environments by citizens 7.5.9 Reduction of public sector health and social care costs 7.5.10 Reduction of costs for healthcare providers and contractors</p>	<p>1.2 Relatives and informal carers profiles 1.2.2 Non co-habiting</p>	<p>1.2.2 1.2.1.1 1.2.1.2</p>	<p>4 PERSONAL</p>	<p>4.2</p>		
<p>Possibility to arrange for 24 hour care support/palliative care in the home</p>	<p>For the informal carer to be able to provide support in the home (to those with high care needs), it may be necessary for them to be able to access 24 hour professional care or palliative care team. This would enable ageing in place also during end-of-life. This need may also be welcome for those informal carers who are friends and neighbours, caring and providing support to older adults living</p>	<p>7.1</p>	<p>7.1.5 Improved access to care 7.3 7.1.6 Lowered dependency on institutionalized care 7.4 7.1.7 Improved sense of comfort at home 7.5 7.3.1 Improved self_reported mental health and happiness 7.3.3 Improved sense of agency</p>	<p>1.2 Relatives and informal carers profiles 1.2.1 Co-habiting 1.2.2 Non co-habiting 1.2.1.1 Partner 1.2.1.2 Other</p>	<p>1.2.1 1.2.1.1 1.2.2 1.2.1.2 1.2.1.1 1.2.1.2</p>	<p>4 PERSONAL</p>	<p>4.2</p>		



D2.4 and D3.1 | Working Taxonomy and KPI-framework for Smart age friendly living environments

	alone, with either no next-of-kin, or relatives who live far away.	7.3.4 7.3.5 7.4.1 7.5.2 7.5.3	Reduced incidence of anxiety and depression Lowered demand for formal mental health care Lower rates of loneliness and isolation Improved income and wealth position for older people and carers Improved willingness to invest in home environments by citizens	1.2.2.1 Partner 1.2.2.2 Other						
Home should enable inhabitants to remain independent and in control of their lives.	Irrespective of age, all carers have a very important role an may need support, but with older carers the challenges of being a carer may be exacerbated by their age and own health.	7.3	7.3.2 Improved sense of self_worth and self_reliance 7.3.3 Improved sense of agency 7.3.4 Reduced incidence of anxiety and depression	1.2 Relatives and informal carers profiles	1.2.1 1.2.1.1 1.2.1.2	4 PERSONAL	4.2	4.1.1	4.1.1.6	
The home should help the carer to feel a sense of achievement, fulfilment and personal growth	Caring gives some carers a sense of purpose and pride and may often also be a source of great satisfaction and reward, and is not always (as often portrayed) a burden.	7.3 7.4	7.3.1 Improved self_reported mental health and happiness 7.3.2 Improved sense of self_worth and self_reliance 7.3.3 Improved sense of agency 7.4.1 Lower rates of loneliness and isolation 7.4.3 Improved sense of social connection with others	1.2 Relatives and informal carers profiles	1.2.1 1.2.1.1 1.2.1.2	4 PERSONAL	4.1	4.1.1 4.1.3	4.1.1.2 4.1.1.6 4.1.3.1 4.1.3.2	
Sense of Attachment to one's home	Older people want choices about where and how they age in place. "Ageing in place" was seen as an advantage in terms of a sense of attachment or connection and feelings of security and familiarity in relation to both homes and communities. Ageing in place related to a sense of identity both through independence, autonomy, through caring relationships and roles in the places people live. Long-term emotional attachments to environmental surroundings also contribute to well-being in old age.	7.1 7.2 7.3 7.4 7.5	7.1.1 Improved self_reported health and wellbeing 7.1.6 Lowered dependency on institutionalized care 7.2.1 Better reported satisfaction with home environs and neighbourhood 7.2.2 Improved rate and range of outdoor activity 7.2.7 The paper in the reference section explains that 'even though some talked about personal experiences of crime, they dissociated there from the community itself.' 7.3.1 Improved self_reported mental health and happiness 7.3.2 Improved sense of self_worth and self_reliance 7.3.4 Reduced incidence of anxiety and depression 7.3.6 Linked to sense of self-worth: 'maintaining good relations with a variety of neighbors	1.1 User profiles		4 PERSONAL	4.1			



D2.4 and D3.1 | Working Taxonomy and KPI-framework for Smart age friendly living environments

		<p>7.4.1 Lower rates of loneliness and isolation</p> <p>7.4.2 Improved rate and range of social activities</p> <p>7.4.3 Improved sense of social connection with others</p> <p>7.4.4 Improved satisfaction with opportunities for social engagement in the home</p> <p>7.4.5 Improved satisfaction with opportunities for social engagement outside the home</p> <p>7.4.8 Matter of quantity and frequency too: 'Being greeted by numerous people as they walked down the street provided daily evidence of belonging, and a sense of security is derived from familiarity'</p> <p>7.5.9 Reduction of public sector health and social care costs</p>							
Feeling of safety and security in the home	Healthy housing provides a feeling of home, including a sense of belonging, security and privacy. In many cities, older people feel insecure and particularly fear living alone.	<p>7.1 7.1.1 Improved self_reported health and wellbeing</p> <p>7.3 7.1.2 Improved rate and range of indoor activity</p> <p>7.4 7.1.4 Lowered risk of falls and accidents</p> <p>7.1.7 Improved sense of comfort at home</p> <p>7.1.9 Improved sense of safety at home</p> <p>7.3.1 Improved self_reported mental health and happiness</p> <p>7.3.2 Improved sense of self_worth and self_reliance</p> <p>7.3.4 Reduced incidence of anxiety and depression</p> <p>7.4.6 See also references to affordability (financial insecurity)</p> <p>7.4.2 Improved rate and range of social activities</p> <p>7.4.8 Sense of freedom: 'Bringing down rent levels and improving security of tenure, could offer older people more social and financial freedom.' (Age UK, p. 38)</p>	1.1 User profiles		4 PERSONAL	4.1	4.1.1		
Connection with personal history	bla	<p>7.3 7.3.1 Improved self_reported mental health and happiness</p> <p>7.3.2 Improved sense of self_worth and self_reliance</p> <p>7.3.3 Improved sense of agency</p> <p>7.3.4 Reduced incidence of anxiety and depression</p> <p>7.3.5 Lowered demand for formal mental health care</p>	1.1 User profiles	1.1.1 1.1.2 1.1.3 1.1.4 1.1.5	4 PERSONAL	4.1			



						1.1.6				
						1.1.7				
Connection with personal history	To support emotional wellbeing and sense of self, people need to be able to feel connected to their personal history in their home environment, and to experience a sense of continuity between past and present selves. Availability of familiar objects, personalization of spaces and a sense of pride in their surroundings all come into play. Evidence suggests that assistive technologies are more easily accepted if they make use of heirloom status items	7.3	7.3.1	Improved self_reported mental health and happiness	1.1	User profiles	1.1.1	4 PERSONAL	4.1	
			7.3.2	Improved sense of self_worth and self_reliance			1.1.2			
			7.3.3	Improved sense of agency			1.1.3			
			7.3.4	Reduced incidence of anxiety and depression			1.1.4			
			7.3.5	Lowered demand for formal mental health care			1.1.5			
							1.1.6			
							1.1.7			
Personal history connection to environment	People need to find aspects in the immediate environment of their home that accord with and establish a sense of continuity with their personal history and identity.	7.2	7.2.3	Improved sense of safety in home environs and neighbourhood	1.1	User profiles	1.1.1	4 PERSONAL	4.1	4.1.2
		7.3	7.3.1	Improved self_reported mental health and happiness			1.1.2			
			7.3.2	Improved sense of self_worth and self_reliance			1.1.3			
			7.3.3	Improved sense of agency			1.1.4			
			7.3.4	Reduced incidence of anxiety and depression			1.1.5			
			7.3.5	Lowered demand for formal mental health care			1.1.6			
							1.1.7			
Autonomy in activities	People need to feel enabled to pursue activities independently while in their home. This contributes to a sense of emotional wellbeing, by establishing the home as a trusted base for activity	7.2	7.2.3	Improved sense of safety in home environs and neighbourhood	1.1	User profiles	1.1.1	4 PERSONAL	4.1	4.1.1
		7.3	7.3.1	Improved self_reported mental health and happiness			1.1.2			
			7.3.2	Improved sense of self_worth and self_reliance			1.1.3			
			7.3.3	Improved sense of agency			1.1.4			
							1.1.5			
							1.1.6			
							1.1.7			
Autonomy in activities	To support dignity and a sense of privacy, people need to be able to pursue activities independently in their home environment, and to make autonomous choices which	7.2	7.1.11.11	Trade-offs may result in lower objective safety of the home environment	1.1	User profiles	1.1.1	4 PERSONAL	4.2	
		7.3	7.3.1	Improved self_reported mental health and happiness			1.1.2			
			7.3.2	Improved sense of self_worth and self_reliance			1.1.3			



	activities to engage in and when. For people needing specialist housing, Orrell et al (2013) note that trade-offs may be involved between safety concerns of informal and formal carers, and autonomy and self-determination needs of residents.	7.3.3	Improved sense of agency		1.1.4 1.1.5 1.1.6 1.1.7				
Self-fulfillment through lifestyle	The ability to pursue and maintain a self-chosen lifestyle, associated with a particular pattern of self-fulfillment and engagement activities, is positively associated with Quality of Life and emotional wellbeing. The home is a major base in fulfilling this need. Aspects associated with it are e.g. pets, hobbies, storage facilities.	7.1 7.3 7.4	7.1.11.11 Trade-offs may result in lower objective safety of the home environment 7.3.1 Improved self_reported mental health and happiness 7.3.2 Improved sense of self_worth and self_reliance 7.3.3 Improved sense of agency 7.3.4 Reduced incidence of anxiety and depression 7.4.1 Lower rates of loneliness and isolation	1.1 User profiles	1.1.1 1.1.2 1.1.3 1.1.4 1.1.5 1.1.6 1.1.7	4 PERSONAL	4.1	4.1.1	
Dying with dignity at home	The ability to die at home has a strong positive contribution to dying people's psychological state	7.1 7.3 7.4	7.1.11.11 Trade-offs may result in lower objective safety of the home environment 7.3.1 Improved self_reported mental health and happiness 7.3.2 Improved sense of self_worth and self_reliance 7.3.4 Reduced incidence of anxiety and depression 7.4.1 Lower rates of loneliness and isolation	1.1 User profiles		4 PERSONAL	4.2	4.2.6	
Dying with dignity at home	The ability to die at home has a strong positive contribution to dying people's psychological state. This is true not just for the person in the last stages of life, but equally so for informal carers: when their needs for privacy, dignity and personal space are satisfied at this difficult time, it contributes greatly to their psychological wellbeing and ability to cope.	7.1 7.3 7.4	7.1.11.11 Trade-offs may result in lower objective safety of the home environment 7.3.1 Improved self_reported mental health and happiness 7.3.2 Improved sense of self_worth and self_reliance 7.3.4 Reduced incidence of anxiety and depression 7.4.1 Lower rates of loneliness and isolation	1.2 Relatives and informal carers profiles	1.2.1 1.2.1.1 1.2.1.2	4 PERSONAL	4.2	4.2.6	
Dying with dignity at home	The ability to die at home has a strong positive contribution to dying people's psychological state. This is true not just for	7.1 7.3	7.1.11.11 Trade-offs may result in lower objective safety of the home environment 7.3.1 Improved self_reported mental health and happiness	1.2 Relatives and informal carers profiles	1.2.1 1.2.1.1 1.2.1.2	4 PERSONAL	4.2	4.2.6	



	the person in the last stages of life, but equally so for informal carers: when their needs for privacy, dignity and personal space are satisfied at this difficult time, it contributes greatly to their psychological wellbeing and ability to cope.	7.4	7.3.2	Improved sense of self_worth and self_reliance						
			7.3.4	Reduced incidence of anxiety and depression						
			7.4.1	Lower rates of loneliness and isolation						
Private spaces for informal carers	Informal carers, both co-habiting and non-co-habiting, can feel crowded out of the home, with the facilities and processes centred around the person requiring care taking up both physical and psychological space. The presence of one or more dedicated spaces for carers in the home, e.g. a separate bedroom or bed-/sitting room, can support carers to maintain a personal lifestyle and feel welcome in the home, which contributes to mental resilience	7.1	7.1.11.11	Trade-offs may result in lower objective safety of the home environment	1.2	Relatives and informal carers profiles	4	PERSONAL	4.2	4.2.5
		7.3	7.3.1	Improved self_reported mental health and happiness						
		7.4	7.3.2	Improved sense of self_worth and self_reliance						
			7.3.3	Improved sense of agency						
			7.3.4	Reduced incidence of anxiety and depression						
			7.4.4	Improved satisfaction with opportunities for social engagement in the home						
Assistive technologies that work for occupants	When assistive technologies, especially monitoring systems, are deployed in the home, these must respect several design and operational principles to satisfy daily life needs and preferences of occupants. They must assume and realize occupant agency, take account of and accommodate differences and variation, their operation and settings should be transparent to occupants and occupants should be able to easily and dynamically adjust these settings when they wish.	7.1	7.1.11.11	Trade-offs may result in lower objective safety of the home environment	1.1	User profiles	4	PERSONAL	4.2	4.2.3
		7.3	7.1.9	Improved sense of safety at home						
			7.3.2	Improved sense of self_worth and self_reliance						
			7.3.3	Improved sense of agency						
			7.3.4	Reduced incidence of anxiety and depression						
Autonomy in interaction with others	To support a sense of agency, which in turn contributes both to emotional wellbeing and to emotional connection to others, people need to be free to choose the time, manner and degree of interaction with others, both inside the home and outside.	7.1	7.1.11.11	Trade-offs may result in lower objective safety of the home environment	1.1	User profiles	4	PERSONAL	4.2	4.2.1
		7.3	7.3.1	Improved self_reported mental health and happiness						
		7.4	7.3.2	Improved sense of self_worth and self_reliance						
			7.3.3	Improved sense of agency						
			7.4.4	Improved satisfaction with opportunities for social engagement in the home						



		7.4.5	Improved satisfaction with opportunities for social engagement outside the home						
Availability of privileged spaces	To support sense of agency, feelings of self-worth and control over environment and events, people need an area or space that is uniquely theirs, to which they control access and that can serve as a secure base to venture into engagement with others.	7.1	7.1.11. Trade-offs may result in lower objective safety of the home environment	1.1	User profiles		4 PERSONAL	4.2	4.2.1
		7.3	7.3.2 Improved sense of self_worth and self_reliance						4.2.2
		7.4	7.3.3 Improved sense of agency						4.2.5
			7.4.3 Improved sense of social connection with others						
			7.4.4 Improved satisfaction with opportunities for social engagement in the home						
Autonomy in place management	"Smart" home management (e.g. for lighting, heating/cooling) can lead to feelings of alienation and loss of control for occupants, unless their interfaces are designed for and support easy and flexible use by occupants.	7.1	7.1.11. Trade-offs may result in lower objective safety of the home environment	1.1	User profiles		4 PERSONAL	4.2	4.2.3
		7.3	7.1.7 Improved sense of comfort at home						4.2.4
			7.3.2 Improved sense of self_worth and self_reliance						
			7.3.3 Improved sense of agency						
Occupant co-creation of home environments	To establish a sense of connection with and self-worth derived from the home environment, it is important that older people are enabled to act as co-creators in design and decision making for both new builds and renovations of homes, and that where possible they should be actively engaged in decision making and execution of home maintenance activities	7.1	7.1.11. Trade-offs may result in lower objective safety of the home environment	1.1	User profiles		4 PERSONAL	4.2	4.2.4
		7.1	7.1.7 Improved sense of comfort at home						
		7.3	7.3.2 Improved sense of self_worth and self_reliance						
		7.5	7.3.3 Improved sense of agency						
			7.5.3 Improved willingness to invest in home environments by citizens						
Base for meaningful activity and engagement	For emotional wellbeing and attachment to place, it is important that people's home environment provides a suitable base for engagement in activities and relations that are specifically relevant and significant to them. This aids emotional grounding and connection. Part of this is a need for easy access to mobility options.	7.1	7.1.11. Trade-offs may result in lower objective safety of the home environment	1.1	User profiles		4 PERSONAL	4.1	4.1.1
		7.3	7.3.1 Improved self_reported mental health and happiness						4.1.3
		7.4	7.3.2 Improved sense of self_worth and self_reliance						
			7.3.3 Improved sense of agency						
			7.4.1 Lower rates of loneliness and isolation						
			7.4.3 Improved sense of social connection with others						



D2.4 and D3.1 | Working Taxonomy and KPI-framework for Smart age friendly living environments

Access to places with spiritual significance	For many older adults, being able to access places with spiritual significance is important to support sense of identity and emotional attachment.	7.1	7.3.1	Improved self_reported mental health and happiness	1.1	User profiles		4 PERSONAL	4.1	4.1.3	4.1.3.1
		7.3		Trade-offs may result in lower objective safety of the home environment							
			7.3.2	Improved sense of self_worth and self_reliance							
			7.3.3	Improved sense of agency							
Access to facilities with emotional meaning	For emotional wellbeing and attachment to place, it is important that shops and services important to occupants are within easy reach. This proximity does not only have practical advantages, it also helps to safeguard the perception of the neighbourhood as vital and in tune with the needs of its (vulnerable) residents.	7.1	7.3.1	Improved self_reported mental health and happiness	1.1	User profiles		4 PERSONAL	4.1	4.1.3	4.1.3.1
		7.3	7.1.11.11	Trade-offs may result in lower objective safety of the home environment							
		7.4	7.3.2	Improved sense of self_worth and self_reliance							
			7.3.3	Improved sense of agency							
			7.4.1	Lower rates of loneliness and isolation							
			7.4.5	Improved satisfaction with opportunities for social engagement outside the home							
Pets allowed	Pets are companions, and often an important focus for affection and emotional support.	7.1	7.3.1	Improved self_reported mental health and happiness	1.1	User profiles		4 PERSONAL	4.1	4.1.1	
		7.3	7.1.11	Trade-offs may result in lower objective safety of the home environment							
		7.4	7.3.4	Reduced incidence of anxiety and depression							
			7.4.1	Lower rates of loneliness and isolation							
Continuity of long-term relationships	The on-set of dependency should not lead to severing of long-term relationships, as such severing has been shown to be detrimental to wellbeing and quality of life. These relationships may be with other people, but also with e.g. pets.	7.1	7.3.1	Improved self_reported mental health and happiness	1.1	User profiles		4 PERSONAL	4.2	4.2.1	
		7.3	7.1.11	Trade-offs may result in lower objective safety of the home environment							
		7.4	7.3.4	Reduced incidence of anxiety and depression							
			7.4.1	Lower rates of loneliness and isolation							
			7.4.3	Improved sense of social connection with others							
Emotional attachment to neighbourhood	People strongly prefer to live in a neighbourhood that is connected to their personal history, and the socio-cultural and socio-economic characteristics of which mesh with a person's self-perceived socio-cultural and socio-economic identity.	7.1	7.3.1	Improved self_reported mental health and happiness	1.1	User profiles		4 PERSONAL	4.1	4.1.3	
		7.3	7.1.11	Trade-offs may result in lower objective safety of the home environment							
		7.4	7.3.2	Improved sense of self_worth and self_reliance							
			7.4.3	Improved sense of social connection with others							



D2.4 and D3.1 | Working Taxonomy and KPI-framework for Smart age friendly living environments

		7.4.4	Improved satisfaction with opportunities for social engagement in the home							
		7.4.5	Improved satisfaction with opportunities for social engagement outside the home							
Plenty of daylight	In the research literature, having access to plenty of daylight (well in excess of current standards) is associated with a better state of emotional wellbeing	7.1	7.1.7 Improved sense of comfort at home	1.1	User profiles		4 PERSONAL	4.1	4.1.1	4.1.1.5
		7.3	7.1.11 Trade-offs may result in lower objective safety of the home environment							
		7.3.1	Improved self_reported mental health and happiness							
		7.3.4	Reduced incidence of anxiety and depression							
Items and furnishings with special meaning	Items and furnishings in the home environment may be imbued with special meaning/ significance for the occupant. The opportunity to keep these items / furnishings in place is positively associated with emotional wellbeing and attachment.	7.1	7.3.1 Improved self_reported mental health and happiness	1.1	User profiles		4 PERSONAL	4.1	4.1.1	4.1.1.3
		7.3	7.1.11 Trade-offs may result in lower objective safety of the home environment							
		7.3.2	Improved sense of self_worth and self_reliance							
		7.3.4	Reduced incidence of anxiety and depression							
Adequate protection from noise pollution	Exposure to noise pollution is negatively associated with mental health and social functioning. Protection from noise pollution contributes to personal wellbeing and social participation	7.1	7.3.1 Improved self_reported mental health and happiness	1.1	User profiles		4 PERSONAL	4.2	4.2.5	
		7.3	7.1.11 Trade-offs may result in lower objective safety of the home environment							
		7.4	7.3.3 Improved sense of agency							
		7.4.2	Improved rate and range of social activities							
		7.4.3	Improved sense of social connection with others							
		7.4.4	Improved satisfaction with opportunities for social engagement in the home							
Emotional wellbeing outdoors	Having the opportunity to enjoy views of and interactions with nature and access to informal spaces in the vicinity of the home contributes to people's emotional wellbeing.	7.1	7.3.1 Improved self_reported mental health and happiness	1.1	User profiles		4 PERSONAL	4.1	4.1.1	
		7.3	7.1.11 Trade-offs may result in lower objective safety of the home environment						4.1.3	
		7.4	7.3.4 Reduced incidence of anxiety and depression							
		7.4.3	Improved sense of social connection with others							
		7.4.5	Improved satisfaction with opportunities for social engagement outside the home							
Financial security		7.1	7.3.1 Improved self_reported mental health and happiness					4.2		



D2.4 and D3.1 | Working Taxonomy and KPI-framework for Smart age friendly living environments

	Financial dependency is negatively associated with mental health. This is specifically so where there is financial dependency for housing arrangements. To support personal sense of security and emotional wellbeing, residents must have long-term security on costs of housing, or alternatively on the long-term availability of appropriate, affordable housing arrangements.	7.3	7.1.11	Trade-offs may result in lower objective safety of the home environment	1.1 profiles	User	4 PERSONAL							
		7.5	7.3.2	Improved sense of self_worth and self_reliance										
			7.3.4	Reduced incidence of anxiety and depression										
			7.5.2	Improved income and wealth position for older people and carers										
An environment that can be customized to personal tastes	People prefer a living environment that reflects their personal history, sense of self, tastes and preferences. According to the literature, the opportunity to customize the living environment accordingly contributes to the establishment of Place attachment. The opportunity to customize the living environment helps people to stake out a personal territory, in which they feel enabled.	7.1	7.3.1	Improved self_reported mental health and happiness	1.1 profiles	User	4 PERSONAL	4.1	4.1.1	4.1.1.3				
		7.3		Trade-offs may result in lower objective safety of the home environment										4.1.1.4
			7.3.2	Improved sense of self_worth and self_reliance										4.1.1.5
			7.3.3	Improved sense of agency										
An environment that accommodates changing preferences	People's personal preferences, tastes and requirements are not static, but show short-term variation and longer term evolution. A living environment that can respond to these changes easily and under the direction of the occupants themselves, contributes to maintaining Place attachment over the lifecourse.	7.3	7.3.1	Improved self_reported mental health and happiness	1.1 profiles	User	4 PERSONAL	4.2	4.2.3					
			7.3.2	Improved sense of self_worth and self_reliance										4.2.4
			7.3.3	Improved sense of agency										
			7.3.4	Reduced incidence of anxiety and depression										
Dying with dignity at home	The ability to die at home has a strong positive contribution to dying people's psychological state	7.1	7.3.1	Improved self_reported mental health and happiness	1.1 profiles	User	4 PERSONAL	4.2	4.1.1					
		7.3	7.1.11	Trade-offs may result in lower objective safety of the home environment										4.2.6
		7.4	7.3.2	Improved sense of self_worth and self_reliance										
			7.3.4	Reduced incidence of anxiety and depression										
			7.4.1	Lower rates of loneliness and isolation										



A sense of security in the living environment	People's emotional wellbeing is supported when the environment they live in provides a sense of security. This may consist in the availability of personal, "safe" spaces, a supportive social environment, a neighbourhood that is perceived as relatively safe and supportive, and so on. The literature notes that a perceived lack of security may affect subjective wellbeing more than the real impact of any threat.	7.1	7.1.9	Improved sense of safety at home	1.1 User profiles		4 PERSONAL	4.2	4.2.2 4.2.5	
A sense of security in the living environment	People's emotional wellbeing is supported when the environment they live in provides a sense of security. This may consist in the availability of personal, "safe" spaces, a supportive social environment, a neighbourhood that is perceived as relatively safe and supportive, and so on. The literature notes that a perceived lack of security may affect subjective wellbeing more than the real impact of any threat.	7.1	7.1.9	Improved sense of safety at home	1.1 User profiles		4 PERSONAL	4.1	4.1.1 4.1.2 4.1.3	4.1.1.6
Support services for carer needs	The wellbeing and resilience of informal carers is supported if, in the living environment, they can get access to services specifically designed to support them both practically and psychologically. These services may include home care/home support services, respite care and psychological services, but also for instance access to specific carer allowances.	7.1	7.3.1	Improved self_reported mental health and happiness	1.2 Relatives and informal carers profiles		4 PERSONAL	4.1	4.1.1 4.1.2 4.1.3	4.1.1.5 4.1.2.4
Information and ICT support for carers	ICT support and services can help alleviate the burden on carers both by partial take-over of carer tasks (such as monitoring systems/services) and by facilitating access to online information and support (web portals, communication devices etc).	7.1	7.1.9	Improved sense of safety at home	1.2 Relatives and informal carers profiles		4 PERSONAL	4.2	4.2.3 4.2.6	
		7.3	7.1.11	Trade-offs may result in lower objective safety of the home environment						
			7.3.1	Improved self_reported mental health and happiness						
			7.3.2	Improved sense of self_worth and self_reliance						
			7.3.3	Improved sense of agency						



		7.3.4	Reduced incidence of anxiety and depression								
Privacy from surveillance in the home	Surveillance devices and systems in the home are a potential threat to autonomy and privacy of residents both in fact and in residents' perception. To safeguard actual and perceived privacy, residents need to be able to adjust surveillance settings to personal preferences and specifically exclude activities, spaces and locations from surveillance	7.1	7.3.2	Improved sense of self_worth and self_reliance	1.1	User profiles	4	PERSONAL	4.2	4.2.1	
		7.3	7.1.11	Trade-offs may result in lower objective safety of the home environment						4.2.3	
			7.3.3	Improved sense of agency						4.2.5	
			7.3.6	Better level of privacy							
Privacy in an outdoor context	The need for privacy presents not just in indoors environments, but also in outdoor spaces (such as gardens, patios, balconies) attached to dwelling.	7.1	7.3.1	Improved self_reported mental health and happiness	1.1	User profiles	4	PERSONAL	4.1	4.1.1	4.1.1.5
		7.3	7.1.11	Trade-offs may result in lower objective safety of the home environment						4.1.2	4.1.2.4
			7.3.2	Improved sense of self_worth and self_reliance							
			7.3.6	Better level of privacy							
Privacy in an outdoor context	The need for privacy presents not just in indoors environments, but also in outdoor spaces (such as gardens, patios, balconies) attached to dwelling.	7.1	7.3.1	Improved self_reported mental health and happiness	1.1	User profiles	4	PERSONAL	4.2	4.1.1	
		7.3	7.1.11	Trade-offs may result in lower objective safety of the home environment						4.1.2	
			7.3.2	Improved sense of self_worth and self_reliance						4.2.5	
				Better level of privacy							
Ability to engage in meaningful activity	There is a large body of research that shows that engagement in meaningful activity, be it employment, volunteering, hobbies or otherwise, plays an important role in safeguarding and improving wellbeing and quality of life. To furnish this opportunity, important elements in the living environment are easily reachable meaningful destinations, and the proximity of likeminded others.	7.1	7.3.1	Improved self_reported mental health and happiness	1.1	User profiles	4	PERSONAL	4.1	4.1.3	4.1.3.1
		7.3	7.1.11	Trade-offs may result in lower objective safety of the home environment							4.1.3.2
		7.4	7.3.2	Improved sense of self_worth and self_reliance							
			7.3.3	Improved sense of agency							
			7.3.6	Better level of privacy							
			7.4.1	Lower rates of loneliness and isolation							
			7.4.2	Improved rate and range of social activities							
			7.4.3	Improved sense of social connection with others							



D2.4 and D3.1 | Working Taxonomy and KPI-framework for Smart age friendly living environments

Availability of meaningful activity for informal carers	The ability of informal carers to cope and maintain life balance is supported by having easy access to volunteering opportunities in the community or training opportunities that facilitate recognition of informal carer skills e.g. through web-based access (distance learning)	<p>7.1 7.3.1 Improved self_reported mental health and happiness</p> <p>7.3 7.1.11 Trade-offs may result in lower objective safety of the home environment</p> <p>7.5 7.3.2 Improved sense of self_worth and self_reliance</p> <p>7.3.3 Improved sense of agency</p> <p>7.3.6 Better level of privacy</p> <p>7.5.9 Reduction of public sector health and social care costs</p> <p>7.5.10 Reduction of costs for healthcare providers and contractors</p>	1.2 Relatives and informal carers profiles	1.2.1 1.2.1.1 1.2.1.2	4 PERSONAL	4.1	4.1.3	
Ability to participate in pleasurable and meaningful activities	The ability to participate in pleasurable and meaningful activities in the home or its immediate environment has been shown to have a positive effect on preservation of personal dignity especially in people with dementia.	<p>7.1 7.1.6 Lowered dependency on institutionalized care</p> <p>7.3 7.1.11 Trade-offs may result in lower objective safety of the home environment</p> <p>7.3.2 Improved sense of self_worth and self_reliance</p> <p>7.3.3 Improved sense of agency</p> <p>7.3.4 Reduced incidence of anxiety and depression</p> <p>Better level of privacy</p>	1.1 User profiles	1.1.3 1.1.4	4 PERSONAL	4.2	4.2.1	
Feeling of social embedding in and around the home	People strongly prefer a living environment in which they feel at home and secure in terms of the social context, looking for supportive places, interactions and mechanisms.	<p>7.1 7.2.1 Better reported satisfaction with home environs and neighbourhood</p> <p>7.2 7.1.11 Trade-offs may result in lower objective safety of the home environment</p> <p>7.3 7.2.3 Improved sense of safety in home environs and neighbourhood</p> <p>7.4 7.3.2 Improved sense of self_worth and self_reliance</p> <p>7.3.3 Improved sense of agency</p> <p>7.3.6 Better level of privacy</p> <p>7.4.2 Improved rate and range of social activities</p> <p>7.4.4 Improved satisfaction with opportunities for social engagement in the home</p> <p>7.4.5 Improved satisfaction with opportunities for social engagement outside the home</p>	1.1 User profiles		4 PERSONAL	4.1	4.1.2	4.1.2.2 4.1.2.4



D2.4 and D3.1 | Working Taxonomy and KPI-framework for Smart age friendly living environments

<p>Feeling of social embedding in and around the home</p>	<p>People strongly prefer a living environment in which they feel at home and secure in terms of the social context, looking for supportive places, interactions and mechanisms.</p>	<p>7.1 7.2.1 Better reported satisfaction with home environs and neighbourhood 7.2 7.1.11 Trade-offs may result in lower objective safety of the home environment 7.3 7.2.3 Improved sense of safety in home environs and neighbourhood 7.4 7.3.2 Improved sense of self_worth and self_reliance 7.3.3 Improved sense of agency 7.3.6 Better level of privacy 7.4.2 Improved rate and range of social activities 7.4.4 Improved satisfaction with opportunities for social engagement in the home 7.4.5 Improved satisfaction with opportunities for social engagement outside the home</p>	<p>1.1 User profiles</p>		<p>4 PERSONAL</p>	<p>4.2</p>	<p>4.2.1</p>	
<p>Social embedding in the neighbourhood</p>	<p>People's sense of well-being, safety and security is served when they experience the neighbourhood they live in as a supportive environment. This includes both practical aspects such as the ability to navigate the neighbourhood safely and independently, and more emotive aspects such as sensitivity to and fit with specific socio-cultural needs.</p>	<p>7.1 7.2.1 Better reported satisfaction with home environs and neighbourhood 7.2 7.1.11 Trade-offs may result in lower objective safety of the home environment 7.3 7.2.3 Improved sense of safety in home environs and neighbourhood 7.4 7.3.2 Improved sense of self_worth and self_reliance 7.3.3 Improved sense of agency 7.3.6 Better level of privacy 7.4.3 Improved sense of social connection with others 7.4.5 Improved satisfaction with opportunities for social engagement outside the home</p>	<p>1.1 User profiles</p>		<p>4 PERSONAL</p>	<p>4.1</p>	<p>4.1.3</p>	<p>4.1.3.1 4.1.3.2</p>
<p>Social embedding in the neighbourhood</p>	<p>People's sense of well-being, safety and security is served when they experience the neighbourhood they live in as a supportive environment. This includes both practical aspects such as the ability to navigate the neighbourhood safely and independently, and more emotive aspects such as sensitivity to and fit with specific socio-cultural needs.</p>	<p>7.1 7.2.1 Better reported satisfaction with home environs and neighbourhood 7.2 7.1.11 Trade-offs may result in lower objective safety of the home environment 7.3 7.2.3 Improved sense of safety in home environs and neighbourhood 7.4 7.3.2 Improved sense of self_worth and self_reliance 7.3.3 Improved sense of agency</p>	<p>1.1 User profiles</p>		<p>4 PERSONAL</p>	<p>4.2</p>	<p>4.2.2</p>	



D2.4 and D3.1 | Working Taxonomy and KPI-framework for Smart age friendly living environments

		7.3.6 Better level of privacy 7.4.3 Improved sense of social connection with others 7.4.5 Improved satisfaction with opportunities for social engagement outside the home							
Social embedding of carers	The need for a living environment and that are experienced as embedding and supporting in both a practical and emotive sense extends to informal carers.	7.1 7.2.1 Better reported satisfaction with home environs and neighbourhood 7.2 7.1.11 Trade-offs may result in lower objective safety of the home environment 7.3 7.2.3 Improved sense of safety in home environs and neighbourhood 7.4 7.3.1 Improved self_reported mental health and happiness 7.3.2 Improved sense of self_worth and self_reliance 7.3.3 Improved sense of agency 7.3.6 Better level of privacy 7.4.3 Improved sense of social connection with others 7.4.5 Improved satisfaction with opportunities for social engagement outside the home	1.2 Relatives and informal carers profiles		4 PERSONAL	4.2			
Availability of healthy food in the living environment	Personal wellbeing (both physical and emotional) is negatively associated with residency in areas that are designated as "food deserts".	7.1 7.1.1 Improved self_reported health and wellbeing 7.2 7.1.11 Trade-offs may result in lower objective safety of the home environment 7.3 7.2.1 Better reported satisfaction with home environs and neighbourhood 7.3.1 Improved self_reported mental health and happiness 7.3.4 Reduced incidence of anxiety and depression 7.3.6 Better level of privacy	1.1 User profiles		4 PERSONAL	4.1	4.1.3		
Access to social, health and financial services	People need to have the right services available in the neighbourhood where they live in order to feel secure and empowered in living independently.	7.1 7.1.1 Improved self_reported health and wellbeing 7.3 7.1.11 Trade-offs may result in lower objective safety of the home environment 7.5 7.1.5 Improved access to care 7.1.9 Improved sense of safety at home 7.3.2 Improved sense of self_worth and self_reliance	1.1 User profiles	1.1.2 1.1.3 1.1.4 1.1.5 1.1.6	4 PERSONAL	4.2	4.2.6		



		7.3.3	Improved sense of agency		1.1.7					
		7.3.6	Better level of privacy							
		7.5.1	Better availability of financial means for investments in the home environment							
Ability to work from home and/or proximity to employment to be reconcile work and care	The work life balance directive establishes a right for carers to request "flexible working arrangements" (meaning the possibility for workers to adjust their working patterns including the use of remote working arrangements, flexible working schedules, or a reduction in working hours) to which employers must respond.	7.3	7.3.1	Improved self_reported mental health and happiness	1.2 Relatives and informal carers profiles	1.2.1	1.2.1.1	5 SOCIAL	5.2	
		7.4	7.3.2	Improved sense of self_worth and self_reliance	1.2.1 Co-habiting		1.2.1.2			
		7.5	7.3.3	Improved sense of agency						
			7.3.4	Reduced incidence of anxiety and depression						
			7.4.7	Higher percentage of informal carers in fulltime or parttime employment						
			7.5.2	Improved income and wealth position for older people and carers						
Home needs to be sufficiently spacious, functional to receive visitors e.g. friends and relatives	Informal carers commonly experience reduced social connectedness, especially when caring for people with dementia or other mental illness.	7.4	7.4.1	Lower rates of loneliness and isolation	1.2 Relatives and informal carers profiles	1.2.1	1.2.1.1	5 SOCIAL	5.1	5.1.1
			7.4.3	Improved sense of social connection with others			1.2.1.2			5.1.1.2
			7.4.4	Improved satisfaction with opportunities for social engagement in the home						5.1.1.3
Easy access to socially-oriented activities that care recipients and carers can attend together	Socially orientated activities that carers and care recipients can attend together such as dementia cafés allow both carers and care recipients to meet others to gain social and peer support. That way the carer need not feel guilty for leaving the care recipient at home while they enjoy themselves. They also offer environments where others understand health conditions such as dementia and where unusual behaviour is accepted.	7.4	7.4.1	Lower rates of loneliness and isolation	1.2 Relatives and informal carers profiles	1.2.1	1.2.1.1	5 SOCIAL	5.1	5.1.2
			7.4.2	Improved rate and range of social activities			1.2.1.2			5.1.2.6
			7.4.3	Improved sense of social connection with others						5.1.2.7
			7.4.5	Improved satisfaction with opportunities for social engagement outside the home						
Home environs should promote creation of	Commitment occurs naturally among neighbours; along with providing instrumental and emotional support,	7.3	7.3.1	Improved self_reported mental health and happiness	1.2 Relatives and informal carers profiles	1.2.1	1.2.1.1	5 SOCIAL	5.1	3.2.3
			7.3.4	Reduced incidence of anxiety and depression		1.2.2	1.2.1.2			3.2.3
							1.2.1.1			5.1.3



informal support networks (neighbors, friends etc).	neighbour support seems to be a matter of carefully 'watching over each other'. This also seems to be the rationale behind many of the adapted senior co-housing strategies and intergenerational housing, which focus on creating common and shared spaces and a reassuring living environment.					1.2.1.2				
cater for ethnic diversity	The ethnic mix of future older adults in Europe will be more mixed than now. The ability to interact with preferred social groups of other older adults with similar heritage or shared values might become more important		-		1.3 Organisational profiles	1.3.1 1.3.1.1 1.3.1.2 1.3.1.4	5 SOCIAL	5.1	5.1.2 5.1.3	5.1.3.1
Opportunity to co-habit with self-selected others	Co-habitation, with attendant daily social interaction, with elected others is positively associated with mental health in older adults. However, forced co-habitation or co-habitation under circumstances beyond the control of the subject are negatively associated with mental health.	7.1 7.3 7.4	7.3.1 7.1.11 7.3.3 7.3.6 7.4.1 7.4.3 7.4.4	Improved self_reported mental health and happiness Trade-offs may result in lower objective safety of the home environment Improved sense of agency Better level of privacy Lower rates of loneliness and isolation Improved sense of social connection with others Improved satisfaction with opportunities for social engagement in the home	1.1 User profiles		5 SOCIAL	5.1	4.2.6 5.1.1	
Regulate level and conditions of social contact in the home	People have a need to be able to regulate social contacts in the home, and to find a balance between engagement with others and privacy/seclusion. The spatial lay-out and features of the home environment are a means of facilitation this need.	7.1 7.3 7.4	7.1.11 7.3.3 7.3.3 7.3.6 7.4.1 7.4.3 7.4.4	Trade-offs may result in lower objective safety of the home environment Improved self_reported mental health and happiness Improved sense of agency Better level of privacy Lower rates of loneliness and isolation Improved sense of social connection with others Improved satisfaction with opportunities for social engagement in the home	1.1 User profiles		5 SOCIAL	5.1	4.2.6 5.1.1	
Control over access and flow of visitors	For the purpose of emotional security and the experience of autonomy, and to reinforce self-worth and empowerment, people need	7.1 7.3	7.1.11 7.3.1	Trade-offs may result in lower objective safety of the home environment Improved self_reported mental health and happiness	1.1 User profiles		5 SOCIAL	5.1	4.2.6 5.1.1	



	to be able to control access to their home and the flow of visitors, both social visitors and professional operatives	7.4	7.3.2	Improved sense of self_worth and self_reliance						
			7.3.3	Improved sense of agency						
			7.3.6	Better level of privacy						
			7.4.4	Improved satisfaction with opportunities for social engagement in the home						
Opportunities for organized social activity in the living environment	A socially active lifestyle commensurate with individual intrinsic preferences is an important determinant for wellbeing and quality of life. In their living environment, older adults need to be able to locate and reach spaces and places where such interaction can take place. Organized social activities are an important facilitator. A large body of research literature supports this finding, the literature quoted is just a sample.	7.1	7.1.11	Trade-offs may result in lower objective safety of the home environment	1.1	User profiles		5 SOCIAL	5.1	4.2.6
		7.3	7.3.6	Better level of privacy						
		7.4	7.4.1	Lower rates of loneliness and isolation						
			7.4.2	Improved rate and range of social activities						
			7.4.3	Improved sense of social connection with others						
			7.4.4	Improved satisfaction with opportunities for social engagement in the home						
			7.4.5	Improved satisfaction with opportunities for social engagement outside the home						
Opportunities for informal and spontaneous social activity in the living environment	A socially active lifestyle commensurate with individual intrinsic preferences is an important determinant for wellbeing and quality of life. In their living environment, older adults need to be able to locate and reach spaces and places where such interaction can take place. Opportunities for informal and spontaneous social activity play an important role. A large body of research literature supports this finding, the literature quoted is just a sample.	7.1	7.1.11	Trade-offs may result in lower objective safety of the home environment	1.1	User profiles		5 SOCIAL	5.1	4.2.6
		7.3	7.3.6	Better level of privacy						
		7.4	7.4.1	Lower rates of loneliness and isolation						
			7.4.2	Improved rate and range of social activities						
			7.4.3	Improved sense of social connection with others						
			7.4.4	Improved satisfaction with opportunities for social engagement in the home						
			7.4.5	Improved satisfaction with opportunities for social engagement outside the home						
Opportunities for personally significant social activity in the living environment	A socially active lifestyle commensurate with individual intrinsic preferences is an important determinant for wellbeing and quality of life. In their living environment, older adults need to be able to locate and reach spaces and places where such	7.1	7.3.2	Improved sense of self_worth and self_reliance	1.1	User profiles		5 SOCIAL	5.1	4.2.6
		7.3	7.1.11	Trade-offs may result in lower objective safety of the home environment						
		7.4	7.3.6	Better level of privacy						
			7.4.1	Lower rates of loneliness and isolation						



	interaction can take place. Special importance is accorded to opportunities for activities with a special significance to the person involved (e.g. arts, culture).	7.4.3	Improved sense of social connection with others							
		7.4.4	Improved satisfaction with opportunities for social engagement in the home							
		7.4.5	Improved satisfaction with opportunities for social engagement outside the home							
Preservation of personal dignity in social engagement	In engaging socially with others, especially in the own home, it is important that people are able to do so in a manner that is commensurate with and respects their sense of personal dignity.	7.1	7.3.2 Improved sense of self_worth and self_reliance	1.1	User profiles		5 SOCIAL	5.1	4.2.6	
		7.3	7.1.11 Trade-offs may result in lower objective safety of the home environment						5.1.1	
		7.4	7.3.6 Better level of privacy						5.1.3	
			7.3.3 Improved sense of agency							
			7.4.3 Improved sense of social connection with others							
			7.4.4 Improved satisfaction with opportunities for social engagement in the home							
Receiving visitors and visiting	Maintaining ties with loved ones, friends and acquaintances is an essential part of maintaining social connectivity, which in turn contributes to QoL. This requires people to be able both to receive visitors in their own homes and to be able to visit others. For distant visitors and in areas with poor transport, the ability to receive visitors overnight plays a part. Though it cannot replace personal contact, facilities for virtual connectivity also help maintain ties.	7.1	7.4.1 Lower rates of loneliness and isolation	1.1	User profiles		5 SOCIAL	5.1	4.2.6	5.1.1.1
		7.3	7.1.11 Trade-offs may result in lower objective safety of the home environment						5.1.1	5.1.1.2
		7.4	7.3.6 Better level of privacy						5.1.3	5.1.1.3
			7.4.3 Improved sense of social connection with others						5.1.4	5.1.4.1
			7.4.4 Improved satisfaction with opportunities for social engagement in the home							
			7.4.5 Improved satisfaction with opportunities for social engagement outside the home							
Receiving visitors and visiting	Maintaining ties with loved ones, friends and acquaintances is an essential part of maintaining social connectivity, which in turn contributes to QoL. This requires people to be able both to receive visitors in their own homes and to be able to visit others. For distant visitors and in areas with poor transport, the ability to receive visitors overnight plays a part. Though it cannot replace personal contact, facilities for virtual connectivity also help maintain ties.	7.1	7.4.1 Lower rates of loneliness and isolation	1.1	User profiles		5 SOCIAL	5.1	4.2.6	5.1.1.1
		7.3	7.1.11 Trade-offs may result in lower objective safety of the home environment						5.1.1	5.1.1.2
		7.4	7.3.6 Better level of privacy						5.1.3	5.1.1.3
			7.4.3 Improved sense of social connection with others						5.1.4	5.1.4.1
			7.4.4 Improved satisfaction with opportunities for social engagement in the home							
			7.4.5 Improved satisfaction with opportunities for social engagement outside the home							



D2.4 and D3.1 | Working Taxonomy and KPI-framework for Smart age friendly living environments

Autonomous choices in social activity	While participation in social activities is well-attested as supportive of wellbeing and QoL, to achieve these effects and avoid adverse effects, it is important that people both are and feel unable to make autonomous choices regarding their participation. They look to their living environment to support this autonomy.	<p>7.1 7.3.1 Improved self_reported mental health and happiness</p> <p>7.3 7.1.11 Trade-offs may result in lower objective safety of the home environment</p> <p>7.4 7.3.6 Better level of privacy</p> <p>7.3.3 Improved sense of agency</p> <p>7.4.3 Improved sense of social connection with others</p> <p>7.4.4 Improved satisfaction with opportunities for social engagement in the home</p> <p>7.4.5 Improved satisfaction with opportunities for social engagement outside the home</p>	1.1 User profiles		5 SOCIAL	5.1	4.2.6 5.1.1 5.1.3 5.1.4	5.1.1.1 5.1.1.2 5.1.1.3
Autonomous choices in social activity	While participation in social activities is well-attested as supportive of wellbeing and QoL of informal carers, to achieve these effects and avoid adverse effects, it is important that carers both are and feel unable to make autonomous choices regarding their participation. They look to the living environment they share with those they care for to support this autonomy.	<p>7.1 7.3.1 Improved self_reported mental health and happiness</p> <p>7.3 7.1.11 Trade-offs may result in lower objective safety of the home environment</p> <p>7.4 7.3.6 Better level of privacy</p> <p>7.3.3 Improved sense of agency</p> <p>7.4.3 Improved sense of social connection with others</p> <p>7.4.4 Improved satisfaction with opportunities for social engagement in the home</p> <p>7.4.5 Improved satisfaction with opportunities for social engagement outside the home</p>	1.2 Relatives and informal carers profiles		5 SOCIAL	5.1	4.2.6 5.1.1 5.1.3 5.1.4	5.1.1.1 5.1.1.2 5.1.1.3
Gender-specific social activity preferences	Preference in activities to achieve self-fulfillment and experience positive emotions differ markedly between genders, and in fact the specifically feminine orientation of many spaces and opportunities for social engagement can be a hindrance to engagement in social activity by males.	<p>7.1 7.3.1 Improved self_reported mental health and happiness</p> <p>7.3 7.1.11 Trade-offs may result in lower objective safety of the home environment</p> <p>7.4 7.3.6 Better level of privacy</p> <p>7.3.3 Improved sense of agency</p> <p>7.4.2 Improved rate and range of social activities</p> <p>7.4.3 Improved sense of social connection with others</p> <p>7.4.5 Improved satisfaction with opportunities for social engagement outside the home</p>	1.1 User profiles		5 SOCIAL	5.1	4.2.6 5.1.1	



D2.4 and D3.1 | Working Taxonomy and KPI-framework for Smart age friendly living environments

Engagement with significant others	In the area of beneficial effects of social activity and social engagement, Friend bonding and Family bonding, in other words engagement with significant others, are considered especially important, and the living environment should specifically facilitate this type of bonding. Next to human engagement, engagement with pets also falls under this category	<p>7.1 7.3.1 Improved self_reported mental health and happiness</p> <p>7.3 7.1.11 Trade-offs may result in lower objective safety of the home environment</p> <p>7.4 7.3.6 Better level of privacy</p> <p>7.4.1 Lower rates of loneliness and isolation</p> <p>7.4.3 Improved sense of social connection with others</p> <p>7.4.4 Improved satisfaction with opportunities for social engagement in the home</p> <p>7.4.5 Improved satisfaction with opportunities for social engagement outside the home</p>	1.1 User profiles		5 SOCIAL	5.1	4.2.6 5.1.1 5.1.3 5.1.4	5.1.1.1 5.1.1.2 5.1.1.3 5.1.3.1 5.1.4.1 5.1.4.2
Social history and identity	People's identities and sense of self are tied up with their social history and the social identity built up over time. This covers family history, existing social networks, professional history and identity as well as socio-cultural identification. Breaking of ties can have serious deleterious effects, occasioning a sense of alienation and loss of positive purpose in life. Hence a living environment that facilitates continuation of the social self is strongly to be preferred.	<p>7.1 7.3.1 Improved self_reported mental health and happiness</p> <p>7.3 7.1.11 Trade-offs may result in lower objective safety of the home environment</p> <p>7.4 7.3.6 Better level of privacy</p> <p>7.3.2 Improved sense of self_worth and self_reliance</p> <p>7.3.3 Improved sense of agency</p> <p>7.3.4 Reduced incidence of anxiety and depression</p> <p>7.4.1 Lower rates of loneliness and isolation</p> <p>7.4.3 Improved sense of social connection with others</p> <p>7.4.4 Improved satisfaction with opportunities for social engagement in the home</p> <p>7.4.5 Improved satisfaction with opportunities for social engagement outside the home</p>	1.1 User profiles		5 SOCIAL	5.1	4.2.6 5.1.1 5.1.3 5.1.4	5.1.1.1 5.1.1.2 5.1.1.3
Availability of shops and services	Very well-attested in the literature, where a whole range of shops, services, facilities and locations is encountered. Availability is expressed both in tangible terms of distance, accessibility and (perceived) safety of walking routes etc, and in the more intangible terms of appropriateness to personal interests and	<p>7.1 7.3.1 Improved self_reported mental health and happiness</p> <p>7.3 7.1.11 Trade-offs may result in lower objective safety of the home environment</p> <p>7.4 7.3.6 Better level of privacy</p> <p>7.4.2 Improved rate and range of social activities</p> <p>7.4.3 Improved sense of social connection with others</p>	1.1 User profiles		5 SOCIAL	5.1	4.2.6 5.1.2	5.1.1.1 5.1.1.2 5.1.1.3 5.1.2.1 5.1.2.2



D2.4 and D3.1 | Working Taxonomy and KPI-framework for Smart age friendly living environments

	preferences, sense of welcome etc. Large body of research lit, of which just a few samples here	7.4.4	Improved satisfaction with opportunities for social engagement in the home						5.1.2.3
		7.4.5	Improved satisfaction with opportunities for social engagement outside the home						5.1.2.4
									5.1.2.5
									5.1.2.6
									5.1.2.7
Social safety	To remain socially active and to capitalize on the opportunities for social engagement that the neighbourhood offers, it is necessary that this environment is perceived as socially safe by its residents. Next to "harder" aspects such as crime rates, elements that contribute to feeling secure including more relational aspects such as social cohesion, a sense of belonging in and familiarity with the neighbourhood.	7.1	7.1.9 Improved sense of safety at home	1.1	User profiles		5 SOCIAL	5.1	4.2.6
		7.3	7.1.11 Trade-offs may result in lower objective safety of the home environment						5.1.3
		7.4	7.3.6 Better level of privacy						
			7.1.10 Lower incidence of crime and abuse directed at older people						
			7.4.1 Lower rates of loneliness and isolation						
			7.4.2 Improved rate and range of social activities						
			7.4.3 Improved sense of social connection with others						
			7.4.5 Improved satisfaction with opportunities for social engagement outside the home						
A living environment that is socially enabling	To capitalize on the positive health potential of social activity, it is not enough that social activity opportunities are simply present in the neighbourhood, but that the neighbourhood is specifically perceived as enabling. The (extensive) literature highlights various aspects including green spaces, walkability, tailored transport services, activating design features, welcoming public buildings etc	7.1	7.2.1 Better reported satisfaction with home environs and neighbourhood	1.1	User profiles		5 SOCIAL	5.1	4.2.6
		7.2	7.1.11 Trade-offs may result in lower objective safety of the home environment						5.1.2
		7.3	7.3.6 Better level of privacy						5.1.3
		7.4	7.2.2 Improved rate and range of outdoor activity						
			7.1.1 Improved self_reported health and wellbeing						
			7.4.2 Improved rate and range of social activities						
			7.4.5 Improved satisfaction with opportunities for social engagement outside the home						



D2.4 and D3.1 | Working Taxonomy and KPI-framework for Smart age friendly living environments

Living environment imbued with spiritual significance	For many people, the spiritual dimension of life (be it organized religion or otherwise) is an important co-determinant of happiness. The need for spiritual significance may express itself in a desire to be close to specific places such as churches or temples, or to have the opportunity to engage in organized or self-organized spiritual activities	7.1	7.3.1	Improved self_reported mental health and happiness	1.1 User profiles		5 SOCIAL	5.1	4.2.6	
		7.3	7.1.11	Trade-offs may result in lower objective safety of the home environment					5.1.2	
		7.4	7.3.6	Better level of privacy					5.1.3	
			7.3.2	Improved sense of self_worth and self_reliance						
			7.3.4	Reduced incidence of anxiety and depression						
			7.4.3	Improved sense of social connection with others						
			7.4.5	Improved satisfaction with opportunities for social engagement outside the home						
Living environment socially enabling for carers	Like primary users, informal carers benefit from a living environment that is actively socially enabling. Next to the sorts of features mentioned for primary users, carers specifically express a need to be able to access personalized support services, places and tools, both practical and emotional support.	7.1	7.2.1	Better reported satisfaction with home environs and neighbourhood	1.2 Relatives and informal carers profiles		5 SOCIAL	5.1	4.2.6	
		7.2	7.1.11	Trade-offs may result in lower objective safety of the home environment					5.1.2	
		7.3	7.3.6	Better level of privacy					5.1.3	
		7.4	7.1.1	Improved self_reported health and wellbeing					5.1.4	
			7.3.2	Improved sense of self_worth and self_reliance						
			7.4.1	Lower rates of loneliness and isolation						
			7.4.2	Improved rate and range of social activities						
Reciprocity of social networks	To support a sense of agency and feelings of self-worth and self-reliance, people have need of social networks in their living environment that are based on reciprocity, peer-to-peer connection and equality. An added benefit noted in the literature is a stronger sense of social cohesion.	7.1	7.2.1	Better reported satisfaction with home environs and neighbourhood	1.1 User profiles		5 SOCIAL	5.1	4.2.6	
		7.2	7.1.11	Trade-offs may result in lower objective safety of the home environment					5.1.2	
		7.3	7.3.6	Better level of privacy					5.1.3	
		7.4	7.3.2	Improved sense of self_worth and self_reliance					5.1.4	
			7.3.3	Improved sense of agency						
			7.4.2	Improved rate and range of social activities						
			7.4.3	Improved sense of social connection with others						
Social technology that works for people	To the extent that they are aware of it and capable of using it, people see advantage in having technological support to fulfill social	7.1	7.3.2	Improved sense of self_worth and self_reliance	1.1 User profiles		5 SOCIAL	5.1	4.2.6	5.1.4.1
		7.3	7.1.11	Trade-offs may result in lower objective safety of the home environment					5.1.4	5.1.4.2



	needs. For this technology to work for them, however, it must be sensitive to their needs and preferences, transparent in functionality and easy to operate and adjust.	7.4	7.3.6	Better level of privacy							5.1.4.3		
			7.3.3	Improved sense of agency									
			7.4.2	Improved rate and range of social activities									
			7.4.3	Improved sense of social connection with others									
			7.4.4	Improved satisfaction with opportunities for social engagement in the home									
			7.4.5	Improved satisfaction with opportunities for social engagement outside the home									
Opportunities to work at home	Informal carers frequently become (more) housebound, as their care tasks centre around the home. The opportunity to remain engaged in paid employment while (more) housebound helps to avoid loss of employment options and attendant income drops and social isolation.	7.1	7.4.1	Lower rates of loneliness and isolation	1.2	Relatives and informal carers profiles	1.2.1	1.2.1.1	5	SOCIAL	5.2	4.2.6	5.2.1
		7.4	7.1.11	Trade-offs may result in lower objective safety of the home environment				1.2.1.2					
		7.5	7.3.6	Better level of privacy									
			7.4.3	Improved sense of social connection with others									
			7.4.7	Higher percentage of informal carers in fulltime or parttime employment									
			7.5.2	Improved income and wealth position for older people and carers									
Access to employment for informal carers	Carer tasks put a great strain on the ability to remain in (paid) employment. It is a great benefit if the living environment supports access to the place of employment of such type and ease of access that it can be combined with carer tasks. Aspects that come into play include the travel distance to the place of employment, the means of transport available, pricing of suitably located accommodation and digital connections	7.1	7.4.1	Lower rates of loneliness and isolation	1.2	Relatives and informal carers profiles			5	SOCIAL	5.2	4.2.6	5.2.2.1
		7.4	7.1.11	Trade-offs may result in lower objective safety of the home environment								5.2.2	5.2.2.2
		7.5	7.3.6	Better level of privacy									
			7.4.7	Higher percentage of informal carers in fulltime or parttime employment									
			7.5.2	Improved income and wealth position for older people and carers									
Access to (volunteer) work for vulnerable older adults	There is extensive evidence (e.g. from Blue zones analysis) that the opportunity to continue in worklike activity (currently focussed on volunteer work, but conceivably also touching paid employment) is a major contributor to resilience, wellbeing and better QoL. The attendant requirements of	7.1	7.3.1	Improved self_reported mental health and happiness	1.2	Relatives and informal carers profiles			5	SOCIAL	5.2	4.2.6	5.2.2.1
		7.3	7.1.11	Trade-offs may result in lower objective safety of the home environment								5.2.2	5.2.2.2
		7.4	7.3.6	Better level of privacy									
		7.5	7.3.2	Improved sense of self_worth and self_reliance									
			7.4.1	Lower rates of loneliness and isolation									



	the living environment are neatly summarized in the WHO Age-friendly cities indicators framework.	7.4.6 7.5.2	Higher percentage of older persons in paid or voluntary employment Improved income and wealth position for older people and carers							
Affordability of appropriate housing	Age-friendly housing can only fulfill its function if it's affordable for the widest range of potential beneficiaries, with the position of low-income home owners and tenants being especially precarious. A threshold of 30% of disposable income is generally seen as an acceptable cut-off point, bearing in mind this covers ALL housing costs.	7.1	7.5.1 7.1.11 7.3.6 7.5.2 7.5.3	Better availability of financial means for investments in the home environment Trade-offs may result in lower objective safety of the home environment Better level of privacy Improved income and wealth position for older people and carers Improved willingness to invest in home environments by citizens	1.1 User profiles		6 ECONOMIC	6.1	4.2.6 6.1.1	6.1.1.1 6.1.1.2
Affordable housing	The cost of housing is a major factor influencing where older people live and their quality of life. A key lever to promote healthy aging in communities is affordable housing, especially for older adults who have limited incomes. As housing supply and quality decrease for low-income older adults, rising housing costs correspondingly impinge on family support, including availability of food, transportation, in-home assistance, and medical care.	7.1	7.1.11.11 7.3 7.4 7.5 7.3.6 7.4.6 7.4.8 7.5.2 7.5.9 7.5.13	Improved community health: 'Increasing affordable housing follows a "health in all policies" approach that is consistent with the community health indicators findings.' (William, 2016) Improved self_reported mental health and happiness Reduced incidence of anxiety and depression Lowered demand for formal mental health care Reduced level of stress if no longer risk of eviction (especially in the case of slum dwellers) and reduced crowding (WHO, 2018) Higher percentage of older persons in paid or voluntary employment Transport infrastructure can also be considered as an operational aspect of housing affordability, because it influences how much people need to pay to travel (...)' (WHO, 2018) Improved income and wealth position for older people and carers Reduction of public sector health and social care costs Economic security:	1.1 User profiles		6 ECONOMIC	6.1		



D2.4 and D3.1 | Working Taxonomy and KPI-framework for Smart age friendly living environments

Home Modifications	The ability to modify one’s house or apartment also affects the ability of older people to continue to live comfortably at home. Besides identifying the need to ensure older people are aware of the possible options for modifying their homes, it is suggested in many cities that older people need to be able to obtain the necessary equipment.	<p>7.1 7.1.3 Lower dependence on ADL_assistance and aids</p> <p>7.3 7.1.4 Lowered risk of falls and accidents</p> <p>7.4 7.1.5 Improved access to care</p> <p>7.5 7.1.7 Improved sense of comfort at home</p> <p>7.1.9 Improved sense of safety at home</p> <p>7.1.11.11 Yet, the certainty of the evidence that people living with functional impairments are better able to accomplish activities of daily living was assessed as low to moderate (WHO, 2018: p. 70)</p> <p>7.3.1 Improved self_reported mental health and happiness</p> <p>7.3.2 Improved sense of self_worth and self_reliance</p> <p>7.4.1 Lower rates of loneliness and isolation</p> <p>7.4.2 Improved rate and range of social activities</p> <p>7.4.6 Higher percentage of older persons in paid or voluntary employment</p> <p>7.4.7 Higher percentage of informal carers in fulltime or parttime employment</p> <p>7.4.8 Prevents people from moving to other accessible housing that might require to withdraw from the community (WHO, 2018: pp. 73-74)</p> <p>7.5.9 Reduction of public sector health and social care costs</p>	1.1 User profiles		6 ECONOMIC	6.2		
Affordable housing for informal carers	Informal carers often face income loss affecting ability to pay for housing at the same time as specific housing adjustments are needed for the person(s) they care for. For non-co-habiting carers, income loss may result in inability to pay for their current housing arrangements. Affordability should cover ALL costs of housing.	<p>7.1 7.3.1 Improved self_reported mental health and happiness</p> <p>7.3 7.1.11 Trade-offs may result in lower objective safety of the home environment</p> <p>7.5 7.3.4 Reduced incidence of anxiety and depression</p> <p>7.5.1 Better availability of financial means for investments in the home environment</p> <p>7.5.2 Improved income and wealth position for older people and carers</p> <p>7.5.3 Improved willingness to invest in home environments by citizens</p>	1.2 Relatives and informal carers profiles		6 ECONOMIC	6.1	4.2.6 6.1.1	6.1.1.1 6.1.1.2



D2.4 and D3.1 | Working Taxonomy and KPI-framework for Smart age friendly living environments

	friendly investments are introduced. In particular, a clear (and preferably positive) perspective on long(er) term market growth perspective is desired.	7.5.5	Increased investment in housing by social and public housing		1.3.2.1			6.1.2	6.1.1.3	
		7.5.10	Reduction of costs for healthcare providers and contractors		1.3.2.2				6.1.2.1	
		7.5.11	Increase in local_regional economic turnover							
Access to finance for older adults	Access to finance is particularly problematic for older homeowners, due both to age-discriminatory policies on the part of lenders, and due to an often lower income position. Access to finance to stimulate home-ownership and facilitate investments in age-friendly adaptations is particularly problematic for low and middle-income older adults.	7.1	7.5.1 Better availability of financial means for investments in the home environment	1.1 User profiles			6 ECONOMIC	6.1	4.2.6	6.1.1.3
		7.5	7.1.11 Trade-offs may result in lower objective safety of the home environment						6.1.1	
			7.5.2 Improved income and wealth position for older people and carers							
			7.5.3 Improved willingness to invest in home environments by citizens							
		7.5.11	Increase in local_regional economic turnover							
Access to finance for informal carers	Access to finance is particularly problematic for informal carers, especially as becoming an informal carer is often associated with a drop in income and insecure economic prospects. Access to finance to stimulate home-ownership and facilitate investments in age-friendly adaptations is particularly problematic for this group.	7.1	7.5.1 Better availability of financial means for investments in the home environment	1.2 Relatives and informal carers profiles	1.2.1	1.2.1.1	6 ECONOMIC	6.1	4.2.6	6.1.1.3
		7.5	7.1.11 Trade-offs may result in lower objective safety of the home environment			1.2.1.2			6.1.1	
			7.5.2 Improved income and wealth position for older people and carers							
			7.5.3 Improved willingness to invest in home environments by citizens							
		7.5.11	Increase in local_regional economic turnover							
Economic enabling of innovative industry activity	Insight into and security on projected demand for age-friendly homes and the performance requirements needed to make them fit-for-purpose, are a prerequisite for both construction and related industries to direct funds into innovation of materials and products.	7.1	7.5.4 Increased investment in housing by private sector	1.3 Organisational profiles	1.3.2	1.3.2.2	6 ECONOMIC	6.1	4.2.6	6.1.2.1
		7.5	7.1.11 Trade-offs may result in lower objective safety of the home environment			1.3.2.5				6.1.2.2
			7.5.6 Increased investment in services and products by private sector							
			7.5.7 Increased investment in services and products by public sector							
Enabling of occupant economic activity	To support independence, financial security, but also associated psychological / emotional benefits, older adults need their home environments to support their staying or becoming economically active. This may pertain to elements such as absence on	7.1	7.3.1 Improved self_reported mental health and happiness	1.1 User profiles			6 ECONOMIC	6.2	4.2.6	
		7.3	7.1.11 Trade-offs may result in lower objective safety of the home environment						6.2.1	
		7.4	7.3.2 Improved sense of self_worth and self_reliance						6.2.2	
		7.5	7.4.2 Improved rate and range of social activities						6.2.4	



	limitations of use of the domestic property, but is prominently associated with the availability of mobility and transport options.	7.5.2	Improved income and wealth position for older people and carers							
Enabling of informal carer economic activity	To support independence, financial security, but also associated psychological / emotional benefits, informal carers need their home environments to support their staying or becoming economically active. Loss of income and economic earning power is a risk specifically associated with informal care. This may pertain to elements such as absence on limitations of use of the domestic property, but is prominently associated with the availability of mobility and transport options.	7.1 7.3 7.4 7.5	7.3.1 Improved self_reported mental health and happiness 7.1.11 Trade-offs may result in lower objective safety of the home environment 7.3.2 Improved sense of self_worth and self_reliance 7.4.1 Lower rates of loneliness and isolation 7.5.2 Improved income and wealth position for older people and carers 7.5.11 Increase in local_regional economic turnover	1.2 Relatives and informal carers profiles		6 ECONOMIC	6.2	4.2.6 6.2.1 6.2.2 6.2.4		
Choice and choice information	Within their current and projected financial means, people should have enough choice of dwelling and specific home and environment features to opt for a living environment that both satisfied their needs and accords with their personal preferences, lifestyle and identity. This also requires the availability of full, transparent and easy to understand choice information.	7.1 7.3 7.5	7.2.1 Better reported satisfaction with home environs and neighbourhood 7.1.11 Trade-offs may result in lower objective safety of the home environment 7.3.1 Improved self_reported mental health and happiness 7.3.3 Improved sense of agency 7.5.3 Improved willingness to invest in home environments by citizens 7.5.11 Increase in local_regional economic turnover	1.1 User profiles		6 ECONOMIC	6.2	4.2.6		
Corporate Social Responsibility	CSR is a business self-regulation that aims to contribute to societal goals by engaging in ethically-oriented practices. Adherence to CSR principles is a need for private sector companies not only because the age-friendly domain requires alignment between business and societal value, but also to support private sector organisations' right to play on this particular market.	7.1 7.5	7.5.4 Increased investment in housing by private sector 7.1.11 Trade-offs may result in lower objective safety of the home environment 7.5.6 Increased investment in services and products by private sector 7.5.7 Increased investment in services and products by public sector 7.5.11 Increase in local_regional economic turnover	1.3 Organisational profiles	1.3.2	6 ECONOMIC	6.2	4.2.6 6.2.6		
Affordable communications infrastructure	Affordable access to (high-speed) internet and associated communications infrastructure is necessary to support economic enabling of older persons	7.1 7.4 7.5	7.4.1 Lower rates of loneliness and isolation 7.1.11 Trade-offs may result in lower objective safety of the home environment 7.4.2 Improved rate and range of social activities	1.1 User profiles		6 ECONOMIC	6.1	4.2.6 6.1.1 6.1.1.1 6.1.1.2		



D2.4 and D3.1 | Working Taxonomy and KPI-framework for Smart age friendly living environments

		7.5.2	Improved income and wealth position for older people and carers							
		7.5.11	Increase in local_regional economic turnover							
Viable public sector business case	The creation / support of age-friendly homes must be viable from a public sector perspective: total benefits (material and immaterial) must outweigh total (material and immaterial costs). Simple as it is to phrase, ascertaining whether the need is satisfied or even making it operational in terms that allow verification, is extremely complex.	7.1	7.5.1 Better availability of financial means for investments in the home environment	1.3 Organisational profiles	1.3.1	1.3.1.1	6 ECONOMIC	6.1	4.2.6	6.1.2.1
		7.5	7.1.11 Trade-offs may result in lower objective safety of the home environment			1.3.1.2			6.1.2	6.1.2.2
			7.5.5 Increased investment in housing by social and public housing			1.3.1.3				
			7.5.7 Increased investment in services and products by public sector			1.3.1.4				
			7.5.8 Reduction of public sector housing costs							
			7.5.9 Reduction of public sector health and social care costs							
Viable return on investment for private sector operatives	For property developers and the construction sector to be willing to enter the age-friendly market and/or upscale their activities there, they need assurance that they can do so at a return on investment that is compatible with their regular profitability bandwidths.	7.1	7.5.1 Better availability of financial means for investments in the home environment	1.3 Organisational profiles	1.3.2	1.3.2.1	6 ECONOMIC	6.1	4.2.6	6.1.2.1
		7.5	7.1.11 Trade-offs may result in lower objective safety of the home environment			1.3.2.2			6.1.2	6.1.2.2
			7.5.4 Increased investment in housing by private sector							
			7.5.6 Increased investment in services and products by private sector							
			7.5.11 Increase in local_regional economic turnover							
Contribution to market leadership and brand image	For participation in and/or upscaling of activities in the age-friendly market, companies need to feel it contributes (or at least has the potential to contribute) to their position as market leaders, and see positive value in identifying themselves with age-friendly housing concepts.	7.1	7.5.1 Better availability of financial means for investments in the home environment	1.3 Organisational profiles	1.3.2	1.3.2.1	6 ECONOMIC	6.1	4.2.6	6.1.2.1
		7.5	7.1.11 Trade-offs may result in lower objective safety of the home environment			1.3.2.2			6.1.2	6.1.2.2
			7.5.4 Increased investment in housing by private sector			1.3.2.3				
			7.5.6 Increased investment in services and products by private sector			1.3.2.4				
			7.5.11 Increase in local_regional economic turnover			1.3.2.5				
ROI between +/- 10% of non- age friendly homes	To push the property developers to invest in age friendly housing bussiness model has to prove that it's profitable. The % in based upon on the basis of the energy efficiency labels.	7.5	7.5.3 Improved willingness to invest in home environments by citizens	1.3 Organisational profiles	1.3.2	1.3.2.1	6 ECONOMIC	6.1	6.1.2	6.1.2.2
			7.5.4 Increased investment in housing by private sector							
			7.5.5 Increased investment in housing by social and public housing							



D2.4 and D3.1 | Working Taxonomy and KPI-framework for Smart age friendly living environments

			7.5.9 Reduction of public sector health and social care costs							
			7.5.10 Reduction of costs for healthcare providers and contractors							
			7.5.11 Increase in local_regional economic turnover							
			7.5.12 Increase in local_regional property values							
proven demand of construction products for age friendly housing	the increasing demand of specific product for this type of housing will foster the research and innovation of the industry related to the construction sector to achieve more and better solutions for age friendly living environments .	7.5	7.5.6 Increased investment in services and products by private sector 7.5.7 Increased investment in services and products by public sector 7.5.11 Increase in local_regional economic turnover 7.5.13 creation of new opportunities for the industrial sector	Please Select...	1.3.2	1.3.2.2	6 ECONOMIC	6.2	6.2.1 6.2.5	
ROI of renting between +/- 10% of non- age friendly homes	To push the property developers to invest in age friendly housing bussiness model has to prove that it's profiteable. The % in based upon on the basis of the energy efficiency labels.	7.5	7.5.2 Improved income and wealth position for older people and carers 7.5.4 Increased investment in housing by private sector 7.5.5 Increased investment in housing by social and public housing 7.5.8 Reduction of public sector housing costs 7.5.11 Increase in local_regional economic turnover	1.3 Organisational profiles	1.3.2	1.3.2.1	6 ECONOMIC	6.1	6.1.2	6.1.2.2
Rights for carers to access to affordable housing	Carers can experience significant financial hardship as a consequence of their caring role. Providing care, especially intensive care, to a relative, often entails a substantial economic sacrifice: informal carers may be forced to cut down their working time or leave paid employment, which in return reduces their pensions rights, causing poverty when they reach pension age.	7.3	7.5.2 Improved income and wealth position for older people and carers	1.2 Relatives and informal carers profiles	1.2.1 1.2.2	1.2.1.1 1.2.1.2 1.2.1.1 1.2.1.2	6 ECONOMIC	6.1		
Should have choice to either adapt current home or to relocate to a more suitable alternative	Ageing-in-place can only be a reality if the home environment can either be affordably modified/ adapted e.g. through publicly subsidised grant schemes and home maintenance schemes, or by providing alternative and affordable mainstream housing options in the SAME community to older persons and their cohabiting carers.	7.1 7.3	7.1.2 Improved rate and range of indoor activity 7.1.3 Lower dependence on ADL_assistance and aids 7.1.4 Lowered risk of falls and accidents 7.1.9 Improved sense of safety at home 7.3.3 Improved sense of agency	1.2 Relatives and informal carers profiles	1.2.1		6 ECONOMIC	6.2	6.1.1 6.2.3 6.2.5	6.2.3.1 6.2.3.2 6.2.3.3 6.2.3.4 6.2.3.5 6.2.5.1 6.2.5.2



D2.4 and D3.1 | Working Taxonomy and KPI-framework for Smart age friendly living environments

											6.2.5.3 6.2.5.4
Proved demand of this profile of homes	Both private and public bodies in order to foster or /and invest in age friendly living environments should have the evidence to assure the demand, specially for the private companies profitability should be guaranteed .	7.5	7.5.4 7.5.5 7.5.6 7.5.7 7.5.11	Increased investment in housing by private sector Increased investment in housing by social and public housing Increased investment in services and products by private sector Increased investment in services and products by public sector Increase in local_regional economic turnover	1.3 Organisational profiles	1.3.2	1.3.2.1	6 ECONO-MIC	6.2	6.2.1	
equity	public actors representing the public interest must insure that age-friendly housing is affordable for citizens with a limited budget	7.1 7.3	7.1.6 7.3.2 7.5.9 7.5.10	Lowered dependency on institutionalized care Improved sense of self_worth and self_reliance Reduction of public sector health and social care costs Reduction of costs for healthcare providers and contractors	1.3 Organisational profiles	1.3.1	1.3.1.1 1.3.1.2 1.3.1.3 1.3.1.4	6 ECONO-MIC	6.1		
stimulate innovation	Public and private actors in a particular region have a shared interest in boosting the innovation ecosystem of their region as a way to foster economic development in the longer term	7.5	7.5.1 7.5.11	Better availability of financial means for investments in the home environment Increase in local_regional economic turnover	1.3 Organisational profiles	1.3.1 1.3.2	1.3.1.1 1.3.1.2 1.3.2.5	6 ECONO-MIC	6.1	6.1.1 6.1.2	6.1.1.3 6.1.2.2
reduce healthcare costs	one of the big promises of aging at home is that people it reduces physical and mental health realted costs compared to institutionalized care (i.e. nursing homes)	7.5	7.5.8 7.3.6 7.5.9 7.5.10	Reduction of public sector housing costs from an organisational perspective, the benefits and frame for this NoPs catheory differ widely between actors Reduction of public sector health and social care costs Reduction of costs for healthcare providers and contractors	1.3 Organisational profiles			6 ECONO-MIC	6.1		
Regulatory certainty	Project developers/investment companies can better forecast their ROI in presence of Regulatory certainty that must be provided by public institution.	7.5	7.5.1 7.5.3 7.5.4 7.5.5 7.5.6 7.5.7 7.5.9	Better availability of financial means for investments in the home environment Improved willingness to invest in home environments by citizens Increased investment in housing by private sector Increased investment in housing by social and public housing Increased investment in services and products by private sector Increased investment in services and products by public sector Reduction of public sector health and social care costs	1.3 Organisational profiles	1.3.2	1.3.2.1 1.3.2.5	6 ECONO-MIC	6.1	6.2.6	6.1.1.3



D2.4 and D3.1 | Working Taxonomy and KPI-framework for Smart age friendly living environments

public Incentives	Based on the cost reduction for the sanitary system, governments shall incentives retrofitting intervention for age-friendly environments	7.5	7.5.1	Better availability of financial means for investments in the home environment	1.3 Organisational profiles	1.3.2.1	6 ECONOMIC	6.1	6.1.2	6.1.2.2
			7.5.4	Increased investment in housing by private sector						
			7.5.5	Increased investment in housing by social and public housing						
			7.5.6	Increased investment in services and products by private sector						
			7.5.7	Increased investment in services and products by public sector						
			7.5.9	Reduction of public sector health and social care costs						
			7.5.10	Reduction of costs for healthcare providers and contractors						
standardized approach for ICT infrastructure	A general framework is needed, rather than a too customized approach. Interoperability standards have to be defined.	7.5	7.5.1	Better availability of financial means for investments in the home environment	1.3 Organisational profiles	1.3.2	1.3.2.2	6 ECONOMIC	6.2	
			7.5.4	Increased investment in housing by private sector						
			7.5.5	Increased investment in housing by social and public housing						
			7.5.6	Increased investment in services and products by private sector						
			7.5.7	Increased investment in services and products by public sector						
			7.5.8	Reduction of public sector housing costs						
BIM (Building information modelling) for Age friendly Environment	Age friendly environment design is compliant with available BIM (Building information modelling). BIM has to provide specific libraries to implement Smart Age-friendly environments contributing to fill in the existing gap (these specificities don't exist at present). The Age-Friendly environment has common features of all the buildings but with some specificities that require using BIM.	7.5	7.5.4	Increased investment in housing by private sector	1.3 Organisational profiles	1.3.2	1.3.2.1	6 ECONOMIC	6.1	
			7.5.5	Increased investment in housing by social and public housing						
			7.5.6	Increased investment in services and products by private sector						
			7.5.7	Increased investment in services and products by public sector						
			7.5.8	Reduction of public sector housing costs						
standardized retrofitting solutions	standardized solutions (e.g. plug and play prefabricated elements) are available to implement optimal age-friendly environments refurbishment with minimal intrusivity on occupants and reduced costs. Easy installation and maintenance.	7.5	7.5.3	Improved willingness to invest in home environments by citizens	1.3 Organisational profiles	1.3.2	1.3.2.2	6 ECONOMIC	6.1	
			7.5.4	Increased investment in housing by private sector						
			7.5.5	Increased investment in housing by social and public housing						
			7.5.8	Reduction of public sector housing costs						



D2.4 and D3.1 | Working Taxonomy and KPI-framework for Smart age friendly living environments

Incentives	incentives from public sector for aging people to increase affordability to access private AFE services. With this opportunity, the service providers of AFE market will expand.	7.1	7.1.5	Improved access to care	1.3 Organisational profiles	1.3.2	1.3.2.3	6 ECONOMIC	6.1		
		7.5	7.5.1	Better availability of financial means for investments in the home environment							
			7.5.2	Improved income and wealth position for older people and carers							
			7.5.10	Reduction of costs for healthcare providers and contractors							
Home and building certification	the home and building certification will signal the AFE level that can be used by private insurance and private health insurance companies to apply price discrimination	7.1	7.1.4	Lowered risk of falls and accidents	1.3 Organisational profiles	1.3.2	1.3.2.5	6 ECONOMIC	6.1		
		7.5	7.1.9	Improved sense of safety at home							
			7.5.1	Better availability of financial means for investments in the home environment							
			7.5.2	Improved income and wealth position for older people and carers							
			7.5.3	Improved willingness to invest in home environments by citizens							
Insurance scheme for AFE	A specific insurance scheme for AFE is needed to introduce the private insurance companies in this sector	7.1	7.1.9	Improved sense of safety at home	1.3 Organisational profiles	1.3.2	1.3.2.5	6 ECONOMIC	6.1		
		7.2	7.2.3	Improved sense of safety in home environs and neighbourhood							
		7.5	7.5.5	Increased investment in housing by social and public housing							
Local epidemiological data	Health insurance companies need of available local epidemiological data to provide a comprehensive insurance price	7.1			1.3 Organisational profiles		1.3.2.4	6 ECONOMIC	6.1		
A system based on certain and shared rules and information	A system regarding Age-Friendly environments based on certain and shared rules and information 1) reduces transaction costs through information symmetry about prices and quality of provided services, standardisation of product and services, easy entry and exit of providers in the health market 2) will positively affect the use of available resources in the health system.	7.5	7.5.1	Better availability of financial means for investments in the home environment	1.3 Organisational profiles			6 ECONOMIC	6.1		
			7.5.2	Improved income and wealth position for older people and carers							
			7.5.9	Reduction of public sector health and social care costs							

Appendix 3: Overview of KPIs



Criterion		Taxonomy cluster			Notes
Proposed title	Description	KPI Cluster	Category	Subcategory	Quality and approach study
Identifiable handrail in stair cases	Staircases are the origin of a large number of accidents. Almost all accidents occur in the descent. Therefore installation of handrails are crucial to serve as support.	_2_PHYSICAL	_2.1_Personal_Safety	2.1.1_Accidents_and_calamities	Constructive solutions
Non-slip stair covering	All stairways should be non-slip according to the coefficient of slipperiness specified in each national regulation	_2_PHYSICAL	_2.1_Personal_Safety	2.1.1_Accidents_and_calamities	Performance and measures of stair's covering materials
Adapted lighting/lighting controls	Lack of adequate lighting can decreased visual efficiency and cause accidents. Visual comfort depends on a large number of variables. In relation to the amount of light it can produce either glaze (too much light) or dark spaces. Lighting intensity will be evaluated, avoiding shadows and dazzle. As for lighting controls presence detection is regarded as most efficient system.	_2_PHYSICAL	_2.1_Personal_Safety	2.1.1_Accidents_and_calamities	Performance and measures of lighting systems
Non-slip flooring	The need to ensure the safety of people have led to the improvement of regulations regarding the design and requirements of pavements, specially on wet rooms, indoor-outdoor spaces such as halls...	_2_PHYSICAL	_2.1_Personal_Safety	2.1.1_Accidents_and_calamities	Performance and measures of flooring materials
Presence of a shower w/ handrails (COMPULSORY)	Entering and leaving a bathtub is a considerable inconvenience for people with reduced mobility. Due to its safety and distribution of space showers are much more functional than tubs.	_2_PHYSICAL	_2.1_Personal_Safety	2.1.1_Accidents_and_calamities	Constructive solution installed YES/NO
Fire protection	In order to prevent fires in homes and minimize major catastrophes, providing fire protection devices such as fire alarm, special fire extinguisher system	_2_PHYSICAL	_2.1_Personal_Safety	2.1.1_Accidents_and_calamities	Performance and measures of systems



Criterion		Taxonomy cluster			Notes
Proposed title	Description	KPI Cluster	Category	Subcategory	Quality and approach study
Lighting		_2_PHYSICAL	_2.1_Personal_Safety	2.1.2_Safe_use_of_amenities_and_facilities	
Presence of thermostatic mixer in the shower	thermostats are control units for the shower, which control the flow and the pressure of the water in a reliable way, thus allowing to enjoy maximum comfort without risk of unpleasant temperature changes, which may cause injuries due to high temperatures	_2_PHYSICAL	_2.1_Personal_Safety	2.1.2_Safe_use_of_amenities_and_facilities	Installed YES/NO
Presence of raised toilet	Raised toilets facilitate transfer from the wheelchair. If they are suspended as well cleaning will be much easier.	_2_PHYSICAL	_2.1_Personal_Safety	2.1.2_Safe_use_of_amenities_and_facilities	Installed YES/NO
Arrangements	National regulations need to be check in relation to design arrangements for the safety requirement such as doors sizes, opening of doors,... and many other features	_2_PHYSICAL	_2.1_Personal_Safety	2.1.2_Safe_use_of_amenities_and_facilities	Building layout according to design regulations
Safety requirement in the toilets	National regulations need to be check in relation to the safety requirement in toilets regarding non-sliping floors, support bars on toliets, showers ..etc	_2_PHYSICAL	_2.1_Personal_Safety	2.1.2_Safe_use_of_amenities_and_facilities	Constructive solutions according to national regulations on accessibility
Lighting	Proper lighting around the home referring to the entrances so that these spaces have the right intensity as well as presence detection system covering the entire space.	_2_PHYSICAL	_2.1_Personal_Safety	2.1.3_Safety_around_the_home	Performance and measures of lighting systems
Floor covering for outside circulation	Outdoor cications (accessible paths, stairs, terraces, etc.) are non-freezing and non-slippery in accordance to national regulations	_2_PHYSICAL	_2.1_Personal_Safety	2.1.3_Safety_around_the_home	Performance and measures of flooring material



Criterion		Taxonomy cluster			Notes
Proposed title	Description	KPI Cluster	Category	Subcategory	Quality and approach study
Burglary protection	Security systems installation against burglary include alarms as well as other basic devices such as videophone, door eye or peephole, which are placed at the right heights.	_2_PHYSICAL	_2.1_Personal_Safety	2.1.4_Safety_from_outside_threats	Installed YES/NO
Direct sightline from street	The location of the front door should provide a direct sight so that the occupant is able to see the visitor	_2_PHYSICAL	_2.1_Personal_Safety	2.1.4_Safety_from_outside_threats	Building lay-out
Social safety requirements for access doors	Access doors should be fitted with a device allowing them to be automatically blocked open at a 90° angle if necessary.	_2_PHYSICAL	_2.1_Personal_Safety	2.1.4_Safety_from_outside_threats	Installed YES/NO

Criterion		Taxonomy cluster			Notes
Proposed title	Description	KPI Cluster	Category	Subcategory	Quality and approach study
Proper layout to ensure satisfactory thermal comfort conditions for tenants	The building orientation (i.e., dominant winds in winter, sunrays in summer, ...) impacts on thermal comfort inside the building. Assessment based on plans and environmental conditions.	_2_PHYSICAL	_2.2_Comfort	2.2.1_Temperature_regulation	Building layout
Design conditions related to thermal comfort, both in summer and winter	Homes are designed: to avoid a risk of overheating in summer months; for comfort in winter by avoiding radiant asymmetry from extensive areas of cold surfaces, and ensure that heating systems can work effectively and efficiently. In addition, they are resilient to temperature extremes due to climate change over their lifetime. Passive house allows lower energy consumption in terms of heat.	_2_PHYSICAL	_2.2_Comfort	2.2.1_Temperature_regulation	Constructive solutions, materials, performance and measures



Criterion		Taxonomy cluster			Notes
Proposed title	Description	KPI Cluster	Category	Subcategory	Quality and approach study
Operability and control of HVAC (heating, ventilation and air conditioning) systems	Installations for each room must be operable separately. It should be possible to manage heating and cooling systems from a single point in the dwelling. Moreover, ease of use must be addressed for senior occupants: user's manual, explanation of systems.	_2_PHYSICAL	_2.2_Comfort	2.2.1_Temperature_r egulation	Systems, management and monitoring, use of equipment by occupant
Assessment on thermal comfort	Assessment of comfort conditions controlled by automated systems. If not automated systems, % of time out of a comfort range defined by temperature, air speed and relative humidity.	_2_PHYSICAL	_2.2_Comfort	2.2.1_Temperature_r egulation	Performance and measures. Optional.
Occupant's perception and satisfaction on thermal comfort	Survey on thermal conditions and results; may allow to pinpoint specific attention to senior occupants	_2_PHYSICAL	_2.2_Comfort	2.2.1_Temperature_r egulation	Occupant's perception and satisfaction
Outdoor air quality of the environment around the building	Outdoor air quality has a major impact on indoor air quality: soils (depollution of brownfield), air pollution (major equipment nearby: industries, road traffic, airport, etc.). Assessment based on plans and environment analysis	_2_PHYSICAL	_2.2_Comfort	2.2.2_Air_quality	Building layout
Identification and treatment of pollution sources on the site	Services areas concerned: parking lot or attached garage, common kitchen, activity rooms, ... Treatment: air ventilation and purification	_2_PHYSICAL	_2.2_Comfort	2.2.2_Air_quality	Constructive solutions, systems
Indoor air quality - materials	If existing, compliance of the materials with regulations or labels in terms of pollutants emission (paints and coatings, adhesive and sealants, flooring, insulation)	_2_PHYSICAL	_2.2_Comfort	2.2.2_Air_quality	Materials. We propose to limit ourselves to building materials; without taking into account furniture, furnishings or cleaning products which we consider out of H4L scope in the dwellings.



Criterion		Taxonomy cluster			Notes
Proposed title	Description	KPI Cluster	Category	Subcategory	Quality and approach study
Indoor air quality - ventilation	Ensure good indoor air quality throughout the house: consistent supply of fresh air, controlled ventilation, limitation of moisture (condensation and mould growth) and of the concentration of harmful pollutants in the air within the house	_2_PHYSICAL	_2.2_Comfort	2.2.2_Air_quality	Systems, management and monitoring
Operability and control of HVAC (heating, ventilation and air conditioning) systems	Installations for each room must be operable separately. It should be possible to manage heating and cooling systems from a single point in the dwelling. Moreover, ease of use must be addressed for senior occupants: user's manual, explanation of systems.	_2_PHYSICAL	_2.2_Comfort	2.2.2_Air_quality	Systems, management and monitoring, use of equipment by occupant
Indoor air quality - assessment	Pollution rates: minimum values to respect for selected IAQ pollutants	_2_PHYSICAL	_2.2_Comfort	2.2.2_Air_quality	Performance and measures
Occupant's perception and satisfaction on IAQ	Survey on air quality (perception of stuffy atmosphere, ...)	_2_PHYSICAL	_2.2_Comfort	2.2.2_Air_quality	Occupant's perception and satisfaction
Proper layout to ensure satisfactory lighting conditions for tenants	Positioning of the building according to its environment. Assessment based on plans and environmental conditions.	_2_PHYSICAL	_2.2_Comfort	2.2.3_Lighting	Building lay-out
Daylighting and access to natural light, especially in winter	Improve quality of life and mental wellbeing by providing visual delight and daylighting in living spaces, bedroom, bathroom and kitchen (fenestration: size, % of window surface, lease depth, transmittance, ...). Promote good daylighting and thereby reduce the need for energy to light the home.	_2_PHYSICAL	_2.2_Comfort	2.2.3_Lighting	Constructive solutions
Visual comfort: surface design and color quality	Glare control and contrast between materials	_2_PHYSICAL	_2.2_Comfort	2.2.3_Lighting	Systems, materials, occupant's perception and satisfaction
Lighting systems	Presence of lighting points (type, quantity, position), shutters and blinds, solar protection	_2_PHYSICAL	_2.2_Comfort	2.2.3_Lighting	Systems



Criterion		Taxonomy cluster			Notes
Proposed title	Description	KPI Cluster	Category	Subcategory	Quality and approach study
Operability and control of natural and artificial lighting systems	Adapted lighting control (automated sunlight control, brightness control or presence-controlled lighting solutions), high frequency ballast, switches; opening and closing switch, control of automation by occupant on shutters and blinds	_2_PHYSICAL	_2.2_Comfort	2.2.3_Lighting	Management and monitoring
Assessment on lighting conditions	Average daylight factor	_2_PHYSICAL	_2.2_Comfort	2.2.3_Lighting	Performance and measures
Occupant's perception and satisfaction on lighting comfort	Survey on lighting conditions and control	_2_PHYSICAL	_2.2_Comfort	2.2.3_Lighting	Occupant's perception and satisfaction
Proper layout to ensure satisfactory acoustic conditions for tenants: insulation from the outside of the building	Positioning of the building according to its environment (fair protection from noises outside the building). Assessment based on plans and environmental conditions.	_2_PHYSICAL	_2.2_Comfort	2.2.4_Acoustics	Building lay-out, constructive solutions
Acoustic comfort: insulation between dwellings and with common spaces	Maximize acoustic comfort and provide privacy between homes (fair protection from noises of neighboring apartments and from common spaces in multiple dwelling buildings): halls, staircases, lifts in common spaces; systems and equipment of neighboring dwellings	_2_PHYSICAL	_2.2_Comfort	2.2.4_Acoustics	Building lay-out, constructive solutions
Acoustic comfort: insulation inside dwelling	Reduce noise transfer (ceilings, walls, floors, doors, systems and equipment)	_2_PHYSICAL	_2.2_Comfort	2.2.4_Acoustics	Constructive solutions, materials, systems
Assessment on acoustics performance	Ambient noise. Sound insulation performance and % of time out of a comfort range defined by levels of impact noises.	_2_PHYSICAL	_2.2_Comfort	2.2.4_Acoustics	Performance and measures, occupant's perception and satisfaction



Criterion		Taxonomy cluster			Notes
Proposed title	Description	KPI Cluster	Category	Subcategory	Quality and approach study
Occupant's perception and satisfaction on acoustic comfort	Surveys on occupant's perception and satisfaction may allow to pinpoint specific attention to senior occupants.	_2_PHYSICAL	_2.2_Comfort	2.2.4_Acoustics	Performance and measures, occupant's perception and satisfaction

Criterion		Taxonomy cluster			Notes
Proposed title	Description	KPI Cluster	Category	Subcategory	Quality and approach study
Flat exterior circulation, or with limited ramps if site constraints	The building where the home is must be accessible , the exterior circulations should be flat and in those cases where it is no possible it can be solved with ramps.	_2_PHYSICAL	_2.3_Accessibility_and_orientation	2.3.1_Getting_in_and_out_of_the_house	Building and surroundings lay-out
Adequate exterior circulations	The exterior soil coatings must facilitate the movement of people, they have to guarantee to be adequate, not loose, non-slippery, with adequate lighting day and night .	_2_PHYSICAL	_2.3_Accessibility_and_orientation	2.3.1_Getting_in_and_out_of_the_house	Constructive solutions, materials, performance and measures
Main access worthy	Main access designed to avoid any kind of discrimination, and to be used by all and useful for all.	_2_PHYSICAL	_2.3_Accessibility_and_orientation	2.3.1_Getting_in_and_out_of_the_house	Access quality: layout and characteristics (materials, illumination...)
Doors of the main entrances usable by all	Doors of the main entrances have to be usable by all, and secure.	_2_PHYSICAL	_2.3_Accessibility_and_orientation	2.3.1_Getting_in_and_out_of_the_house	Characteristics of entrances doors
Levels of service served by elevator	Levels of service served by elevator, including mezzanine levels	_2_PHYSICAL	_2.3_Accessibility_and_orientation	2.3.1_Getting_in_and_out_of_the_house	Technical Characteristics
Adequate lifts	Conforming and comfortable lifts	_2_PHYSICAL	_2.3_Accessibility_and_orientation	2.3.1_Getting_in_and_out_of_the_house	Characteristics of lifts
Adequate interior circulations	Flat interior circulations with adequate characteristics , to guarantee accessibility and security.	_2_PHYSICAL	_2.3_Accessibility_and_orientation	2.3.1_Getting_in_and_out_of_the_house	Constructive solutions, materials, performance and measures



Criterion		Taxonomy cluster			Notes
Proposed title	Description	KPI Cluster	Category	Subcategory	Quality and approach study
Horizontal and vertical circulations without obstacles	In the common spaces inside the building the horizontal and vertical circulations are free of obstacles.	_2_PHYSICAL	_2.3_Accessibility_and_orientation	2.3.1_Getting_in_and_out_of_the_house	Access quality: layout and characteristics
Presence of safety devices in case of risk of falling	Presence of safety devices like handrails and other in the case of the existence of risk of falling	_2_PHYSICAL	_2.3_Accessibility_and_orientation	2.3.1_Getting_in_and_out_of_the_house	
Characteristics of the stairs	Morphology of the stairs facilitating their use and guaranteeing security.	_2_PHYSICAL	_2.3_Accessibility_and_orientation	2.3.1_Getting_in_and_out_of_the_house	Characteristics, layout (compliant with the specific regulations of each country)
Presence of parking spaces for people with specific needs.	Presence of parking spaces with specific characteristics, located closer to the entrance of the building or elevator. This parking spaces are assigned priority to people with disabilities and/or specific needs	_2_PHYSICAL	_2.3_Accessibility_and_orientation	2.3.1_Getting_in_and_out_of_the_house	Characteristics of the parking spaces. Lay-out of the parking.
Signage around the building	Existence of enough signage around and inside the building . This signage has to be compliant with the requirement of the accessibility regulations regarding position and characteristics.	_2_PHYSICAL	_2.3_Accessibility_and_orientation	2.3.1_Getting_in_and_out_of_the_house	Characteristics and visibility of the signage
Signage and visual cues in the corridors	Signage and visual cues in the corridors in the common spaces of the building Differentiation by color in: - the doors of the housing in relation to the service doors - the floors in relation to the walls Signage is easily readable: - The floor numbers are indicated - The dwellings are indicated - The signage is compliant with the existing regulations	_2_PHYSICAL	_2.3_Accessibility_and_orientation	2.3.1_Getting_in_and_out_of_the_house	Characteristics, layout (compliant with the specific regulations of each country)
Lighting in the corridor	The lighting of the corridors of the common spaces of the buildings presents on average, on the path, the same intensity (assigned by each countries regulation) There should be no shadows, no direct glare from the	_2_PHYSICAL	_2.3_Accessibility_and_orientation	2.3.1_Getting_in_and_out_of_the_house	Characteristics of lighting system, layout (compliant with the specific regulations of each country)



Criterion		Taxonomy cluster			Notes
Proposed title	Description	KPI Cluster	Category	Subcategory	Quality and approach study
	users on the area or no reflection on the signage. The position of the lighting control base is compliant with the regulations. There must be some solution to prevent a situation without any lighting (Lighting system by presence detection , permanent lighting , other solutions)				
Motorization of the garage door	When the building has garage for the residents , the door is motorized.	_2_PHYSICAL	_2.3_Accessibility_and_orientation	2.3.1_Getting_in_and_out_of_the_house	
Access and circulation in the toilets	Maneuver of doors and comfortable circulations in the toilets	_2_PHYSICAL	_2.3_Accessibility_and_orientation	2.3.2_Getting_around_the_house	Characteristics of doors. Layout of the toilet.
Entry thresholds	The threshold to access to the home is accessible.	_2_PHYSICAL	_2.3_Accessibility_and_orientation	2.3.2_Getting_around_the_house	Lay-out
Physical accessibility inside the home	The living room, the kitchen, a bedroom, the toilet and the bathroom are at the same level of access as the entrance door of the apartment, without any physical obstacle .	_2_PHYSICAL	_2.3_Accessibility_and_orientation	2.3.2_Getting_around_the_house	Lay-out
Accessibility and visibility of controls	The controls (lighting and other) of each room - including the corridors - are easily accessible from the threshold of each entrance door and are easily recognizable with the wall.	_2_PHYSICAL	_2.3_Accessibility_and_orientation	2.3.2_Getting_around_the_house	Installation instructions (compliant with the specific regulations of each country)
Accessibility	Accessibility according to each country's or region's requirements	_2_PHYSICAL	_2.3_Accessibility_and_orientation	2.3.2_Getting_around_the_house	Specific regulations of each country
Minimum dimensions of the different home rooms	The different areas in the homes must satisfy certain spacial standards to allow use by people with impairments	_2_PHYSICAL	_2.3_Accessibility_and_orientation	2.3.2_Getting_around_the_house	Specific regulations of each country
Maneuverability of the annex room door	If there is a closed additional room (garbage, bicycle, pushchair, etc.): the door of the room can must be maneuverable by all.	_2_PHYSICAL	_2.3_Accessibility_and_orientation	2.3.3_Performing_daily_in_house_activities	Characteristics of doors.



Criterion		Taxonomy cluster			Notes
Proposed title	Description	KPI Cluster	Category	Subcategory	Quality and approach study
Accessibility of mailboxes	Mailboxes, located in the lobby of collective buildings, are easily accessible and those assigned to people with specific needs will comply with the requirements of the national/regional/local regulations	_2_PHYSICAL	_2.3_Accessibility_and_orientation	2.3.3_Performing_daily_in_house_activities	Specific regulations of each country
Lighting in the kitchen	Installation of a suitable lighting: point of light, above the worktop and / or sink. There must be no direct dazzle of the users.	_2_PHYSICAL	_2.3_Accessibility_and_orientation	2.3.3_Performing_daily_in_house_activities	
Height of power outlets	In each of the main-use living rooms (main bedroom, living room, kitchen), at least one power outlet is installed at a height that facilitates accessibility: comply with the requirements of the national/regional/local accessibility regulations	_2_PHYSICAL	_2.3_Accessibility_and_orientation	2.3.3_Performing_daily_in_house_activities	Installation instructions (compliant with the specific regulations of each country)
Sliding doors on closets	If it's possible, sliding doors are installed to avoid space loose	_2_PHYSICAL	_2.3_Accessibility_and_orientation	2.3.3_Performing_daily_in_house_activities	Characteristics of doors.
Adaptability requirements bathroom	The bathrooms have to be adaptable to make it suitable for use by occupants with (more serious) mobility impairments (wheelchair dependency, need of assistance in ADL activities)	_2_PHYSICAL	_2.3_Accessibility_and_orientation	2.3.3_Performing_daily_in_house_activities	Layout of the bathroom space
Spatial requirements second bedroom	The second bedroom must be of sufficient dimensions to accommodate a single bed and allow sufficient maneuvering room	_2_PHYSICAL	_2.3_Accessibility_and_orientation	2.3.4_Getting_in_and_out_of_bed	Layout of the bedroom space
Equipment in cabins and sanitary spaces adapted for disabled people	There must be a minimal equipment in cabins and sanitary spaces adapted for disabled people. This minimum will be defined by the national/regional/local regulations	_2_PHYSICAL	_2.3_Accessibility_and_orientation	2.3.5_Personal_hygiene	Equipment of the sanitary space.



Criterion		Taxonomy cluster			Notes
Proposed title	Description	KPI Cluster	Category	Subcategory	Quality and approach study
Sliding door or opening on the outside (bathroom / toilet)	The door of the bathroom/toilet is on a sliding rail or opens on the outside of the room. Complies with the requirements of the applicable regulations.	_2_PHYSICAL	_2.3_Accessibility_and_orientation	2.3.5_Personal_hygiene	Characteristics of doors.
Communication and access control devices usable by all	Communication and access control devices usable by all	_2_PHYSICAL	_2.3_Accessibility_and_orientation	2.3.6_Using_communication_and_entertainment_features	
Intercom / videophone system (private entrance)	Several possibilities for the installation of an intercom or a videophone: - An intercom or videophone connecting the housing to the entrance of the building is installed. In this case, the installation of the device in the housing is performed following the applicable regulation - The intercom is connected to the phone of the tenant The sound level is set on demand.	_2_PHYSICAL	_2.3_Accessibility_and_orientation	2.3.6_Using_communication_and_entertainment_features	Technical characteristics.
Office at home	Home office, workspace in the building or coworking	_2_PHYSICAL	_2.3_Accessibility_and_orientation	2.3.7_Doing_work_or_hobbies	Dwelling lay-out
Presence of a signal in flight of descending stairs.	Presence of a tactile and/or visual device of each flight of descending stairs	_2_PHYSICAL	_2.3_Accessibility_and_orientation	2.3.9_Orientating_oneself_in_space_and_time	



Criterion		Taxonomy cluster			Notes
Proposed title	Description	KPI Cluster	Category	Subcategory	Quality and approach study
Access to Medical care	Reward community connectivity, assist in reducing transport-related emissions and traffic congestion, and promote communal life Quantify the number of and distance to services of medical care in relation to the assessed home. Quality of the infrastructure.	_2_PHYSICAL	_2.4_Health_and_social_care	2.4.1_Proximity_to_services	Number of General practitioner/specialist doctors /health centres ...
Physical Activity Spaces	Access and quality of Physical Activity Spaces suitable for all	_2_PHYSICAL	_2.4_Health_and_social_care	2.4.1_Proximity_to_services	Distance, characteristics of the available services
Fitness Equipment	Access and quality of Fitness Equipment suitable for all	_2_PHYSICAL	_2.4_Health_and_social_care	2.4.1_Proximity_to_services	Distance, characteristics of the available services
Health and Wellness awareness	Health and Wellness awareness when it has been designed .	_2_PHYSICAL	_2.4_Health_and_social_care	2.4.2_Options_and_facilities_for_eHealth_and_remote_medicine	WELL BUILDING STANDARD Guide



Criterion		Taxonomy cluster			Notes
Proposed title	Description	KPI Cluster	Category	Subcategory	Quality and approach study
Predisposition of cabling of the building and common spaces	The building is prepared to receive the cabling or network equipment, which gather the connections of private communicating systems of the estate lots / activity surfaces.	_2_PHYSICAL	_2.5_Smart_readiness		Smart readiness (SR) may be qualified as the capability of ICT tools to communicate altogether safely and easily. Broadly understood, it includes several principles such as openness, interoperability, security and data protection, as well as user friendliness
Predisposition of cabling of the dwelling	The dwellings benefit from different pre-equipped networks. Presence of minimal infrastructure required: the indoor installation includes the termination and patching devices required for telephone access, audiovisual communication services (terrestrial television, satellite and cable networks) and digital data (internet).	_2_PHYSICAL	_2.5_Smart_readiness		
Minimal connected devices	Presence of a central home management system interface for comfort devices: heating, ventilation, shutters and blinds	_2_PHYSICAL	_2.5_Smart_readiness		
Interoperability - Interfaces	The IT interfaces should be based on standards (if available)	_2_PHYSICAL	_2.5_Smart_readiness	2.5.3_IT_infrastructure_APIs	
Digital Security - Security and protection of personal data	Confidentiality and protection of personal data: The contracting authority must ensure that the installed equipment and systems comply with the provisions of the new European protection of individuals with regard to personal data and the free movement of such data (General Data Protection Regulation).	_2_PHYSICAL	_2.5_Smart_readiness	2.5.4_Digital_security_and_data_protection	



Criterion		Taxonomy cluster			Notes
Proposed title	Description	KPI Cluster	Category	Subcategory	Quality and approach study
Digital Security - Security in case of cyber attack or hacking	In the presence of intelligent and connected equipment, foresee the establishment of a system of protection and access against piracy (security of access to the network, mechanism of identification / protection of access to data by password , protection of access to services provided by the connected building, dynamic IP addressing, secure web services offered ...).	_2_PHYSICAL	_2.5_Smart_readiness	2.5.4_Digital_security_and_data_protection	
Occupant's perception and satisfaction on digital equipment and services	Survey on smart readiness; may allow to pinpoint specific attention to senior occupants	_2_PHYSICAL	_2.5_Smart_readiness		Occupant's perception and satisfaction



Criterion		Taxonomy Cluster			Notes
Proposed title	Description	KPI Cluster	Category	Subcategory	Quality and approach study
Access to outdoor areas	Conditions for entering and moving around outdoor spaces must meet requirement in terms of universal design, accessibility and usability	_3_OUTDOOR_ACCESS	_3.1_Home_and_building	3.1.1_Outdoor_spaces	Constructive solutions
Conditions outdoor spaces	Conditions of outdoor spaces must meet requirement in terms of universal design, accessibility and usability	_3_OUTDOOR_ACCESS	_3.1_Home_and_building	3.1.1_Outdoor_spaces	Constructive solutions
View quality	View quality from the inside to the outside should make it possible to see the sky and the landscape	_3_OUTDOOR_ACCESS	_3.1_Home_and_building	3.1.1_Outdoor_spaces	
Easy accessibility	Reduced mobility occupants may be able to access in and out of the building and dwelling	_3_OUTDOOR_ACCESS	_3.2_Immediate_environment	3.2.1_Accessibility	
Vacancy rate	The neighborhood quality can be measured by the number of vacant housing	_3_OUTDOOR_ACCESS	_3.2_Immediate_environment	3.2.3_Social_safety	
Options for transportation	The location of the home should be close to existing transport as well as alternative transportation modes in an effective distance	_3_OUTDOOR_ACCESS	_3.3_Neighbourhood_or_village	3.3.1_Accessibility	
Frequency and proximity of public transport	Promotion of public transportation in terms of proximity but also frequency	_3_OUTDOOR_ACCESS	_3.3_Neighbourhood_or_village	3.3.1_Accessibility	specification of the types of transport, distance to the entrance of the site, as well as the frequencies of passages of public transport.
Safe pedestrian routes	Pedestrian routes need to be safe for people to walk to local services	_3_OUTDOOR_ACCESS	_3.3_Neighbourhood_or_village	3.3.1_Accessibility	



Criterion		Taxonomy Cluster			Notes
Proposed title	Description	KPI Cluster	Category	Subcategory	Quality and approach study
Alternative ways of transport (bikes)	Use of alternative transportation modes such as bicycles and provisions for safe routes and bike parking	_3_OUTDOOR_ACCESS	_3.3_Neighbourhood_or_village	3.3.1_Accessibility	Quantify the number of and distance to key amenities in relation to the assessed home
Parks and open spaces	Access to parks and open spaces promote communal living. Short distance to be able to walk to such spaces is recommended from a sustainable perspective	_3_OUTDOOR_ACCESS	_3.3_Neighbourhood_or_village	3.3.2_Attractiveness	Measure the distance to available infrastructure facilities
Shopping	Shopping for daily needs in a short walking or bike distance from home promotes communal living and socialization opportunity	_3_OUTDOOR_ACCESS	_3.3_Neighbourhood_or_village	3.3.2_Attractiveness	Measure the distance to available infrastructure facilities
Basic services	Providing basic services such as medical care, schools, cultural facilities in a short walking or bike distance from home promotes communal living and socialization opportunity	_3_OUTDOOR_ACCESS	_3.3_Neighbourhood_or_village	3.3.2_Attractiveness	Measure the distance to available infrastructure facilities



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI Cluster	Category	Sub category	Source	Quality and approach study
<p>Adequate maintenance for affective ties to home environment financially viable</p>	<p>To maintain affective ties to the home environment, and help preserve location-specific aspects of personal identity, adequate maintenance must be possible within reasonable limits for housing cost expenditure</p> <p><i>Study has an interesting take on home maintenance issues: where many studies consider these primarily from a Physical safety and comfort perspective, this paper finds that maintenance problems cause stress and anxiety, thus "rupturing affective ties to place, limiting access to preferred identities and reducing well-being. The paper also finds that an interdependence approach to maintenance, as a communal and self-help experience and at the direction of older people themselves, plays a part in maintaining and strengthening social relationships.</i></p> <p><i>The above is also an NoP issue: older people need to feel in control of the maintenance and upkeep of their living environment.</i></p> <p><i>Satisfaction of the criterion could look to the quantitative threshold for housing costs found in another article above (maintenance costs should fit within an envelope of 30% of income on housing costs for the lowest 40% earners). Depending on financial arrangements, depreciation costs for the investment could be assessed, or access to and terms of financing to cover the investment, or cost effects in terms of rent and service costs, depending on tenure and method of financing of maintenance work</i></p>	_4_PERSONAL	_4.1_Identity_and_emotional_connectivity	4.1.1_Home	Coleman, T., Kearns, R., Wiles, J. (2016)	Well-executed study (case study and interview based, of course). Only drawback is the study population was quite specific (island community in the Auckland, New Zealand metropolitan area). Study subjects lived independently and were between 65 and 94 years of age.
<p>Home environment must allow keeping pets</p>	<p>Haven't seen this one before. Sounds relevant, especially for rented accommodation and extra care housing, where this may be controversial</p>	_4_PERSONAL	_4.1_Identity_and_emotional_connectivity	4.1.1_Home	Darab, S., Hartman, Y., Holdsworth, L. (2018)	Note of caution is sounded in the study itself that the regional/rural context of the study population may shape the group's preferences differently than those of their metropolitan counterparts



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI Cluster	Category	Sub category	Source	Quality and approach study
home environments for older women living alone must offer private outdoor spaces	<p>To support occupants sense of identity and autonomy, home environments for older women living alone must offer private outdoor spaces</p> <p><i>Where "private" is a somewhat flexible term. It does not necessarily imply exclusivity, the requirement is also satisfied when e.g. the occupant has control over who uses the outdoor space, the outdoor space is part of a co-housing development etc</i></p>	_4_PERSONAL	_4.1_Identity_and_emotional_connectivity	4.1.1_Home	Darab, S., Hartman, Y., Holdsworth, L. (2018)	Note of caution is sounded in the study itself that the regional/rural context of the study population may shape the group's preferences differently than those of their metropolitan counterparts
Home environment promotes creation of informal support networks e.g neighbours, and sense of safety and security is reassured	Home environment provides reassurance and sense of safety through existence of common and shared spaces e.g common room for meal taking, communal laundry, shared gardens and patios.	_4_PERSONAL	_4.1_Identity_and_emotional_connectivity	4.1.1_Home	Fernández-Carro, C., Vlachantoni, A. (2019)	
Space for deployment of personal history objects	<p>Home environments for people with MCI or early-stage dementia must offer room for deployment of material objects that reflect personal history and/or serve as symbolic links to valued relationships</p> <p><i>Note that the study quotes what is apparently a more or less classic holistic definition of the concept of "home" (Sixsmith, 1986) "A place of physical, personal and social experience that sustains a sense of security, safety, privacy, independence and choice." Good one to quote in the "conceptual framework" section of the deliverables report</i></p>	_4_PERSONAL	_4.1_Identity_and_emotional_connectivity	4.1.1_Home	Gabriel, M., Stirling, C., Faulkner, D, Lloyd, B. (2014)	Positioning paper summarizing current research for the Australian AHURI programme. This paper looks specifically at housing and support needs of people with dementia.



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI Cluster	Category	Sub category	Source	Quality and approach study
Daylight access for positive connection with home environment	<p>To support a positive and enabling connection between occupant and home environment, spaces must provide copious daylight access</p> <p>Daylight access (well in excess of construction norms, and also encompassing outdoor views) is here connected with emotional wellbeing. Verification may also take in provision of mood lighting. We could merge the verification process with any verification on daylight factors we want to do to provide a score in the Comfort category of the Physical cluster</p>	_4_PERSONAL	_4.1_Identity_and_emotional_connectivity	4.1.1_Home	Karol, E. (2016)	the author of this paper used an 'architecture of accommodation' approach in designing an award-winning house that would support independence of the occupants into old age. I've rated the evidence quality as low, because the findings are essentially based on a single case study.
Home environment allows older people to pursue activities independently	<p>To allow frail older people to benefit from the sense of the home as a trusted base, the home environment should enable frail older people to pursue activities independently</p> <p>Study does not really have much specific to say about KPIs for the home environment, but does note the importance of being able to stay in the familiar home environment as frailty sets in as an enabler for wellbeing and sense of autonomy. Maybe use the study as the basis for an NoP in this domain.</p>	_4_PERSONAL	_4.1_Identity_and_emotional_connectivity	4.1.1_Home	Klindtworth, K. et al (2017)	Qualitative study, using a series of in-depth semi-structured interviews with 31 subjects. Doubtful whether study gives rise to any KPIs suitable for evaluation directly in the Personal or Social domain. Such requirements as are hinted at will be covered in the Physical and Outdoor access clusters



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI Cluster	Category	Sub category	Source	Quality and approach study
Spaces and features for views and interaction with nature	<p>To contribute to Nature bonding (dimension of place attachment), the hom environment must provide spaces and design features allowing views of nature and interaction with nature</p> <p>The design features associated with these types of interaction found in the study were: View of nature * Large windows * Individual home back porch * Common house patio * Individual home great room Interaction with nature * Common garden * Compost area * Labyrinth * Nodes and sidewalk system</p>	_4_PERSONAL	_4.1_Identity_and_emotional_connectivity	4.1.1_Home	Lies, M., Kang, M., Sample, R. (2017)	<p>Small-scale observational study, but well grounded in place making and place attachment theory. Exploratory in nature, and small scale, but very useful and practically applicable findings. If adopted in any of our certification pilots, verification could be through assigning a score based on the number of features present</p>



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI Cluster	Category	Sub category	Source	Quality and approach study
Availability of places and features for personalization of home environment	<p>To contribute to Place identity (a dimension of place attachment), the home environment must provide spaces and design features that enable personalization of the home environment, reflecting the occupants' personal history, sense of self, tastes and preferences</p> <p>Lies et al find that design features associated with personalization are:</p> <ul style="list-style-type: none"> * Individual home display spaces * Individual home front porch * Individual home back porch * Wild and raised flowers * Common house dining room <p>Bergland et al (2015) note the importance of both personal historical continuity (the home as a place and reminder of past experience), and personal + personalized space, as well as stress and anxiety at losing these resources in the case of moving home. By inference, a new home environment that allows customization to suit personal history and preferences will help avoid loss of the sense of self and identity, as well as contributing to emotional wellbeing.</p>	_4_PERSONAL	_4.1_Identity_and_emotional_connectivity	4.1.1_Home	Lies, M., Kang, M., Sample, R. (2017) Bergland, A., Slettebo, A. (2015)	<p>Lies et al is a small-scale observational study, but well grounded in place making and place attachment theory. Exploratory in nature, and small scale, but very useful and practically applicable findings.</p> <p>If adopted in any of our certification pilots, verification could be through assigning a score based on the number of features present.</p> <p>Bergland et al use a salutogenic approach to look into coping strategies employed by the 'oldest old', specifically women aged 90 years and older. Study examines the contribution of a range of health resources, including the home.</p> <p>Hard to judge the quality of the study: it is in any case highly qualitative in nature and quite small-scale, with 10 study subjects</p>



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI Cluster	Category	Sub category	Source	Quality and approach study
Personalization of kitchen spaces	<p>To preserve their function as a locus for emotional attachment and personal identity, kitchens must allow personalization of design, equipment and processes to reflect occupants' lived experience</p> <p>The study applies the methodologies of work done in researching spaces of memory in geographical and public spaces contexts to the private space of the kitchen, building upon conceptualizations of the kitchen as a lieu de mémoire "that provides a context for the sensory, haptic and kinetic dimensions of memory which may, or may not, relate to food, but which certainly connects kitchens and their occupants to individuals and moments in time which may otherwise be forgotten." Kitchens, in other words, play an important role in establishing people's sense of self and personal history, and thus to the extent in which people experience their homes as emotionally important and supportive. To reflect this, kitchen spaces and kitchen adaptations in age-friendly homes should offer customization opportunities in terms of lay-out, equipment and design.</p>	_4_PERSONAL	_4.1_Identity_and_emotional_connectivity	4.1.1_Home	Meah, A., Jackson, P. (2016)	Hard to gauge the quality of the study, as it is of a type (ethnography) not otherwise much encountered in this field.
Opportunities for meaningful social activity	<p>The home and its immediate environment should offer opportunities to engage in meaningful social activity</p> <p>Inferred KPI from the observation in the study (itself citing an earlier study) that it is often better for the well-being of older people give rather than receive social support.</p>	_4_PERSONAL	_4.1_Identity_and_emotional_connectivity	4.1.1_Home	Orrrell, A. et al (2013)	Large-scale and thorough analysis of relation of building and design characteristics to reported QoL in residents of extra care housing schemes in the UK, using the EVOLVE tool as an instrument for structured description of building features.
Easy and affordable access to specific "carer" support needs	Home environment provides easy and remote access to supportive services that specifically recognise and support the work of informal carers such as respite care, psychosocial services, peer support, carer allowances	_4_PERSONAL	_4.1_Identity_and_emotional_connectivity	4.1.1_Home	Plöthner, M. et al (2019)	



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI Cluster	Category	Sub category	Source	Quality and approach study
<p>Home offers dedicated space for pursuing activities for self-fulfilment and social engagement.</p>	<p>Home should offer dedicated space for pursuing activities for self-fulfilment and social engagement. Specifically, the home environment must offer adequate spatial provisions for pets, hobbies, socialing and storage. Where homes have multiple occupants, the home should be able to cater for the preferences of each occupant</p> <p>Research shows that the ability to pursue these activities in the home contributes to positive perception of the home environment and contributes to perceived agency in ageing healthily</p>	_4_PERSONAL	_4.1_identity_and_emotional_connectivity	4.1.1_Home	Sixsmith, J. et al (2014) Mackenzie et al (2015)	Sixsmith, J. et al (2014) interesting study, part of the ENABLE-AGE project. Limited source of KPIs, but definitely worth another look as a source of NoPs Mackenzie et al (2015) rather an extensive qualitative study cum literature review, making use of material from the Australian Housing and Independent Living study
<p>Opportunity for deployment of items and furnishings with special meaning</p>	<p>A home environment contributes to feelings of emotional wellbeing and attachment by offering the opportunity to deploy items and furnishings with a special meaning to the occupant.</p> <p><i>Some text in the introductory section (outline of literature / existing theoretical approaches) on the absence of a consolidated, agreed upon definition of the meaning of home to an individual. Useful ammo to further justify using a pragmatic approach in shaping the H4L taxonomy Article notes that it is not self-evident that occupants will want to share the significance or acknowledge the presence of these objects/furnishings to visitors of the house. So ideally, the home should offer the opportunity to stow away objects in a private place. Useful term for dropping somewhere: "appropriation" for the proces of investing a home with personal meaning</i></p>	_4_PERSONAL	_4.1_identity_and_emotional_connectivity	4.1.1_Home	van Steenwinkel et al (2017)	



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI Cluster	Category	Sub category	Source	Quality and approach study
Assistive technologies in the dwelling take account of heirloom status	Acceptance of assistive technologies in the home is positively affected by 'heirloom' re-use of items. Integration of technologies in the dwelling should take account of future use by others than the initial occupants	_4_PERSONAL	_4.1_Identity_and_emotional_connectivity	4.1.1_Home	White, G., Evans, R., Connelly, K., Caine, K. (2014)	Very small-scale observational study
Opportunities for social activities and networks continuity	<p>The home's immediate environment should offer opportunities for continuation of existing social activities, networks and contexts, or at any rate the opportunity to establish/engage in contacts/activities that represent conceptual continuity within the lived experience of the occupant</p> <p>The study found a marked difference in perceived safety between the ECH location with and architectural and spatial design that allowed residents to continue activity and social engagement patterns from previous life phases, and the location where the architectural/spatial design required residents to reconstruct their social identities</p>	_4_PERSONAL	_4.1_Identity_and_emotional_connectivity	4.1.2_Apartment_building_complex	Berglund-Snodgrass, L., Nord, C. (2019)	Well executed case study, but quite small-scale, based on a comparative analysis at two ECH complexes. Study abandons traditional distinctions between inner and outer safety in favour of an approach in which these kinds of safety are considered as co-constitutive situational effects. The focus of the study is on Extra Care Housing, This is within H4L scope, as ECH is considered as a special type of ordinary housing (not as a "light" form of residential LTC facility)
Home environment promotes creation of informal support networks e.g neighbours, and sense of safety and security is reassured	Home environment provides reassurance and sense of safety through existence of common and shared spaces e.g common room for meal taking, communal laundry, shared gardens and patios.	_4_PERSONAL	_4.1_Identity_and_emotional_connectivity	4.1.2_Apartment_building_complex	Fernández-Carro, C., Vlachantoni, A. (2019)	



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI Cluster	Category	Sub category	Source	Quality and approach study
Home environment and neighbourhood contain 'third place thresholds'	<p>The immediate environment of the home and the neighbourhood in which it is situated must offer opportunities for engagement with others. These can take the form of so-called 'third place thresholds'.</p> <p>Study notes that this is essential to well-being and self-identity among older adults and quotes earlier study (Peace, Holland, and Kellaher, 2006) that states: "No longer being able to go out independently is a critical stage in identity construction because, without the wider contexts that lie beyond the dwelling, the home itself becomes diminished as a source of identity construction. Continued capacity to engage with 'the other' is represented by neighborhood in a way that immediate domicile cannot demonstrate or prove." In other words, neighbourhood level characteristics directly co-determine the fitness for purpose of the home environment According to the study, 'thresholds' "are the hybrid, semi-public spaces that straddle the private dwelling and public neighborhood, such as porches, patios, backyards and balconies. These in-between third places provide easy and readily available opportunities for social interaction, most commonly with neighbors." For those living in high-rise dwellings, balconies, lobbies and elevators took on the role of 'thresholds'.</p>	_4_PERSONAL	_4.1_Identity_and_emotional_connectivity	4.1.2_Apartment_building_complex	Gardner, P. (2011)	Study focuses primarily on the neighbourhood as a "place of aging", referring to older studies on the home as a "place of aging". So borderline in terms of the H4L scope. Study nevertheless interesting, because it employs a qualitative, in-depth approach to gain a better understanding of those social and physical elements of the neighbourhood that contribute to well being



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI Cluster	Category	Sub category	Source	Quality and approach study
Home has quality private outdoor spaces	To support a positive and enabling connection between occupant and home environment, the home must provide quality private outdoor spaces	_4_PERSONAL	_4.1_Identity_and_emotional_connectivity	4.1.2_Apartment_building_complex	Karol, E. (2016)	the author of this paper used an 'architecture of accommodation' approach in designing an award-winning house that would support independence of the occupants into old age. I've rated the evidence quality as low, because the findings are essentially based on a single case study.
Home environment allows views of and interaction with nature	To contribute to Nature bonding (dimension of place attachment), the home environment must provide spaces and design features allowing views of nature and interaction with nature Lies et al (2017) found that the design features associated with these types of interaction found in the study are: View of nature * Large windows * Individual home back porch * Common house patio * Individual home great room Interaction with nature * Common garden * Compost area * Labyrinth * Nodes and sidewalk system	_4_PERSONAL	_4.1_Identity_and_emotional_connectivity	4.1.2_Apartment_building_complex	Lies, M., Kang, M., Sample, R. (2017) Kemperman, A., Timmermans, H. (2014)	Lies et al is a small-scale observational study, but well grounded in place making and place attachment theory. Exploratory in nature, and small scale, but very useful and practically applicable findings. If adopted in any of our certification pilots, verification could be through assigning a score based on the number of features present



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI Cluster	Category	Sub category	Source	Quality and approach study
Assistive technologies take account of occupant activity patterns and rituals	Acceptance and effectiveness of assistive technologies is positively affected if their deployment and functioning is sensitive to individual daily routines and activity patterns, and if their deployment is linked to daily activities with ritualistic significance.	_4_PERSONAL	_4.1_Identity_and_emotional_connectivity	4.1.2_Apartment_building_complex	White, G., Evans, R., Connelly, K., Caine, K. (2014)	Evaluation could actually be part quantitative and part qualitative. Deployment flexibility as such should be part of device performance specifications and could be evaluated quantitatively. Whether or not deployment actually does take account of these factors could be evaluated qualitatively on base of supplier practice, occupant experience...
Access to general/indirect "carer" needs such as home care/home support services (primary target: care recipient)	Home care services are available and affordable in the community supporting independence of care recipient whilst helping caregivers feel more competent in caring for their relatives (e.g through providing respite, maintaining a supportive relationship with caregivers, teaching them new skills, and providing help to the caregivers to navigate the healthcare system)	_4_PERSONAL	_4.1_Identity_and_emotional_connectivity	4.1.3_Neighbourhood_or_village	Care Alliance Ireland (2014)	



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI Cluster	Category	Sub category	Source	Quality and approach study
Home is situated in a neighbourhood that scores above average on security and solidarity items.	<p>Wellbeing in this study was measured using the 15-item version of the Social Production Function Instrument for the Level of Well-being (SPF-IL). The scale measures both physical and social wellbeing. Solidarity was measured with 10 items, each scored on a five-point scale. The scale was based on a theory common in work science to measure solidarity in employee teams. Security was assessed using four items, each scored on a four-point scale</p> <p>Study outcomes show that security and solidarity scores are each associated with higher levels of wellbeing among older people; moreover the results suggest a multiplicative effect from the combination of these attributes, and a reinforcing effect from higher scores on security on the effect that a higher level of solidarity has on wellbeing.</p> <p>In most cases, verification could make use of municipal data.</p>	_4_PERSONAL	_4.1_Identity_and_emotional_connectivity	4.1.3_Neighbourhood_or_village	Cramm, J., Nieboer, A. (2013)	Study looking into the effect of neighbourhood attributes solidarity and security on wellbeing of community-dwelling older people in the Netherlands, as well as into the combined effect on wellbeing of these attributes. Looks a fairly sturdy analysis, based on a sample of 869 older adults (defined as 70+) living in 92 neighbourhoods in the city of Rotterdam
Home environment facilitates recognition and training of informal carer skills	Home environment provides easy access to volunteering opportunities in the community or training opportunities that facilitate recognition of informal carer skills e.g through web-based access (distance learning)	_4_PERSONAL	_4.1_Identity_and_emotional_connectivity	4.1.3_Neighbourhood_or_village	Eurocarers (2017) Eurocarers - TRACK project (2016)	



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI Cluster	Category	Sub category	Source	Quality and approach study
Home within range of neighbourhood 'third places'	<p>To promote emotional connectivity, meaningful activity and social engagement, the home should be located within easy, accessible range of a variety of appropriate 'third place' destinations in the neighbourhood.</p> <p>'Third places', using a definition from Oldenburg (1989) are places "that are located outside of the home (first place) and work (second place) and share several essential features: they are on neutral ground, they act as 'levelers', conversation is the main activity, they are accessible, 'regulars' spend time in them, they are physically plain and unassuming, the mood is playful, and people feel like they are a 'home away from home'. "</p> <p>Notable 'third places' identified by the subjects in the study were public parks, certain local businesses (with a strong preference for small single-purpose shops), community organisations and institutions</p>	_4_PERSONAL	_4.1_Identity_and_emotional_connectivity	4.1.3_Neighbourhood_or_village	Gardner, P. (2011)	Study focuses primarily on the neighbourhood as a "place of aging", referring to older studies on the home as a "place of aging". So borderline in terms of the H4L scope. Study nevertheless interesting, because it employs a qualitative, in-depth approach to gain a better understanding of those social and physical elements of the neighbourhood that contribute to well being
Access to personalised tailored support services or tools informal carers	Home environment provides access to community services that are able to provide easily accessible and tailored support through a personalised assessment of needs of the informal carers.	_4_PERSONAL	_4.1_Identity_and_emotional_connectivity	4.1.3_Neighbourhood_or_village	Greenwood, N. et al (2019) Lefranc, A. et al (2017)	
Self-organization of social interaction	The dwelling is situated in a neighbourhood that offers older adults opportunities for co-creation and self-organization of social interaction. This contributes to sense of agency and emotional attachment to living environment, as well as stimulating meaningful interaction with others	_4_PERSONAL	_4.1_Identity_and_emotional_connectivity	4.1.3_Neighbourhood_or_village	Lager, D., van Hoven, B., Huigen, P.P.P. (2013)	Study well-grounded in literature and theory, but in itself small-scale, qualitative and case study based



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI Cluster	Category	Sub category	Source	Quality and approach study
Emotional attachment and alignment	The occupant of the dwelling experiences emotional attachment and alignment (identification) with the identity and social/cultural composition of the dwelling's neighbourhood	_4_PERSONAL	_4.1_Identity_and_emotional_connectivity	4.1.3_Neighbourhood_or_village	Lager, D., van Hoven, B., Huigen, P.P.P. (2013)	Evaluation for existing dwellings could be on the basis of questionnaire to current occupants, occupant representative panel or similar. For new dwellings, evaluation could be against stated preferences of prospective occupants/respondents representative of prospective occupants' views
Dwelling is situated in proximity to likeminded others	Dwelling is situated in a neighbourhood where like-minded others are also domiciled. This contributes both to social activity and to personal wellbeing, as well as being associated with a sense of agency and emotional attachment to the living environment	_4_PERSONAL	_4.1_Identity_and_emotional_connectivity	4.1.3_Neighbourhood_or_village	Lager, D., van Hoven, B., Huigen, P.P.P. (2013)	Study well-grounded in literature and theory, but in itself small-scale, qualitative and case study based



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI Cluster	Category	Sub category	Source	Quality and approach study
Social living environment is sensitive to specific socio-cultural needs	<p>The social living environment of older people from migrant communities, should not just be sensitive to their specific socio-cultural needs and preferences, but also supports trust building and development of social capital</p> <p><i>Very hard to see how we can make this into a verifiable KPI, but nevertheless an important point made by the study: simply creating ethnically homogeneous living communities is not sufficient to support social connectivity, and in fact may have an adverse effect if such living arrangements are experienced as (socially) unsafe and/or adversarial by occupants</i></p>	_4_PERSONAL	_4.1_identity_and_emotional_connectivity	4.1.3_Neighbourhood_or_village	Luo, H. (2015)	Study's main interest is in examining the role of the housing environment in building and strengthening social capital for older immigrants. Applicability of its findings may be limited by the specificity of its study group (older Chinese migrants in Canada); on the other hand, ageing immigrant populations are a feature in many EU MSS. Fairly small-scale study (though part of a larger programme), conducted using a focus group approach



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI Cluster	Category	Sub category	Source	Quality and approach study
Home environment within reach of community activities and engagement	<p>For emotional wellbeing and attachment to place, the home environment must be situated within short and accessible reach of community activities, and opportunities for social engagement, and contact with significant others</p> <p>Gardner (2011) notes that this is essential to well-being and self-identity among older adults and quotes earlier study (Peace, Holland, and Kellaheer, 2006) that states: "No longer being able to go out independently is a critical stage in identity construction because, without the wider contexts that lie beyond the dwelling, the home itself becomes diminished as a source of identity construction. Continued capacity to engage with 'the other' is represented by neighborhood in a way that immediate domicile cannot demonstrate or prove." In other words, neighbourhood level characteristics directly co-determine the fitness for purpose of the home environment</p>	_4_PERSONAL	_4.1_Identity_and_emotional_connectivity	4.1.3_Neighbourhood_or_village	Mackenzie et al (2015) Gardner, P. (2011)	Mackenzie et al is rather an extensive qualitative study cum literature review, making use of material from the Australian Housing and Independent Living study. Gardner focuses primarily on the neighbourhood as a "place of aging", referring to older studies on the home as a "place of aging". Interesting because it employs a qualitative, in-depth approach to gain a better understanding of those social and physical elements of the neighbourhood that contribute to well being



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI Cluster	Category	Sub category	Source	Quality and approach study
Home environment within reach of shops and services	<p>For emotional wellbeing and attachment to place, the home environment must be situated within short and accessible reach of shops and services</p> <p>Smith et al (2011) notes "that when a community is unable to provide these basic services and retail outlets, older people commonly feel discontent and their connections to the place can deteriorate because they are forced to travel elsewhere to meet those needs."</p>	_4_PERSONAL	_4.1_Identity_and_emotional_connectivity	4.1.3_Neighbourhood_or_village	Mackenzie et al (2015) Smith, J., Cartlidge, M. (2011)	Mackenzie et al is a rather extensive qualitative study cum literature review, making use of material from the Australian Housing and Independent Living study. Smith et al is a fairly specific case study, with some issues as to applicability in Europe. Nevertheless, an interesting article: it investigates which elements of the cultural landscape promote emotional attachment to place in retirees. It also highlights some tensions between sustainability ambitions and affordability of dwellings.
Emergency Preparedness	Emergency Preparedness Plans take into account needs of older residents	_4_PERSONAL	_4.1_Identity_and_emotional_connectivity	4.1.3_Neighbourhood_or_village	Metlife Institute / Stanford Center on Longevity (2013)	
Availability, accessibility and affordability of healthy food suppliers	The area surrounding the house is not designated as a Food Desert. Alternatively and in the absence of accessible healthy food suppliers, existence of home-delivered and congregate meal programs.	_4_PERSONAL	_4.1_Identity_and_emotional_connectivity	4.1.3_Neighbourhood_or_village	Metlife Institute / Stanford Center on Longevity (2013)	



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI Cluster	Category	Sub category	Source	Quality and approach study
The home should be situated in an area that facilitates establishment of reciprocal social relationships with e.g. neighbours		_4_PERSONAL	_4.1_Identity_and_emotional_connectivity	4.1.3_Neighbourhood_or_village	Rowles, G., Bernard, M. (2013)	It's a decent enough scene setting essay, intended as the opener and scene setter for a book featuring explorations of various aspects of environmental gerontology. The reason I'm not sure how to value the quality of evidence is precisely because it is a scene setting rather than an experimental or investigative article.
Dwelling has meaningful destinations within walking distance	<p>Meaningful destinations (social engagement and meaningful activity) within walking distance. This is important for both primary users and carers, and especially important for people with dementia</p> <p>Like primary users, informal carers need easy access to various services and amenities preferably at walking distance e.g grocery stores and other shopping facilities, pharmacist and other primary care services, social connections, community services incl work)</p>	_4_PERSONAL	_4.1_Identity_and_emotional_connectivity	4.1.3_Neighbourhood_or_village	Scharlach, A. (2017) Gabriel, M., Faulkner, D, Stirling, C. (2015)	Gabriel et al is the final report of the Australian AHURI programme



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI Cluster	Category	Sub category	Source	Quality and approach study
Availability of places with spiritual significance	<p>For many older adults, the availability of places with spiritual significance within walking distance (accessible routes) of the home is important to support sense of identity and emotional attachment. Conversely, proximity to commercial, industrial and organised religious facilities is negatively associated with mental health</p> <p>According to Smith et al (2013), for many older adults, the availability of places with spiritual significance within walking distance (accessible routes) of the home is important to support sense of identity and emotional attachment. Conversely, according to Firdaus (2017), proximity to commercial, industrial and organised religious facilities is negatively associated with mental health. Firdaus looks to use this proximity as a proxy for substandard housing.</p>	_4_PERSONAL	_4.1_Identity_and_emotional_connectivity	4.1.3_Neighbourhood_or_village	Smith, J., Cartlidge, M. (2011) Firdaus, G. (2017)	Smith et al is a fairly specific case study, with some issues as to applicability in Europe. Nevertheless, an interesting article: it investigates which elements of the cultural landscape promote emotional attachment to place in retirees. It also highlights some tensions between sustainability ambitions and affordability of dwellings. Note on verification: it could use distance categories already proposed for Outdoor access and Social cluster items, with inverse valuation. Alternatively, could be based on expert (map-based or in situ) assessment of dwelling environment and neighbourhood
Mobility	Easy access, and proximity to affordable public transportation from home environment supporting access for example to social activities and other facilities	_4_PERSONAL	_4.1_Identity_and_emotional_connectivity	4.1.3_Neighbourhood_or_village	WHO (2015)	
The neighbourhood around the dwelling satisfies walkability requirements	Proportion of streets in the neighbourhood that have pedestrian paths which meet locally accepted standards	_4_PERSONAL	_4.1_Identity_and_emotional_connectivity	4.1.3_Neighbourhood_or_village	WHO (2015)	



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI Cluster	Category	Sub category	Source	Quality and approach study
Public spaces and buildings in the home's neighbourhood satisfy accessibility criteria	Proportion of new and existing public spaces and buildings that are fully accessible by wheelchair (accessible for all people, including those who have limitations in mobility, vision or hearing).	_4_PERSONAL	_4.1_Identity_and_emotional_connectivity	4.1.3_Neighbourhood_or_village	WHO (2015)	
Home environment must allow keeping pets	Haven't seen this one before. Sounds relevant, especially for rented accommodation and extra care housing, where this may be controversial	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.1_Control_over_social_interaction	Darab, S., Hartman, Y., Holdsworth, L. (2018)	Note of caution is sounded in the study itself that the regional/rural context of the study population may shape the group's preferences differently than those of their metropolitan counterparts
Housing options for single older women must enable occupants to live alone (as opposed to sharing accommodation with other tenants)		_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.1_Control_over_social_interaction	Darab, S., Hartman, Y., Holdsworth, L. (2018)	Note of caution is sounded in the study itself that the regional/rural context of the study population may shape the group's preferences differently than those of their metropolitan counterparts



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI Cluster	Category	Sub category	Source	Quality and approach study
Elected co-habitation	Co-habitation with elected others is associated positively with mental health in older adults. Conversely, co-habitation with non-elected others or under circumstances beyond the control of the subject are negatively associated with mental health	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.1_Control_over_social_interaction	Firdaus, G. (2017)	General observations re quality of evidence * Tranferrability of findings is problematic, given the decidedly non-European context (Delhi). Problems pertain mostly to scales/levels; items as such are recognizable. Applicability Europe would be best for highly urbanized low affluence environments * Study using large number of interviews on the basis of validated questionnaire. So no direct empirical evidence
Home environment has multiple 'third place thresholds'	To promote emotional connectivity, meaningful activity and social engagement, the immediate environment of the home should have multiple 'third place thresholds' According to the study, 'thresholds' "are the hybrid, semi-public spaces that straddle the private dwelling and public neighborhood, such as porches, patios, backyards and balconies. These in-between third places provide easy and readily available opportunities for social interaction, most commonly with neighbors." For those living in high-rise dwellings, balconies, lobbies and elevators took on the role of 'thresholds'.	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.1_Control_over_social_interaction	Gardner, P. (2011)	Study focuses primarily on the neighbourhood as a "place of aging", referring to older studies on the home as a "place of aging". So borderline in terms of the H4L scope. Study nevertheless interesting, because it employs a qualitative, in-depth approach to gain a better understanding of those social and physical elements of the neighbourhood that contribute to well being



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI Cluster	Category	Sub category	Source	Quality and approach study
Home plus environment offer opportunity for pleasurable and meaningful activities	<p>To support preservation of personal dignity (especially in people with dementia) the home and its immediate environment must offer accessible opportunities for engagement in pleasurable and meaningful activities</p> <p>The ability to keep performing daily routines and engage in activities in and around the house that are experienced as pleasurable and/or meaningful contributes to the preservation of personal dignity in people with dementia (and by analogy in other people with chronic illnesses).</p>	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.1_Control_lover_social_interaction	Gennip, I.E. van et al (2016)	Qualitative study, based on in-depth interviews with 14 people with mild to moderate dementia living at home. Assessment of this KPI could be through occupant assessment, user panel assessment, assessment by design professional etc



<p>Home and environment offer free choice in social activity participation</p>	<p>Home enables social dignity by providing access to seven essential conditions. This comprises the condition that the spatial characteristics of the home and its immediate environment should give residents a free choice from moment to moment whether and how (directly or distanced) to participate in social activities</p> <p>Gibson et al (2012): Social dignity, a construct based on the taxonomy constructed by Nora Jacobson (2007, 2009) is generated in the interactions between and amongst individuals and groups and comes in two types: Dignity-of-Self and Dignity-in-Relation.</p> <p>The seven essential conditions are:</p> <ul style="list-style-type: none"> * Meaning, self and self-expression * Safety and security * Ability to sustain meaningful relationships * Access to community and civic life * Participation in school,work or leisure * Respectful care relationships * Control, flexibility and spontaneity <p>Berglund-Snodgrass et al (2019) state that self-elected participation, as well as the opportunity to participate to a degree commensurate with personal preferences and needs, is associated with greater perceived safety.</p>	<p>_4_PERSONAL</p>	<p>_4.2_Privacy_and_dignity</p>	<p>4.2.1_Control_over_social_interaction</p>	<p>Gibson, B.E. et al (2012) Berglund-Snodgrass, L., Nord, C. (2019)</p>	<p>Gibson et al: extent to which essential conditions can be evaluated and how varies. Important publication! Piquant, too, as its primary focus is on younger adults (19-55) with mobility disabilities, and their home environment needs are presented as underaddressed relative to older persons. This seems a false dichotomy, or at any rate a too facile assumptions that older people's needs were actually being catered for (which our project suggests cannot have been the case) Berglund-Snodgrass et al: Well executed case study, but quite small-scale, based on a comparative analysis at two ECH complexes. Study abandons traditional distinctions between inner and outer safety in favour of an approach in which these kinds of safety are considered as co-constitutive situational effects. The focus of the study is on Extra Care Housing, This is within H4L scope, as ECH is considered as a special type of ordinary housing (not as a "light" form of residential LTC facility)</p>
---	---	--------------------	---------------------------------	--	--	---



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI Cluster	Category	Sub category	Source	Quality and approach study
Home environment social and physical infrastructure supports social participation/ preventing social exclusion	Home environment and immediate neighbourhood provides for a supportive physical environment that promotes mobility and does provides access to suitable socially-oriented activities for both older adults and their carer to attend together e.g senior centres, dementia cafes, etc Home environment provides for a supportive physical and social infrastructure that provides opportunities for meaningful interpersonal connections	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.1_Control_over_social_interaction	Levasseur, M. et al (2015) Scharlach, A. (2017)	
Control over level of social interaction while in the home	The spatial lay-out of the home environment must allow occupants control over the level of social interaction they engage in while in the home. Specifically, each home should have a distinct private space to which the occupant wholly controls access	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.1_Control_over_social_interaction	van Steenwinkel et al (2017)	
Secured housing, including perceived safety at home	security is important to subjective well-being. This is reflected in correlations between experience of victimisation and subjective well-being at the individual level (Boarini et al., 2012), as well as by subjective perceptions of safety. Often a perceived lack of physical safety may affect subjective well-being more than the real impact of any threat. Therefore, Measures to improve the security in older people's homes can be needed, e.g. emergency call monitoring devices to keep older people safe; safe from natural disasters.	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.2_Control_over_access	Eurostat (2019)	



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI Cluster	Category	Sub category	Source	Quality and approach study
Occupant has discriminatory control over access to (parts of) dwelling	<p>The home must offer the occupant discriminatory control over access to the dwelling and/or parts thereof. This includes the opportunity to regulate the flow of visitors and "professional operatives" to the home. Specifically, each home should have a distinct private space to which the occupant wholly controls access</p> <p>Hutchings et al (2017) note that subjects both reported and were observed to attaching importance to this aspect, and to specifically evaluate negatively caregivers and others accessing the home without the subjects being informed and asked for consent. Ewart et al (2013) suggest that as long as these visits can be controlled, the loss of privacy "is not necessarily seen as a negative effect of ageing, rather it is accepted as part of the social process that feeds into life changes around this time." Ewart et al note the tricky balance all participants struggled with between "wanting to retain the home as a private space whilst accepting the need for a greater degree of interference." van Steenwinkel et al (2017) specifically point to the need for a distinct private space.</p>	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.2_Control_over_access	Hutchings, B., Chaplin, E (2017) Ewart, I., Luck, R. (2013) van Steenwinkel et al (2017)	Results from Hutchings et al need to be treated with some caution, as they are specifically about older adults with developmental disabilities, and we need to be careful about generalizing findings for this group to the general population. Ewart et al is interesting in that it takes account of and tries to itemize a fundamental shift in the perception of home that occurs as people age, and encounter age-related issues: the home loses its significance "as a personal statement, or a reflection of identity, and becomes more important as a base for planning activities outside the immediate confines of the house." The home as somewhere you leave, and not only somewhere to reside.
Home occupants have access to housing programmes and resources	availability of a resource listing age-friendly home maintenance, support and care-giving services.	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.2_Control_over_access	Orpana, H. et al (2016)	



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI Cluster	Category	Sub category	Source	Quality and approach study
Monitoring systems assume and accommodate occupant agency	<p>Monitoring systems deployed in the home environment must assume and accommodate active, creative agency on the part of occupants. This includes operational principles and data flows being made transparent to occupants in non-technical terms, and monitoring sensitivity being situationally adjustable according to wishes of and through actions of occupants.</p> <p>Berridge (2017) states: "The strategies older adults employ would indicate that passive monitoring is a misnomer....residents resisted the expectations of regularity of routine and passivity built into the technological tool. This is remarkable in light of the fact that the technology provided little room for unintended or creative use; it was designed with...a 'passive age script' to be passively received with minimal added burden of learning how to interact with it....This refusal and 'reshaping' are acts that...must be respected and understood as an ethical imperative to avoid 'totalising and coercive' telecare practices." Garg et al (2014) note that occupants can only make informed trade-offs between safety and privacy/dignity when it is clear what information is collected and processed and to whom it is being made available. They also find a) that older people experience some situations/activities as more privacy and dignity sensitive than others b) and that if informed and enabled of the opportunity to do so, they would make different trade-offs between safety and privacy/dignity for different situations</p>	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.3_Control_over_data_collection_and_management	Berridge, C. (2017)	<p>Berridge well-designed qualitative study based on semi-structured interviews and using grounded theory methods. Sample size quite small.</p> <p>Garg et al Interesting study into design and performance requirements for in-home monitoring and data processing systems, taking into account informed trade-offs made by older adults between autonomy/dignity, utility and privacy using a four-dimensional model developed by Huber et al (no not that Huber, another Huber) (2010). Re verification: performance specifications of systems in question should bear this out</p>



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI Cluster	Category	Sub category	Source	Quality and approach study
ICT solutions such as remote sensor and monitoring systems can support caregiving by carers and independent living of care-recipient.	Home environment can be appropriately adapted to integrate smart 'sensor' technologies that address actual needs of all stakeholders including end users, their family members and caregivers, and health professionals.	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.3_Control_over_data_collection_and_management	Eurocarers (2016) Jegundo, A., Goncalves, G. (2018) Ding, D. et al (2011)	
Monitoring systems situationally adjustable according to wishes of and through actions of occupants.	<p>When monitoring / data collection systems are deployed around the home, monitoring sensitivity must be situationally adjustable according to wishes of and through actions of occupants.</p> <p>This is an inferred KPI based on material put forward in the study that documents</p> <p>a) that older people experience some situations/activities as more privacy and dignity sensitive than others</p> <p>b) and that if informed and enabled of the opportunity to do so, they would make different trade-offs between safety and privacy/dignity for different situations</p>	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.3_Control_over_data_collection_and_management	Garg, V. et al (2014)	Interesting study into design and performance requirements for in-home monitoring and data processing systems, taking into account informed trade-offs made by older adults between autonomy/dignity, utility and privacy using a four-dimensional model developed by Huber et al (no not that Huber, another Huber) (2010). Re verification: performance specifications of systems in question should bear this out



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI Cluster	Category	Sub category	Source	Quality and approach study
Principles / data flows monitoring systems transparent to occupants.	<p>When monitoring / data collection systems are deployed around the home, operational principles and data flows must be made transparent to occupants in non-technical terms</p> <p>Inferred KPI formulated on the basis of information in the study suggesting that occupants can only make informed trade-offs between safety and privacy/dignity when it is clear what information is collected and processed and to whom it is being made available</p>	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.3_Control_over_data_collection_and_management	Garg, V. et al (2014)	
Adjustments to home (systems) offer sense of autonomy and control	<p>To support preservation of personal dignity (especially in people with dementia), adjustments to the home and home management systems must offer a sense of autonomy and control to residents.</p> <p>An inferred KPI, based on the conclusion in the study that there is a marked difference between the degree of personal dignity experienced by people with dementia within familiar, "safe" home environments and outside them. The study concludes that home environments can contribute to the preservation of a sense of agency, autonomy and control, which in turn contribute to preservation of personal dignity.</p>	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.3_Control_over_data_collection_and_management	Gennip, I.E. van et al (2016)	Effectively the evaluation could be a combination of quantitative and qualitative assessment. Quantitative assessment could for instance focus on whether user interfaces comply with emerging design for all standards. Other aspects will be more qualitative and based on user or expert evaluation / feedback



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI Cluster	Category	Sub category	Source	Quality and approach study
Technologies and interfaces designed for use by occupants	<p>In-home technologies/control interfaces need to be designed for safe and convenient use by occupants. This is especially important in home environments for people with MCI or early stage-dementia</p> <p>Need for user control noted in Lorenzen-Huber et al (2011) based on a sophisticated argument predicated on the naivety of many older persons' mental models of privacy, and the fact that in contrast to generally strongly developed mental models about independence and autonomy, mental models of privacy tend to be activity-centric. Literature referenced in Gabriel et al (2014) suggests that for people with MCI/early stage dementia this is important both to objectively give control over the living environment, AND to engender a sense agency and autonomy</p>	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.3_Control_over_data_collection_and_management	Lorenzen-Huber et al (2011) Gabriel, M., Stirling, C., Faulkner, D, Lloyd, B. (2014)	Lorenzen-Huber et al has influenced Garg et al (2013) refers to (see above). Gabriel et al is a positioning paper summarizing current research for the Australian AHURI programme. This paper looks specifically at housing and support needs of people with dementia



<p>Home and home systems accommodate variety of short term and long term occupant routines</p>	<p>The home and any assistive devices and monitoring systems deployed in it, must be designed such as to allow occupants the opportunity to shape and alter their daily routines both in the short term and as regards longer term changes</p> <p>Berridge (2017) states: "Both tangible and intangible elements of design contribute to the independence and well-being of older people at home. However, two important guidelines on housing design for older people refer only to tangible elements of design. It is proposed that intangible elements of design, which make older people feel well, encourage self-esteem and support independence, are also critical in providing high quality housing for older people. Study refers to a model by M. Lawton (1989) which evaluates the suitability of the home environment for older people (also) in terms of 'stimulation' and 'excessive support', with stimulation leading to personal satisfaction and enhanced wellbeing, and excessive support leading to overdependence and dissatisfaction. (Lawton M. Three functions of the residential environment. Journal of Housing for the elderly 1989;5(1):35-50). These aspects are included in the 'intangible elements'. Elements contributing to feelings of stimulation found in the study centre on flexibility of use and furnishing of spaces; daylight access; outdoor views; availability of quality private outdoor spaces The study forcefully argues that the assumption that older persons are creatures of habit with unvarying routines is 'hardwired into systems' design. This has a strong normative component where the system and its professional users consider changes to the routines as transgressions of or deviations from the norm, that require special justification by the occupant. This in turns constrains residents in living their lives as they see fit, impairs privacy and is at the base of many cases of disuse and discontinuation of monitoring systems. Interesting observation: "The system played an institutionalising role by policing behaviours such as being in the bathroom 'too long', taking an afternoon nap for 'too long' or sleeping in late. This effect has been</p>	<p>_4_PERSONAL</p>	<p>_4.2_Privacy_and_dignity</p>	<p>4.2.3_Control_over_data_collection_and_management</p>	<p>Mackenzie et al (2015) Berridge, C. (2017)</p>	<p>Mackenzie et al is rather an extensive qualitative study cum literature review, making use of material from the Australian Housing and Independent Living study Berridge et al is a well-designed qualitative study based on semi-structured interviews and using grounded theory methods. Sample size quite small.</p>
--	--	--------------------	---------------------------------	--	--	---

PUBLIC



	predicted...but not previously explored in empirical research in independent living."						
--	---	--	--	--	--	--	--



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI Cluster	Category	Sub category	Source	Quality and approach study
Surveillance devices and systems in the home adjustable to occupant needs and preferences by occupants themselves	<p>To safeguard perceived autonomy and privacy, any surveillance devices or systems deployed in the home must be adjustable to suit personal preferences for surveillance and non-surveillance, and it must be possible for occupants to do this themselves. It should be transparent to occupants (in terms appropriate to their perspective and background) which information is being shared and with whom by devices and systems deployed about the house, with the occupant being enabled to make and revise decisions about which data is being shared.</p> <p>Mortenson et al (2016) start from theoretical perspectives on the Meaning of home and on intrusive aspects and power relationships inherent in Surveillance, which imply that the introduction of AAL technologies could undermine the basic affordances (roles and significance) of the home.</p> <p>This KPI has as background that participants were worried that AAL might reduce their sense of privacy, and that many of the qualms expressed concerned elements of dignity-preservation. Coupled with a sense of being watched, AAL could be considered as a surveillance devise that undermines "the choice of in/visibility and making the home into an extitutional space, which destabilizes notions of inside and outside."</p> <p>Individual adjustability of settings is required as the extent to which and the manner in which people are prepared to engage in trade-offs between privacy and safety varies enormously from person to person. Participants in the study are clearly concerned about loss of privacy and dignity through data being shared with e.g. family members or caregivers, concerns which are exacerbated when the mechanism and extent of data sharing are unclear, and occupants do not experience a sense of control over data sharing.</p>	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.3_Control_over_data_collection_and_management	Mortenson, W., Sixsmith, A., Beringer, R. (2016)	Qualitative study that takes a potential user perspective on the impact of surveillance technologies on the everyday lives of older people. Organised around three ressearch questions, of which the first is the most immediately relevant for H4L: How would surveillance technologies change the way older people experience the home environment? In terms of the actual technologies under analysis, the article is perhaps a bit dated (the data was collected in 2010; it apparently took the author some time to get his thoughts in order).



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI Cluster	Category	Sub category	Source	Quality and approach study
Monitoring and care platforms deployed in the home environment of people living with dementia should incorporate in their design the five key concern areas / themes	The study suggests that in developing platforms for monitoring / intervention aimed at emotional wellbeing, a participatory design strategy is required which should take into account five key themes: Communication; Isolation; Frustration; Carer challenges; Interventions	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.3_Control_over_data_collection_and_management	Mulvenna, M. et al (2017)	Sympathetic study, especially given its ICT-findings, but very small scale and anecdotal set-up
Information and support needs of carers are easily accessible and understandable	Home allows for home-bound carers to access relevant web-based information (community services, information needs, support needs) and to receive primary care services in the home.	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.3_Control_over_data_collection_and_management	Plöthner, M. et al (2019) Maquire, R. et al (2019)	
Assistive technologies take account of occupant activity patterns and rituals	Acceptance and effectiveness of assistive technologies is positively affected if their deployment and functioning is sensitive to individual daily routines and activity patterns, and if their deployment is linked to daily activities with ritualistic significance.	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.3_Control_over_data_collection_and_management	White, G., Evans, R., Connelly, K., Caine, K. (2014)	Evaluation could actually be part quantitative and part qualitative. Deployment flexibility as such should be part of device performance specifications and could be evaluated quantitatively. Whether or not deployment actually does take account of these factors could be evaluated qualitatively on base of supplier practice, occupant experience...



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI Cluster	Category	Sub category	Source	Quality and approach study
Space and facilities for personal history and sense of self	<p>The home environment must offer sufficient space and facilities for inclusion of elements and objects reflecting the occupants' personal history and sense of self; additionally, it must be possible to customize key areas of the home according to the occupants' personal tastes and preferences.</p> <p>Inferred KPI, based on the analysis in the study of subjects' experience of their current homes and the way in which and extent to which their homes function as a health resource. The importance of both personal historical continuity (the home as a place and reminder of past experience), and personal + personalized space clearly come to the fore, as do stress and anxiety at losing these resources in the case of moving home. By inference, a new home environment that allows customization to suit personal history and preferences will help avoid loss of the sense of self and identity, as well as contributing to emotional wellbeing.</p>	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.4_Control_over_look_and_feel_and_furnishings	Bergland, A., Slettebo, A. (2015)	<p>Study uses a salutogenic approach to look into coping strategies employed by the 'oldest old', specifically women aged 90 years and older. Study examines the contribution of a range of health resources, including the home.</p> <p>Hard to judge the quality of the study: it is in any case highly qualitative in nature and quite small-scale, with 10 study subjects</p>
Home maintenance controlled and engaged in by older people	<p>The home environment and its surroundings (up to neighbourhood level) should offer opportunities and services for home maintenance that actively engage older people in maintenance activities, and cede control of maintenance issues to older people themselves.</p> <p>Active engagement in maintenance activities may promote a sense of autonomy, choice and social cohesion, and may avoid or reduce stress, anxiety and feelings of loss of control as a result of maintenance issues, and/or dealing with maintenance services and service providers</p>	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.4_Control_over_look_and_feel_and_furnishings	Coleman, T., Kearns, R., Wiles, J. (2016)	<p>Well-executed study (case study and interview based, of course). Only drawback is the study population was quite specific (island community in the Auckland, New Zealand metropolitan area). Study subjects lived independently and were between 65 and 94 years of age.</p>



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI Cluster	Category	Sub category	Source	Quality and approach study
Adjustments to the home respect long-term familiarity with and emotional attachment to dwelling	To support preservation of personal dignity (especially in people with dementia), any adjustments to the home must respect the occupants' long-term familiarity with and emotional attachment to the dwelling Study distinguishes between personal dignity and general dignity, and concludes both that loss of personal dignity particularly affects people with dementia, and that this loss is often associated with a sense of worthlessness, of no longer being any use or value to others. Preservation of personal dignity as a care strategem can be generalized to people with other chronic illnesses	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.4_Control_over_look_and_feel_and_furnishings	Gennip, I.E. van et al (2016)	Qualitative study, based on in-depth interviews with 14 people with mild to moderate dementia living at home. Assessment of this KPI could be through occupant assessment, user panel assessment, assessment by design professional etc



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI Cluster	Category	Sub category	Source	Quality and approach study
Occupant can customize living environment according to personal history and identity	<p>The home must offer the occupant opportunities to customize the living environment according to personal, preferences, tastes and history. This includes tailoring of adjustments and features to individual needs and preferences, in order to contribute to Place identity</p> <p>Hutchings et al (21017) note association with positive emotional attachment to the home, sense of wellbeing, and sense of continuity with earlier life phases. The study also specifically notes that it is important that secure storage facilities are available (though this may reflect specific group living conditions for the study population). Kylén et al (2019) highlight the importance of being able to decide and choose individually, on the basis of self-perceived needs and preferences. Arguably, this has an Economic component, as lower income groups may find it hard to have this need catered for.</p> <p>Design features associated with personalization found by Lies et al (2017) are:</p> <ul style="list-style-type: none"> * Individual home display spaces * Individual home front porch * Individual home back porch * Wild and raised flowers * Common house dining room 	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.4_Control_over_look_and_feel_and_furnishings	Hutchings, B., Chaplin, E (2017) Kylén, M., Löfqvist, C., Haak, M., Iwarsson, S. (2019) Lies, M., Kang, M., Sample, R. (2017)	<p>Care needed with Hutchings et al, as study is specifically about older adults with developmental disabilities, and we need to be careful about generalizing findings for this group to the general population.</p> <p>Re Kylén et al: Some of the occupants choices will concern goods and services, but where choices concern actual home components, evaluation could take place on the basis of the availability or not of customization options.</p> <p>Lies et al is a small-scale observational study, but well grounded in place making and place attachment theory. Exploratory in nature, and small scale, but very useful and practically applicable findings.</p> <p>If adopted in any of our certification pilots, verification could be through assigning a score based on the number of features present</p>



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI Cluster	Category	Sub category	Source	Quality and approach study
Occupants can reorder use and furnishing of space to suit (changing) personal preferences	<p>To support a positive and enabling connection between occupant and home environment, occupants must be able to reorder the use and furnishing of spaces according to personal preferences, with the proviso that these preferences may change over time.</p> <p>Quote pertaining to the study's results</p> <p>"Both tangible and intangible elements of design contribute to the independence and well-being of older people at home. However, two important guidelines on housing design for older people refer only to tangible elements of design. It is proposed that intangible elements of design, which make older people feel well, encourage self-esteem and support independence, are also critical in providing high quality housing for older people.</p> <p>Study refers to a model by someone named Lawton which evaluates the suitability of the home environment for older people (also) in terms of 'stimulation' and 'excessive support', with stimulation leading to personal satisfaction and enhanced wellbeing, and excessive support leading to overdependence and dissatisfaction. (Lawton M. Three functions of the residential environment. Journal of Housing for the elderly 1989;5(1):35-50). These aspects are included in the 'intangible elements'. Elements contributing to feelings of stimulation found in the study centre on flexibility of use and furnishing of spaces; daylight access; outdoor views; availability of quality private outdoor spaces</p>	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.4_Control_over_look_and_feel_and_furnishings	Karol, E. (2016)	the author of this paper used an 'architecture of accommodation' approach in designing an award-winning house that would support independence of the occupants into old age. I've rated the evidence quality as low, because the findings are essentially based on a single case study.



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI Cluster	Category	Sub category	Source	Quality and approach study
Personalisation of kitchen spaces	<p>To preserve their function as a locus for emotional attachment and personal identity, kitchens must allow personalization of design, equipment and processes to reflect occupants' lived experience</p> <p>The study applies the methodologies of work done in researching spaces of memory in geographical and public spaces contexts to the private space of the kitchen, building upon conceptualizations of the kitchen as a lieu de mémoire "that provides a context for the sensory, haptic and kinetic dimensions of memory which may, or may not, relate to food, but which certainly connects kitchens and their occupants to individuals and moments in time which may otherwise be forgotten." Kitchens, in other words, play an important role in establishing people's sense of self and personal history, and thus to the extent in which people experience their homes as emotionally important and supportive. To reflect this, kitchen spaces and kitchen adaptations in age-friendly homes should offer customization opportunities in terms of lay-out, equipment and design.</p>	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.4_Control_over_look_and_feel_and_furnishings	Meah, A., Jackson, P. (2016)	Hard to gauge the quality of the study, as it is of a type (ethnography) not otherwise much encountered in this field.
Physical cluster features in specialist housing types have unobtrusive, non-institutionalized design	<p>To support dignity and self-esteem, accessibility, safety and support features in specialist housing types should have unobtrusive, non-institutionalized design</p> <p>The study finds that safety and working care are negatively associated with residents' reported QoL, and interprets that this may be due to the fact that "buildings that signify to their users that they are designed for older people (such as where there are many building elements that reflect the needs of disabled or frail users) can have a negative impact on residents via the activation of stereotypes of age and ageing, which have been demonstrated to impair people's functioning and cognitive performance"</p>	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.4_Control_over_look_and_feel_and_furnishings	Orrrell, A. et al (2013)	Large-scale and thorough analysis of relation of building and design characteristics to reported QoL in residents of extra care housing schemes in the UK, using the EVOLVE tool as an instrument for structured description of building features.



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI Cluster	Category	Sub category	Source	Quality and approach study
Home functions, elements and furnishings can be rearranged without (major) constructive or technical adaptations	<p>Homes should be sufficiently flexible to allow for rearrangement of identity-supporting functions, elements and furnishings without the need for (major) constructive or technical adaptations, as usage patterns of occupants evolve over time: the option to maintain the sense of territory and ownership as e.g. circle of activity contracts should be integrated into the design of the home and its components</p> <p><i>Some relevant NoP material on the meaning and significance of 'home' and 'being at home'. People need their homes to fulfill the functions of</i></p> <ul style="list-style-type: none"> <i>* place of centering, that is to say a reference point from which we build our spatial world.</i> <i>* Derived from that, an anchoring point for the flow of daily life</i> <i>* Providing a sense of permanence and continuity</i> <i>* Territory or place of refuge</i> <i>* investiture for a sense of ownership</i> <p><i>All these aspects are useful to flesh out the NoP side of the H4L taxonomy on the branches dealing with the Personal cluster, more specifically those subbranches that focus on identity and emotional attachment.</i></p> <p><i>The inferred KPI at left, and the one in the following have been inferred from material in the study, though this has not been simple, given the study is a scene-setting paper rather than an experimental or investigative study.</i></p>	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.4_Control_over_look_and_feel_and_furnishings	Rowles, G., Bernard, M. (2013)	It's a decent enough scene setting essay, intended as the opener and scene setter for a book featuring explorations of various aspects of environmental gerontology. The reason I'm not sure how to value the quality of evidence is precisely because it is a scene setting rather than an experimental or investigative article.
Separate extra bedroom for carer	Home has at least one extra bedroom for carer or other visitor or is modular allowing for easy adaptation visiting friends, relatives or other caregiver	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.5_Availability_of_private_spaces_and_times	Carers UK (2016)	



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI Cluster	Category	Sub category	Source	Quality and approach study
The home environment for older women living alone must offer adequate privacy and private spaces		_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.5 Availability of private_spaces_and_times	Darab, S., Hartman, Y., Holdsworth, L. (2018)	Note of caution is sounded in the study itself that the regional/rural context of the study population may shape the group's preferences differently than those of their metropolitan counterparts
home environments for older women living alone must offer private outdoor spaces	To support occupants sense of identity and autonomy, home environments for older women living alone must offer private outdoor spaces Where "private" is a somewhat flexible term. It does not necessarily imply exclusivity, the requirement is also satisfied when e.g. the occupant has control over who uses the outdoor space, the outdoor space is part of a co-housing development etc	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.5 Availability of private_spaces_and_times	Darab, S., Hartman, Y., Holdsworth, L. (2018)	Note of caution is sounded in the study itself that the regional/rural context of the study population may shape the group's preferences differently than those of their metropolitan counterparts
Adequate protection from noise pollution	Exposure to noise pollution is negatively associated with mental health and social functioning. Protection from noise pollution contributes to personal wellbeing and social participation	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.5 Availability of private_spaces_and_times	Firdaus, G. (2017)	Verification: methodology for assessment in Comfort category (Physical cluster) can be used
Home offers opportunity to create personal, "safe" spaces for occupants with MCI/early-stage dementia	Report does not specify further what this means in terms of spatial requirements, access control and so on.	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.5 Availability of private_spaces_and_times	Gabriel, M., Stirling, C., Faulkner, D, Lloyd, B. (2014)	Positioning paper summarizing current research for the Australian AHURI programme. This paper looks specifically at housing and support needs of people with dementia.



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI Cluster	Category	Sub category	Source	Quality and approach study
Private space for each occupant	<p>The home must offer the occupant private space. In co-habitation situations specifically, the dwelling has to provide sufficient personal space for each inhabitant</p> <p>Hutchings et al (2017) Associate private space with positives re autonomy, privacy, but also sense of control and agency, and subjective security.</p> <p>Firdaus (2017) notes that whereolder adults are co-habiting with others (primarily family members, in the study under consideration), lack of sufficient personal space is associated negatively with mental health. In the context of the study, adequate personal space is defined as having your own bedroom of sufficient dimensions. Additionally, positive mental states are associated with (exclusive) availability of amenities in the home: private bath, own heating and cooling system, separate kitchen, own outdoor space). In more affluent contexts this could extrapolate to broader array of personal spaces</p>	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.5_Availability_of_private_spaces_and_times	Hutchings, B., Chaplin, E (2017) Firdaus, G. (2017)	Care needed with interpretation of Hutchings et al, as study is specifically about older adults with developmental disabilities, and we need to be careful about generalizing findings for this group to the general population. Some ideas on verification based on Firdaus: Qualitative verification on the basis of reported/perceived availability of personal space is also an option. For existing home environments use experience of current occupants. For new builds or major refurbishment option could be panel responses to proposed designs/lay-outs



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI Cluster	Category	Sub category	Source	Quality and approach study
Spaces and design features contribute to autonomy and space for transition	<p>To contribute to Place dependence (a dimension of place attachment), the home environment must provide spaces and design features that contribute to autonomy and space for transition</p> <p><i>The design features associated with these aspects found in the study were:</i></p> <p><i>Autonomy:</i></p> <ul style="list-style-type: none"> * Individual home kitchen * Individual home bathroom * Common garden * Compost area <p><i>Space for transition</i></p> <ul style="list-style-type: none"> * Common house guest rooms * Individual home closets * Individual home great room 	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.5_Availability_of_private_spaces_and_times	Lies, M., Kang, M., Sample, R. (2017)	<p>Small-scale observational study, but well grounded in place making and place attachment theory. Exploratory in nature, and small scale, but very useful and practically applicable findings.</p> <p>If adopted in any of our certification pilots, verification could be through assigning a score based on the number of features present</p>
In-home technologies / systems should be equipped with privacy awareness systems tailored to the concerns and tech awareness level of users	<p>Again based on the fact that older people's mental models of privacy are often naïve, and their level of technology awareness and knowledge quite low, the study states: "Making data more transparent can help to align older adults' perceived risk with their actual risk. Privacy awareness systems ... allow data collectors to announce and implement data usage policies and provides users with the ability to track and manage their personal information. Such systems are universally useful. Such a system would create a sense of accountability, rather than absolute security, about privacy, particularly in home-based ubiquitous computing environments</p>	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.5_Availability_of_private_spaces_and_times	Lorenzen-Huber et al (2011)	<p>This is the study that Garg et al (2013) refers to (see above)</p>



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI Cluster	Category	Sub category	Source	Quality and approach study
Opportunity for claiming and crafting personal territory	<p>The home environment should offer opportunity to claim and craft a specific personal space (territory) to facilitate the process of appropriation.</p> <p>Study employs categorization developed by Swedish architect Ola Nylander (2002) of non-measurable aspects of architecture:</p> <ul style="list-style-type: none"> * spatial articulation * enclosure * sensory qualities * materials * form, measurements and proportions 	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.5_Availability_of_private_spaces_and_times	van Steenwinkel et al (2017)	
Palliative care/ End-of-life	Palliative care services can be arranged for in the home and these take into account the specific needs of informal carers	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.6_Seclosure_for_health_and_ADL_care_provision	Ewing, G., Grande, G. (2013) Ewing, G., Grande, G. (2016) Seow, H., Bainbridge, D. (21018)	
Information and support needs of carers are easily accessible and understandable	<i>Home allows for home-bound carers to access relevant web-based information (community services, information needs, support needs) and to receive primary care services in the home.</i>	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.6_Seclosure_for_health_and_ADL_care_provision	Plöthner, M. (2019) Maquire, R. et al (2019)	



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI Cluster	Category	Sub category	Source	Quality and approach study
Formal and personalised social and health services are available, accessible and affordable in the home's neighbourhood	Proportion of older persons who have personal care or assistance needs that are receiving formal (public or private) home- or community-based services.	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.6_Seclosure_for_health_and_ADL_care_provision	WHO (2015)	
Flexible home tenureship rules	Home tenureship rules are flexible, allowing for a carer to live in home of care recipient. Existing tenureship rules allows for a carer to move into home of care-recipient	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.7_Secure_fiture_prospects	Carers UK (2016)	
Affordable housing	Financial dependency is negatively associated with mental health. This is specifically so where there is financial dependency for housing arrangements	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.7_Secure_fiture_prospects	Firdaus, G. (2017)	Verification: use housing costs as percentage of disposable income
Long-term security affordable housing arrangements	To support personal sense of security and emotional wellbeing, occupants must have long-term security on costs of housing, or alternatively on the long-term availability of appropriate, affordable housing arrangements	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.7_Secure_fiture_prospects	Mackenzie et al (2015)	Rather an extensive qualitative study cum literature review, making use of material from the Australian Housing and Independent Living study



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI Cluster	Category	Sub category	Source	Quality and approach study
Financing mechanisms for age-friendly housing should enable as many people as possible to remain or become home owners	Though higher scores on QoL etc for home owners are at least partly due to higher SES, there does seem to be an autonomous positive effect from home ownership compared to tenancy	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.7_Secure_fture_prospects	Nakhodaezadeh ,M. et al (2017)	Applicability of research results may be somewhat limited, because of specific study context (older people in urban Iran). Uses the EVOLVE tool as a starting point for analysis. Of the three main research questions, question 2 is the most pertinent for H4L: "May the sociophysical environment of the home be associated with QoL and perceived social support among elders."



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI Cluster	Category	Sub category	Source	Quality and approach study
<p>Home environment must provide spaces and design features that contribute to autonomy and space for transition.</p>	<p>To contribute to Place dependence (a dimension of place attachment), the home environment must provide spaces and design features that contribute to autonomy and space for transition. In designing and building specialist housing types, the design of provisions for safety and health must take into account the need to maintain residents' sense of independence</p> <p>The design features associated with these aspects found in Lies, M., Kang, M., Sample, R. (2017) were:</p> <p>Autonomy:</p> <ul style="list-style-type: none"> * Individual home kitchen * Individual home bathroom * Common garden * Compost area <p>Space for transition</p> <ul style="list-style-type: none"> * Common house guest rooms * Individual home closets * Individual home great room <p>For specialist housing, Orrell et al (2013) note that safety is negatively associated with QoL, and point to previous research that highlights that "residents' independence and ability to move freely inside and outside the home was compromised by the use of fire-protection devices that kept doors, which required considerable force to open them, closed." Generalizing to other types of safety provisions - and noting that developers of specialist housing tend to adopt risk-averse strategies to minimize the chances of non-compliance with health and safety legislation - the study notes that the trade-off between safety and actual and perceived independence is rife with potential conflict, and design choices need to consciously take this dichotomy into account.</p>	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.7_Secure_fture_prospects	<p>Orrrell, A. et al (2013)</p> <p>Lies, M., Kang, M., Sample, R. (2017)</p>	<p>Orrell et al Large-scale and thorough analysis of relation of building and design characteristics to reported QoL in residents of extra care housing schemes in the UK, using the EVOLVE tool as an instrument for structured description of building features.</p> <p>Lies et al small-scale observational study, but well grounded in place making and place attachment theory. Exploratory in nature, and small scale, but very useful and practically applicable findings.</p> <p>If adopted in any of our certification pilots, verification could be through assigning a score based on the number of features present</p>



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI Cluster	Category	Sub category	Source	Quality and approach study
Home environment promotes sense of autonomy and purpose for informal carers	Home environment should be a place that promotes the wellbeing of informal carers by promoting their sense of autonomy and sense of purpose. There could potentially be several indicators, notably indicators that facilitate and promote access to social connections and social activities in and outside the home (both virtual and actual)	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.8_Self-determination_autoomy_of_moveemnt	Maquire, R. et al (2019)	
Occupants as co-creators of home environments	In new build and major refurbishment projects, (future) occupants should be enabled to act as co-creators of the new or restructured home environment. The study quotes a US programme to show that "aging-in-place initiatives that foster naturally progressing identity changes through a person-centered lens will be more successful than those that promote a directive approach." Part of the reason for this is that cof-creative models help to dynamically preserve people's sense of identity.	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.8_Self-determination_autoomy_of_moveemnt	Martin, D., Long, O., Kessler, L. (2019)	Very much an exploratory, qualitative study, survey-based Interesting take, as such: study examines motives for relocation among older adults to infer conditions for successful ageing in place. Older adults here defined as those over 60 years of age, so a fairly broad definiton. Follow-up survey questions were put to respondents who had answered "no" or "unsure" to the question "Do you want to stay in your own home as you grow older?"



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI Cluster	Category	Sub category	Source	Quality and approach study
Progressive privacy approaches in complexes/configurations of homes	Apartment complexes/configurations of homes for older people should adopt a progressive privacy design approach to reconcile safety and autonomy concerns the study notes that in some ECH complexes analysed, the negative effect of safety on QoL is not apparent, and notes these complexes employ a progressive privacy design approach to keep public and private areas separate. "As such, security is realised in a relatively covert manner, and rather than provoking a feeling of institutionalisation, the knowledge that one lives in a secure environment ...could have a beneficial psychological effect on residents."	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.8_Self-determination_autonomy_of_movement	Orrrell, A. et al (2013)	Large-scale and thorough analysis of relation of building and design characteristics to reported QoL in residents of extra care housing schemes in the UK, using the EVOLVE tool as an instrument for structured description of building features.
Home component settings controllable by occupants	The occupant of the home must be able to control and vary the settings of home components for e.g. temperature control, ventilation, day light access, outdoor views etc. The key concern is that occupants are enabled to control and vary these components independently. This contributes greatly to sense of autonomy and sense of control over the environment (cf. SoC)	_4_PERSONAL	_4.2_Privacy_and_dignity	4.2.8_Self-determination_autonomy_of_movement	van Steenwinkel et al (2017)	



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI cluster	Category	Sub category	Source	Quality and approach study
Home environment offers opportunities for active engagement in social spaces	Social spaces in facilities for communal independent living should offer clear opportunities for active engagement. This is positively associated with both appreciation and use of such spaces	_5_SOCIAL	_5.1_Social_activity	5.1.1_Ability_to_have_social_contacts_in_the_home	Campbell, N. (2015)	Well-designed study using an original conceptual framework (Successful Social Space Attribute Model) developed by the author in a previous study. Reasonably large number of respondents, but only one study-site
Availability of space in the home to receive visitors, including overnight visitors	In Darab et al (2018) this comes out as being especially important to members of the study group (who are at especial risk of social isolation), while at the same time often hard to satisfy in the context of low-cost rented accommodation. Nakhodaezadeh et al (2017) point out that in Iran, more than in (western) Europe, receiving guests, often multiple guests and overnight, at the home is an essential element in maintaining and strengthening social ties and social support networks. This may well also be in the case in areas of southern and eastern Europe, as well as among specific ethnic and socio-cultural groups everywhere. Inferred KPI: as other people in the social network age, these spaces should be accessible for people with (minor or moderate) physical impairments	_5_SOCIAL	_5.1_Social_activity	5.1.1_Ability_to_have_social_contacts_in_the_home	Darab, S., Hartman, Y., Holdsworth, L. (2018) Nakhodaezadeh, M. et al (2017)	Re Darab et al, a note of caution is sounded in the study itself that the regional/rural context of the study population may shape the group's preferences differently than those of their metropolitan counterparts. Applicability of research results from Nakhodaezadeh et al may be somewhat limited, because of specific study context (older people in urban Iran). Uses the EVOLVE tool as a starting point for analysis. Of the three main research questions, question 2 is the most pertinent for H4L: "May the sociophysical environment of the home be associated with QoL and perceived social support among elders."



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI cluster	Category	Sub category	Source	Quality and approach study
The home environment allows free choice in manner and level of social engagement	<p>The home environment - at the levels home, immediate environment and neighbourhood/village must offer occupants free choice in the manner and level of social engagement entered upon (at the scale levels relevant for H4L)</p> <p>Ewart et al (21013) gives as examples of another balancing act: "wanting to remain on good terms with a neighbour for mutual reassurance, but at the same time not wanting to be forced into false companionship....keeping the children close, but not so close that authority and control are lost"</p> <p>Berglund-Snodgrass et al (2019), focusing specifically on the home and its immediate environment note that self-elected participation, as well as the opportunity to participate to a degree commensurate with personal preferences and needs, is associated with greater perceived safety.</p>	_5_SOCIAL	_5.1_Social_activity	5.1.1_Ability_to_have_social_contacts_in_the_home	Ewart, I., Luck, R. (2013) Berglund-Snodgrass, L., Nord, C. (2019)	<p>An interesting innovative approach in Ewart et al is that it takes account of and tries to itemize a fundamental shift in the perception of home that occurs as people age, and encounter age-related issues: the home loses its significance "as a personal statement, or a reflection of identity, and becomes more important as a base for planning activities outside the immediate confines of the house." The home as somewhere you leave, and not only somewhere to reside.</p> <p>Berglund-Snodgrass et al is a well executed case study, but quite small-scale, based on a comparative analysis at two ECH complexes. Study abandons traditional distinctions between inner and outer safety in favour of an approach in which these kinds of safety are considered as co-constitutive situational effects.</p> <p>The focus of the study is on Extra Care Housing, This is within H4L scope, as ECH is considered as a special type of ordinary housing (not as a "light" form of residential LTC facility)</p>



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI cluster	Category	Sub category	Source	Quality and approach study
The home environment enables occupants to access those in their social group	<p>The home environment must enable occupants to access those in their social group, either being able to visit locally or virtually, or allowing access to the home for people who visit. This includes easy accessibility to the home for visitors with limited mobility.</p> <p>This KPI derives from one of the central concepts in Ewart et al (2013), namely that as people grow more housebound, the significance of the home shifts from being a safe haven and place of attachment, to a place from which escape is sought and which must function as a platform for engagement with the world beyond the front door.</p> <p>In terms of NoPs, this means that the outward-focused engagement role of the house takes on a more prominent role as people become more housebound. It also implies that people will have difficulties making accurate assessment of their own future needs and preferences, as these will shift according to how their individual life histories pan out.</p> <p>Accessibility criterion is specifically pointed out by Gabriel et al (2014).</p>	_5_SOCIAL	_5.1_Social_activity	5.1.1_Ability_to_have_social_contacts_in_the_home	Ewart, I., Luck, R. (2013) Gabriel, M., Stirling, C., Faulkner, D., Lloyd, B. (2014)	<p>An interesting innovative approach in Ewart et al is that study takes account of and tries to itemize a fundamental shift in the perception of home that occurs as people age, and encounter age-related issues: the home loses its significance "as a personal statement, or a reflection of identity, and becomes more important as a base for planning activities outside the immediate confines of the house." The home as somewhere you leave, and not only somewhere to reside.</p> <p>Gabriel et al is a positioning paper summarizing current research for the Australian AHURI programme. This paper looks specifically at housing and support needs of people with dementia.</p>
Home offers sufficient personal space in co-habitation situations	<p>Where older adults are co-habiting with others (primarily family members, in the study under consideration), lack of sufficient personal space is associated negatively with mental health. In the context of the study, adequate personal space is defined as having your own bedroom of sufficient dimensions. Additionally, positive mental states are associated with (exclusive) availability of amenities in the home: private bath, own heating and cooling system, separate kitchen, own outdoor space). In more affluent contexts this could extrapolate to broader array of personal spaces</p>	_5_SOCIAL	_5.1_Social_activity	5.1.1_Ability_to_have_social_contacts_in_the_home	Firdaus, G. (2017)	<p>Qualitative verification on the basis of reported/perceived availability of personal space is also an option. For existing home environments use experience of current occupants. For new builds or major refurbishment option could be panel responses to proposed designs/lay-outs</p>



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI cluster	Category	Sub category	Source	Quality and approach study
Home must offer opportunity to co-habit with self-selected others	<p>According to Firdaus (2017), co-habitation with elected others is associated positively with mental health in older adults. Conversely, co-habitation with non-elected others or under circumstances beyond the control of the subject are negatively associated with mental health.</p> <p>Hui et al (2014) remark that the home must offer the opportunity to co-habit with others they themselves select, be they relatives or others. In the research findings, this aspect is positively associated with the perceived utility of the home</p>	_5_SOCIAL	_5.1_Social_activity	5.1.1_Ability_to_have_social_contacts_in_the_home	Firdaus, G. (2017) Hui, E.C.M., Wong, F.K.W., Chung, K.W., Lau, K.Y. (2014)	<p>General observations re quality of evidence from Firdaus:</p> <ul style="list-style-type: none"> * Tranferrability of findings is problematic, given the decidedly non-European context (Delhi). Problems pertain mostly to scales/levels; items as such are recognizable. Applicability Europe would be best for highly urbanized low affluence environments * Study using large number of interviews on the basis of validated questionnaire. So no direct empirical evidence <p>findings from Hui et al need to be treated with some caution, as the study was carried out in a very different socio-cultural context (Hongkong)</p>
The home's immediate environment has multiple 'third place thresholds'	<p>To promote emotional connectivity, meaningful activity and social engagement, the immediate environment of the home should have multiple 'third place thresholds'</p> <p>According to the study, 'thresholds' "are the hybrid, semi-public spaces that straddle the private dwelling and public neighborhood, such as porches, patios, backyards and balconies. These in-between third places provide easy and readily available opportunities for social interaction, most commonly with neighbors." For those living in high-rise dwellings, balconies, lobbies and elevators took on the role of 'thresholds'.</p>	_5_SOCIAL	_5.1_Social_activity	5.1.1_Ability_to_have_social_contacts_in_the_home	Gardner, P. (2011)	<p>Study focuses primarily on the neighbourhood as a "place of aging", referring to older studies on the home as a "place of aging". So borderline in terms of the H4L scope.</p> <p>Study nevertheless interesting, because it employs a qualitative, in-depth approach to gain a better understanding of those social and physical elements of the neighbourhood that contribute to well being</p>



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI cluster	Category	Sub category	Source	Quality and approach study
Home enables social dignity by providing access to seven essential conditions	<p>Social dignity, a construct based on the taxonomy constructed by Nora Jacobson (2007, 2009) is generated in the interactions between and amongst individuals and groups and comes in two types: Dignity-of-Self and Dignity-in-Relation. The seven essential conditions are:</p> <ul style="list-style-type: none"> * Meaning, self and self-expression * Safety and security * Ability to sustain meaningful relationships * Access to community and civic life * Participation in school, work or leisure * Respectful care relationships * Control, flexibility and spontaneity 	_5_SOCIAL	_5.1_Social_activity	5.1.1_Ability_to_have_social_contacts_in_the_home	Gibson, B.E. et al (2012)	Extent to which essential conditions can be evaluated and how varies. Important publication! Piquant, too, as its primary focus is on younger adults (19-55) with mobility disabilities, and their home environment needs are presented as under addressed relative to older persons. This seems a false dichotomy, or at any rate a too facile assumptions that older people's needs were actually being catered for (which our project suggests cannot have been the case)
Home environment has spaces and design features that contribute to autonomy and space for transition	<p>To contribute to Place dependence (a dimension of place attachment), the home environment must provide spaces and design features that contribute to autonomy and space for transition</p> <p>The design features associated with these aspects found in the study were:</p> <p>Autonomy:</p> <ul style="list-style-type: none"> * Individual home kitchen * Individual home bathroom * Common garden * Compost area <p>Space for transition</p> <ul style="list-style-type: none"> * Common house guest rooms * Individual home closets * Individual home great room 	_5_SOCIAL	_5.1_Social_activity	5.1.1_Ability_to_have_social_contacts_in_the_home	Lies, M., Kang, M., Sample, R. (2017)	Small-scale observational study, but well grounded in place making and place attachment theory. Exploratory in nature, and small scale, but very useful and practically applicable findings. If adopted in any of our certification pilots, verification could be through assigning a score based on the number of features present



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI cluster	Category	Sub category	Source	Quality and approach study
Home environment has spaces and design features that allow expression of family history	<p>To contribute to Family bonding (a dimension of place attachment), the home environment must provide spaces and design features that allow for continuation of family past and continuation of family history</p> <p>The design features associated with these aspects found in the study were:</p> <ul style="list-style-type: none"> Continuation of family past * Allowance of pets * Spending time with grandchildren Continuation of family history * Individual home display spaces 	_5_SOCIAL	_5.1_Social_activity	5.1.1_Ability_to_have_social_contacts_in_the_home	Lies, M., Kang, M., Sample, R. (2017)	<p>Small-scale observational study, but well grounded in place making and place attachment theory. Exploratory in nature, and small scale, but very useful and practically applicable findings.</p> <p>If adopted in any of our certification pilots, verification could be through assigning a score based on the number of features present</p>



<p>Homes environment provides spaces and design features conducive to spontaneous, proposed and organized interaction</p>	<p>To contribute to Friend bonding (dimension of place attachment), the home environment must provide spaces and design features conducive to spontaneous, proposed and organized interaction. This also applies to Family bonding</p> <p><i>Lies et al (2017) uses a five-dimensions model of place attachment developed by Raymond et al (2010), which breaks this down into:</i></p> <ul style="list-style-type: none"> * place dependence * place identity * nature bonding * friend bonding * family bonding <p><i>The present study examines the relative importance of these five dimensions and explores which design features of the home environment contribute to each dimension. The study took place among residents of a senior co-housing community in the US Midwest. Despite a number of communal facilities on-site, this concerns independent living and is thus in scope for H4L. The relative importance of the five dimensions in decreasing order of importance:</i></p> <ul style="list-style-type: none"> * Friend bonding * Nature bonding * Place dependence * Place identity * Family bonding <p><i>The design features associated with these types of interaction found in the study were:</i></p> <p><i>Spontaneous interaction</i></p> <ul style="list-style-type: none"> * Individual home front porch * Nodes and Sidewalk System * Clustered mailboxes * Clustered parking <p><i>Proposed interaction:</i></p>	<p>_5_SOCIAL</p>	<p>_5.1_Social_activity</p>	<p>5.1.1_Ability_to_have_social_contacts_in_the_home</p>	<p>Lies, M., Kang, M., Sample, R. (2017) Gray et al (2018)</p>	<p>Lies et al is a small-scale observational study, but well grounded in place making and place attachment theory. Exploratory in nature, and small scale, but very useful and practically applicable findings.</p> <p>If adopted in any of our certification pilots, verification could be through assigning a score based on the number of features present</p> <p>Interesting observation in Gray et al with regards to financial feasibility of integration of features in the home environment: risk of loneliness and its attendant adverse effects is highest among older residents with lower SES, who tend to live in accommodation towards the lower end of the market (often rented)</p> <p>There is a table of factors contributing to higher loneliness and isolation in the study</p>
---	---	------------------	-----------------------------	--	--	---



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI cluster	Category	Sub category	Source	Quality and approach study
	<ul style="list-style-type: none"> * Common House Game Room * Common House Hearth Room <p>Organized interaction</p> <ul style="list-style-type: none"> * Common House Dining Room * Common House Patio * Individual Home Great Room <p>Though Lies et al attaches only relatively minor significance to Family bonding, other studies including Gray et al (2018) do agree that older residents who are in frequent contacts with these others experience less loneliness and a higher level of well-being</p>					
Home environment offers adequate spatial provisions for pets, hobbies, socialising and storage	<p>The home environment must offer adequate spatial provisions for pets, hobbies, socialising and storage. Where homes have multiple occupants, the home should be able to cater for the preferences of each occupant</p> <p>The broader spectrum of requirements is mentioned in Mackenzie et al (2015). Darab et al (2018) specifically mention pets.</p>	_5_SOCIAL	_5.1_Social_activity	5.1.1_Ability_to_have_social_contacts_in_the_home	Mackenzie et al (2015) Darab, S., Hartman, Y., Holdsworth, L. (2018)	Mackenzie et al is rather an extensive qualitative study cum literature review, making use of material from the Australian Housing and Independent Living study. Re Darab et al, a note of caution is sounded in the study itself that the regional/rural context of the study population may shape the group's preferences differently than those of their metropolitan counterparts
Home environment promotes informal carers' sense of autonomy and purpose	Home environment should be a place that promotes the wellbeing of informal carers by promoting their sense of autonomy and sense of purpose. There could potentially be several indicators, notably indicators that facilitate and promote access to social connections and social activities in and outside the home (both virtual and actual)	_5_SOCIAL	_5.1_Social_activity	5.1.1_Ability_to_have_social_contacts_in_the_home	Maquire, R. et al (2019)	
The home and its immediate environment offer opportunities to engage in meaningful social activity	Inferred KPI from the observation in the study (itself citing an earlier study) that it is often better for the well-being of older people give rather than receive social support.	_5_SOCIAL	_5.1_Social_activity	5.1.1_Ability_to_have_social_contacts_in_the_home	Orrrell, A. et al (2013)	Large-scale and thorough analysis of relation of building and design characteristics to reported QoL in residents of extra care housing schemes in the UK, using the EVOLVE tool as an instrument for structured description of building features.



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI cluster	Category	Sub category	Source	Quality and approach study
Home offers dedicated space for pursuing activities for self-fulfilment and social engagement.	Research shows that the ability to pursue these activities in the home contributes to positive perception of the home environment and contributes to perceived agency in ageing healthily	_5_SOCIAL	_5.1_Social_activity	5.1.1_Ability_to_have_social_contacts_in_the_home	Sixsmith, J. et al (2014)	Interesting study, part of the ENABLE-AGE project. Limited source of KPIs, but definitely worth another look as a source of NoPs
Occupants have control over access to home	<p>Home must offer access control to occupants, thus giving occupants the opportunity to regulate the flow of visitors and "professional operatives" to the home</p> <p>According to Sixsmith et al (2014), for the purpose of emotional security and the experience of autonomy and agency, homes should allow occupants to exercise control over access by others to the dwellings and/or parts thereof.</p> <p>Results from Ewart et al (2013) suggest that as long as these visits can be controlled, the loss of privacy "is not necessarily seen as a negative effect of ageing, rather it is accepted as part of the social process that feeds into life changes around this time."</p> <p>Study notes the tricky balance all participants struggled with between "wanting to retain the home as a private space whilst accepting the need for a greater degree of interference."</p>	_5_SOCIAL	_5.1_Social_activity	5.1.1_Ability_to_have_social_contacts_in_the_home	Sixsmith, J. et al (2014) Ewart, I., Luck, R. (2013)	<p>Sixsmith et al is an interesting study, part of the ENABLE-AGE project. Limited source of KPIs, but definitely worth another look as a source of NoPs</p> <p>An interesting innovative approach in Ewart et al is that the study takes account of and tries to itemize a fundamental shift in the perception of home that occurs as people age, and encounter age-related issues: the home loses its significance "as a personal statement, or a reflection of identity, and becomes more important as a base for planning activities outside the immediate confines of the house." The home as somewhere you leave, and not only somewhere to reside.</p>
Spatial lay-out of the home environment allows control over level of social interaction.	The spatial lay-out of the home environment must allow occupants control over the level of social interaction they engage in while in the home. Specifically, each home should have a distinct private space to which the occupant wholly controls access	_5_SOCIAL	_5.1_Social_activity	5.1.1_Ability_to_have_social_contacts_in_the_home	van Steenwinkel et al (2017)	



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI cluster	Category	Sub category	Source	Quality and approach study
The home should be situated in a neighbourhood that is perceived as safe by the home's occupants.	<p>The study quotes evidence that living in an area that is perceived as 'unsafe' has a negative impact on social activity and contributes to functional decline. Qualitative operational parameters that might be used in verification of the KPI include:</p> <ul style="list-style-type: none"> * proximity to everyday services * strong social cohesion * sense of belonging/familiarity 	_5_SOCIAL	_5.1_Social_activity	5.1.2_Proximity_to_activities_and_facilities	Berglund-Snodgrass, L., Nord, C. (2019)	<p>Well executed case study, but quite small-scale, based on a comparative analysis at two ECH complexes.</p> <p>Study abandons traditional distinctions between inner and outer safety in favor of an approach in which these kinds of safety are considered as co-constitutive situational effects.</p> <p>The focus of the study is on Extra Care Housing, This is within H4L scope, as ECH is considered as a special type of ordinary housing (not as a "light" form of residential LTC facility)</p>



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI cluster	Category	Sub category	Source	Quality and approach study
The immediate environment of the home and the neighbourhood offer accessible opportunities for engagement with others in meaningful activity and social contacts	<p>Gardner (2011) notes that this is essential to well-being and self-identity among older adults and quotes earlier study (Peace, Holland, and Kellaher, 2006) that states:</p> <p>"No longer being able to go out independently is a critical stage in identity construction because, without the wider contexts that lie beyond the dwelling, the home itself becomes diminished as a source of identity construction. Continued capacity to engage with 'the other' is represented by neighborhood in a way that immediate domicile cannot demonstrate or prove."</p> <p>In other words, neighbourhood level characteristics directly co-determine the fitness for purpose of the home environment</p> <p>Martin et al (2019) observe that, next to practical considerations on home modifications, size, costs and so on, major drivers of desire/willingness to move home proved to be "uncertainty about the ability to actively engage in the community and the fear of becoming socially isolated". By implication, these are requirements to impose on suitable home environments. " The more so as participants in the study also expressed concern that moving away from familiar surroundings would lead to emotional distress and/or social isolation</p>	_5_SOCIAL	_5.1_Social_activity	5.1.2_Proximity_to_activities_and_facilities	Gardner, P. (2011) Martin, D., Long, O., Kessler, L. (2019)	<p>Gardner focuses primarily on the neighbourhood as a "place of aging", referring to older studies on the home as a "place of aging". Main interest of the study lies in its qualitative, in-depth approach to gain a better understanding of those social and physical elements of the neighbourhood that contribute to well being.</p> <p>Martin et al is very much an exploratory, qualitative study, survey-based</p> <p>Interesting take, as such: study examines motives for relocation among older adults to infer conditions for successful ageing in place.</p> <p>Older adults here defined as those over 60 years of age, so a fairly broad definition.</p> <p>Follow-up survey questions were put to respondents who had answered "no" or "unsure" to the question "Do you want to stay in your own home as you grow older?"</p>



<p>The direct environment of the home offers suitable spaces for engagement in organized social and learning activities.</p>	<p>Where home environments are integrated into a larger building (apartment complex) or other form of complex (e.g. a retirement village or community living facility), the complex must have suitable spaces for the organisation of a suitable range of social activities. Such spaces must be near, and logically positioned of social spaces</p> <p>Where the homes are individual buildings, the "direct environment" may refer to a community centre or similar; for homes in apartment buildings/complexes this will usually refer to communal spaces within the complexes</p> <p>Gray et al (2018) in their literature review mention a list of types of activities that come out of the literature as being beneficial. While it is hardly reasonable to require a complex to have separate spaces for each of these activities, the list could be used as a checklist to assess the suitability of such spaces as are available within the complex. The 'ideal menu' of group activities emerging from the literature:</p> <ul style="list-style-type: none"> * provision of 'something for everyone' in physical and hobby activities * a range of different forms of mental stimulation and physical exercise to suit various tastes * activities which will foster emotional support and informal contacts that develop into real friendship, addressing emotional loneliness * breaking the vicious circle which leads through loneliness to poorer health, and thus to reduced capacity to engage with others and make new friends (health promotion events and similar) * supporting the most frail and especially those with mobility problems to take part in community life * helping residents maintain links with the wider community, in particular links with other age groups and with healthier people * encouragement of internet use as an important gateway to the wider social environment * offering specialised help to those who are too frail or immobile to leave their homes, or who have become withdrawn due to bereavement or crisis leading to rupture of social networks 	<p>_5_SOCIAL</p>	<p>_5.1_Social_activity</p>	<p>5.1.2_Proximity_to_activities_and_facilities</p>	<p>Kylén, M., Löfqvist, C., Haak, M., Iwarsson, S. (2019) Gray et al (2018) Campbell, N. (2015)</p>	<p>Kylén et al is a qualitative study, but very well-defined with careful selection of respondents and well-designed interview and analysis protocols</p> <p>Gray et al has an interesting observation with regards to financial feasibility of integration of features in the home environment: risk of loneliness and its attendant adverse effects is highest among older residents with lower SES, who tend to live in accommodation towards the lower end of the market (often rented)</p> <p>There is a table of factors contributing to higher loneliness and isolation in the study</p> <p>Campbell is a well-designed study using an original conceptual framework (Successful Social Space Attribute Model) developed by the author in a previous study. Reasonably large number of respondents, but only one study-site</p>
--	---	------------------	-----------------------------	---	---	--



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI cluster	Category	Sub category	Source	Quality and approach study
	Campbell (2015) finds that social spaces in facilities for communal independent living should be positioned within easy range (optimum: less than 82.5 feet (= 25,15 meters) from individual dwelling and along a logical travel path for daily activities. This positioning is positively associated with both appreciation and use of such spaces					
The home environment and immediate neighbourhood support social participation/ preventing social exclusion.	<p>This includes proximity to and accessibility of community activities, and opportunities for social engagement, and contact with significant others</p> <p>Home environment and immediate neighbourhood provides for a supportive physical environment that promotes mobility and does provides access to suitable socially-oriented activities for both older adults and their carer to attend together e.g senior centres, dementia cafes, etc.</p> <p>Home environment provides for a supportive physical and social infrastructure that provides opportunities for meaningful interpersonal connections</p>	_5_SOCIAL	_5.1_Social_activity	5.1.2_Proximity_to_activities_and_facilities	Levasseur, M. et al (2015) Scharlach, A. et al (2017) Mackenzie et al (2015)	Mackenzie et al is rather an extensive qualitative study cum literature review, making use of material from the Australian Housing and Independent Living study



<p>Home environment within short and accessible reach of shops and services</p>	<p>For emotional wellbeing and attachment to place, the home environment must be situated within short and accessible reach of shops and services</p> <p>Smith et al (2011) specifically mention 'walking distance' and note "that when a community is unable to provide these basic services and retail outlets, older people commonly feel discontent and their connections to the place can deteriorate because they are forced to travel elsewhere to meet those needs."</p> <p>Firdaus (2017) includes park/playground/library among the services required and notes that proximity of the dwelling to these facilities is positively associated with positive mental states, through association of these neighbourhood characteristics with recovery from mental fatigue, stress reduction and social cohesion.</p> <p>Kramer et al (2016) point to the social engagement role of shops and services. The study finds that high levels of satisfactions with facilities for engagement in social and other daily activities in subjects' current neighbourhood were associated with a strong intention to stay put in their current homes.</p> <p>Bates et al (2019) highlight the importance of affordable rental accommodation being situated within easy reach of shops and services. They point out a tendency for affordable accommodation to shift to the periphery, away from services, as areas are redeveloped and gentrified.</p> <p>As Kylén et al (2019) point out, proximity to shops and services is also a relevant requirement for people in the "younger old" demographic. The study looks specifically at the perception of home by younger old people (defined by the sample population as 67-70 years old), as literature suggests that these perceptions and attendant requirements are very different from those of the older old population.</p> <p>There is continuity between the groups, though, in terms of the NoPs associated. For both groups these centre around the home as a secure base, as a comforting environment, as a source of emotional attachment and as a starting point for engagement in social activities</p>	<p>_5_SOCIAL</p>	<p>_5.1_Social_activity</p>	<p>5.1.2_Proximity_to_activities_and_facilities</p>	<p>Mackenzie et al (2015) Smith, J., Cartlidge, M. (2011) Firdaus, G. (2017) Kramer, C., Pfaffenbach, C. (2016) Bates, L. Wiles, J., Kearns, R., Coleman, T. (2019) Kylén, M., Löfqvist, C., Haak, M., Iwarsson, S. (2019) Molinsky, J., Forsyth, A. (2018) Hillcoat-Nallétamby, S., Ogg, J. (2014)</p>	<p>Mackenzie et al is rather an extensive qualitative study cum literature review, making use of material from the Australian Housing and Independent Living study Smith et al is a fairly specific case study, with some issues as to applicability in Europe: the study looks at the rebuilding of a rural community in Kansas after a 2007 tornado. Nevertheless, an interesting article: it investigates which elements of the cultural landscape promote emotional attachment to place in retirees. It also highlights some tensions between sustainability ambitions and affordability of dwellings. Kramer et al is a well-designed study analysing a large body of material and taking into account different (sub)urban and socio-cultural settings. Interesting for its focus on the baby boom generation: predictive value for future demand Bates et al is a well-executed study (questionnaire and interview based, of course). Only drawback is the study population was quite specific (low-income residents of an island community in the Auckland, New Zealand metropolitan area). Study defines older renters as those over 55 years of age, which fits well with broad H4L scope. Kylén et al is a qualitative study, but very well-defined with careful selection of respondents and well-designed interview and analysis protocols. Although published in an academic journal, Molinsky et al is a position paper/white paper rather than a study Hillcoat-Nallétamby et al is explicitly</p>
---	---	------------------	-----------------------------	---	---	--



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI cluster	Category	Sub category	Source	Quality and approach study
						presented as a challenge to the current consensus.
Home environment supports sense of autonomy and purpose of informal carers	Home environment should be a place that promotes the wellbeing of informal carers by promoting their sense of autonomy and sense of purpose. There could potentially be several indicators, notably indicators that facilitate and promote access to social connections and social activities in and outside the home (both virtual and actual)	_5_SOCIAL	_5.1_Social_activity	5.1.2_Proximity_to_activities_and_facilities	Maquire, R. et al (2019)	
Housing programmes and resources	availability of a resource listing age-friendly home maintenance, support and care-giving services.	_5_SOCIAL	_5.1_Social_activity	5.1.2_Proximity_to_activities_and_facilities	Orpana, H. et al (2016)	



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI cluster	Category	Sub category	Source	Quality and approach study
Home environment provides easy and affordable access to specific "carer" support needs	Home environment provides easy and remote access to supportive services that specifically recognize and support the work of informal carers such as respite care, psychosocial services, peer support, carer allowances.	_5_SOCIAL	_5.1_Social_activity	5.1.2_Proximity_to_activities_and_facilities	Plöthner, M. et al (2019)	
Meaningful destinations within walking distance	Informal carers need easy access to various services and amenities preferably at walking distance e.g grocery stores and other shopping facilities, pharmacist and other primary care services, social connections, community services incl work)	_5_SOCIAL	_5.1_Social_activity	5.1.2_Proximity_to_activities_and_facilities	Scharlach, A. (2017)	
Home within easy reach of accessible and affordable public and individualizes transport services	WHO (2015) notes the importance of easy access, and proximity to affordable public transportation from home environment supporting access for example to social activities and other facilities. As ideas for indicators, WHO (2015 puts forward: Proportion of public transport services (incl. vehicles and stops) with designated places for older people or people who have disabilities. It refers to the ability of people with disabilities and older people to safely ride in a public transport vehicle in order to reach their destination Proportion of housing within walking distance (500 m) to a public transportation stop. Having an accessible stop is in favour of the older person, the informal carer, but also professional carers. NB: Additional indicators would be needed to take into consideration the safety and quality of the route to the transportation stop.	_5_SOCIAL	_5.1_Social_activity	5.1.2_Proximity_to_activities_and_facilities	WHO (2015)	



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI cluster	Category	Sub category	Source	Quality and approach study
Home's neighbourhood offers opportunities for engagement in socio-cultural-religious and/or life-long learning activities	Proportion of older adults among all reported visitors to local cultural facilities and events and/or Proportion of older people who were enrolled in education or training, either formal or non-formal, in the past year.	_5_SOCIAL	_5.1_Social_activity	5.1.2_Proximity_to_activities_and_facilities	WHO (2015)	
Meaningful destinations within walking distance	Informal carers need easy access to various services and amenities preferably at walking distance e.g grocery stores and other shopping facilities, pharmacist and other primary care services, social connections, community services incl work)	_5_SOCIAL	_5.1_Social_activity	5.2.2_Connection_to_place_of_employment	Scharlach, A. (2017)	
Home's immediate environment supports continuation of existing social activities, networks and contexts	<p>The home's immediate environment should offer opportunities for continuation of existing social activities, networks and contexts, or at any rate the opportunity to establish/engage in contacts/activities that represent conceptual continuity within the lived experience of the occupant</p> <p>The criterion is primarily relevant for home environment in an extra care and/or community living setting. The study found a marked difference in perceived safety between the ECH location with an architectural and spatial design that allowed residents to continue activity and social engagement patterns from previous life phases, and the location where the architectural/spatial design required residents to reconstruct their social identities</p>	_5_SOCIAL	_5.1_Social_activity	5.1.3_Ability_to_find_social_contacts_outside_the_home	Berglund-Snodgrass, L., Nord, C. (2019)	<p>Well executed case study, but quite small-scale, based on a comparative analysis at two ECH complexes.</p> <p>Study abandons traditional distinctions between inner and outer safety in favor of an approach in which these kinds of safety are considered as co-constitutive situational effects.</p> <p>The focus of the study is on Extra Care Housing, This is within H4L scope, as ECH is considered as a special type of ordinary housing (not as a "light" form of residential LTC facility)</p>



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI cluster	Category	Sub category	Source	Quality and approach study
<p>The home should be situated in a neighbourhood that is perceived as safe by the home's occupants.</p>	<p>This can be roughly equated to a neighbourhood that scores above average on security and solidarity themes, such as crime rates against older people.</p> <p>Berglund-Snodgrass et al (2019) quote evidence that living in an area that is perceived as 'unsafe' has a negative impact on social activity and contributes to functional decline. Qualitative operational parameters that might be used in verification of the KPI include:</p> <ul style="list-style-type: none"> * proximity to everyday services * strong social cohesion * sense of belonging/familiarity <p>WHO (2015) argues that perceived safety can further promote people's wellbeing and inclusion in society by reducing their anxiety about leaving home to engage in physical exercise and social activities.</p> <p>Cramm et al (2013) measured wellbeing using the 15-item version of the Social Production Function Instrument for the Level of Well-being (SPF-IL). The scale measures both physical and social wellbeing. Solidarity was measured with 10 items, each scored on a five-point scale. The scale was based on a theory common in work science to measure solidarity in employee teams. Security was assessed using four items, each scored on a four-point scale</p> <p>Study outcomes show that security and solidarity scores are each associated with higher levels of wellbeing among older people; moreover the results suggest a multiplicative effect from the combination of these attributes, and a reinforcing effect from higher scores on security on the effect that a higher level of solidarity has on wellbeing.</p> <p>In most cases, verification could make use of municipal data.</p>	_5_SOCIAL	_5.1_Social_activity	5.1.3_Ability_to_find_social_contacts_outside_the_home	<p>Berglund-Snodgrass, L., Nord, C. (2019)</p> <p>WHO (2015)</p> <p>Cramm, J., Nieboer, A. (2013)</p>	<p>Berglund-Snodgrass et al is a well executed case study, but quite small-scale, based on a comparative analysis at two ECH complexes. Study abandons traditional distinctions between inner and outer safety in favor of an approach in which these kinds of safety are considered as co-constitutive situational effects.</p> <p>The focus of the study is on Extra Care Housing, This is within H4L scope, as ECH is considered as a special type of ordinary housing (not as a "light" form of residential LTC facility)</p> <p>WHO refers to the World Health Organization's publication Measuring the Age-friendliness of Cities - A Guide to Using Core Indicators.</p> <p>Cramm et al is a study looking into the effect of neighbourhood attributes solidarity and security on well-being of community-dwelling older people in the Netherlands, as well as into the combined effect on wellbeing of these attributes.</p> <p>Looks a fairly sturdy analysis, based on a sample of 869 older adults (defined as 70+) living in 92 neighbourhoods in the city of Rotterdam.</p>



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI cluster	Category	Sub category	Source	Quality and approach study
<p>The neighbourhood offers opportunities for social interaction, within range of the home and by accessible routes.</p>	<p>This should include a choice of spaces within walking distance. This is especially important for people with dementia.</p> <p>Engel et al (2016) present an interesting argument by pointing out: * on the one hand, that results from the current study and other studies indicate that it is primarily the social environment people find themselves in that contributes to QoL, with the built environment not or almost not contributing directly; * nevertheless, social interactions take place within the neighbourhood built environment. "The built environment can, therefore, be seen as a facilitator or barrier for the social environment".</p> <p>This observation can be seen as support to the Homes4Life decision to give precedence to social aspects of the neighbourhood over outdoor access features.</p> <p>A significant observation in van Hees et al (2017): although both professionals and older people identified the same sorts of spaces within the neighbourhood as important for social interaction and place attachment, the professionals did so from a purely functional perspective, while older people's selections were driven by emotional attachment to places, the significance of certain spaces in their own life history and so on.</p> <p>Gabriel et al (2015) zoom in on the significance for people with dementia</p>	_5_SOCIAL	_5.1_Social_activity	5.1.3_Ability_to_find_social_contacts_outside_the_home	<p>Engel, L. et al (2016) van Hees et al (2107) Gabriel, M., Faulkner, D, Stirling, C. (2015)</p>	<p>Engel et al should be used with some caution, as study only considers the built environment as being the outdoor neighbourhood environment (urban design, land use and transportation system), not the home itself. Interesting study, though: it examines the association between the built environment and social cohesion with QoL community-dwelling older adults (age over 65, sample size 160 people) on low income in the metropolitan area of Vancouver.</p> <p>As for evidence quality: the authors themselves stress that results should be considered as hypothesis-generating and need confirmation in a larger longitudinal study.</p> <p>Van Hees et al uses photovoice methodology to elicit responses and opinions from a study population of 14 professionals and 18 older people.</p> <p>Gabriel et al is the final report of the Australian AHURI programme</p>



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI cluster	Category	Sub category	Source	Quality and approach study
The home environment allows free choice in manner and level of social engagement	<p>The home environment must offer occupants free choice in the manner and level of social engagement entered upon (at the scale levels relevant for H4L)</p> <p>Study gives as examples of another balancing act: "wanting to remain on good terms with a neighbour for mutual reassurance, but at the same time not wanting to be forced into false companionship....keeping the children close, but not so close that authority and control are lost"</p>	_5_SOCIAL	_5.1_Social_activity	5.1.3_Ability_to_find_social_contacts_outside_the_home	Ewart, I., Luck, R. (2013)	An interesting innovative approach in this study is that it takes account of and tries to itemize a fundamental shift in the perception of home that occurs as people age, and encounter age-related issues: the home loses its significance "as a personal statement, or a reflection of identity, and becomes more important as a base for planning activities outside the immediate confines of the house." The home as somewhere you leave, and not only somewhere to reside.
Home enables social dignity by providing access to seven essential conditions	<p>Social dignity, a construct based on the taxonomy constructed by Nora Jacobson (2007, 2009) is generated in the interactions between and amongst individuals and groups and comes in two types: Dignity-of-Self and Dignity-in-Relation. The seven essential conditions are:</p> <ul style="list-style-type: none"> * Meaning, self and self-expression * Safety and security * Ability to sustain meaningful relationships * Access to community and civic life * Participation in school,work or leisure * Respectful care relationships * Control, flexibility and spontaneity 	_5_SOCIAL	_5.1_Social_activity	5.1.3_Ability_to_find_social_contacts_outside_the_home	Gibson, B.E. et al (2012)	Extent to which essential conditions can be evaluated and how varies. Important publication! Piquant, too, as its primary focus is on younger adults (19-55) with mobility disabilities, and their home environment needs are presented as under addressed relative to older persons. This seems a false dichotomy, or at any rate a too facile assumptions that older people's needs were actually being catered for (which our project suggests cannot have been the case)



<p>The home's immediate environment offers opportunities for engagement in (organized) social activities</p>	<p>To tackle the risk of loneliness among occupants, the home's immediate environment must offer opportunities for engagement in (organized) social activities Where home environments are integrated into a larger building (apartment complex) or other form of complex (e.g. a retirement village or community living facility), the complex must have suitable spaces for the organisation of a suitable range of social activities</p> <p>The literature review in Gray et al (2018) mentions quite a number of studies into the correlation between loneliness and isolation (two different concepts) on the one hand and engagement in social activities and relationships with neighbours, friends and relatives on the other.</p> <p>It also mentions a list of types of activities that come out of the literature as being beneficial. While it is hardly reasonable to require a complex to have separate spaces for each of these activities, the list could be used as a checklist to assess the suitability of such spaces as are available within the complexes. The 'ideal menu' of group activities emerging from the literature:</p> <ul style="list-style-type: none"> * provision of 'something for everyone' in physical and hobby activities * a range of different forms of mental stimulation and physical exercise to suit various tastes * activities which will foster emotional support and informal contacts that develop into real friendship, addressing emotional loneliness * breaking the vicious circle which leads through loneliness to poorer health, and thus to reduced capacity to engage with others and make new friends (health promotion events and similar) * supporting the most frail and especially those with mobility problems to take part in community life * helping residents maintain links with the wider community, in particular links with other age groups and with healthier people * encouragement of internet use as an important gateway to the wider social environment 	<p>_5_SOCIAL</p>	<p>_5.1_Social_activity</p>	<p>5.1.3_Ability_to_find_social_contacts_outside_the_home</p>	<p>Gray et al (2018)</p>	<p>Literature review looking at strategies to avoid loneliness in occupants of retirement housing, focusing primarily on the value of organized social activities. Retirement housing is within scope for H4L: it concerns sheltered housing for the over 55 or 60; specific to the UK; some retirement housing offers on-site services, but residential care homes are excluded from the definition. Organized social activities themselves are out of scope for H4L (we're not certifying services), but evaluation could be on the basis of whether the home is situated in an environment that offers the opportunity to engage in social activities; and for apartment buildings and complexes (the literature review specifically mentions retirement villages), whether appropriate physical spaces for social activity are available in the building.</p> <p>Interesting observation in the study with regards to financial feasibility of integration of features in the home environment: risk of loneliness and its attendant adverse effects is highest among older residents with lower SES, who tend to live in accommodation towards the lower end of the market (often rented)</p> <p>There is a table of factors contributing to higher loneliness and isolation in the study</p>
--	--	------------------	-----------------------------	---	--------------------------	--



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI cluster	Category	Sub category	Source	Quality and approach study
	* offering specialised help to those who are too frail or immobile to leave their homes, or who have become withdrawn due to bereavement or crisis leading to rupture of social networks					
Green spaces present in home environment	The living environment provides for high quality green spaces which support social contacts between neighbors and strengthen communities for the aging population.	_5_SOCIAL	_5.1_Social_activity	5.1.3_Ability_to_find_social_contacts_outside_the_home	Kemperman, A., Timmermans, H. (2014)	
Home is close to established social networks	<p>The home should be situated so that proximity to established social networks is ensured. This can include networks for practical issues such as maintenance.</p> <p>KPI deduced on the basis of findings in Kramer et al (2016) that high levels of satisfaction of residents with these aspects of their current neighbourhood are associated with a strong intention to stay put in their current homes.</p> <p>Coleman et al (2016) for social networks for practical issues. Their study indicates that where older people have the opportunity to manage maintenance and engage in maintenance activities in interdependent groups, rather than having to engage with standardized and/or external services, home maintenance can actually function as a social bonding agent.</p>	_5_SOCIAL	_5.1_Social_activity	5.1.3_Ability_to_find_social_contacts_outside_the_home	Kramer, C., Pfaffenbach, C. (2016) Coleman, T., Kearns, R., Wiles, J. (2016)	Kramer et al is a well-designed study analysing a large body of material and taking into account different (sub)urban and socio-cultural settings. Interesting for its focus on the baby boom generation: predictive value for future demand Coleman is likewise well-executed. Only drawback is the study population was quite specific (island community in the Auckland, New Zealand metropolitan area). Study subjects lived independently and were between 65 and 94 years of age.



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI cluster	Category	Sub category	Source	Quality and approach study
Home is situated in direct proximity to and easy reach of likeminded others	<p>To support social engagement and contribute to feelings of self-worth and purpose, the home should be situated in direct proximity to and easy reach of likeminded others</p> <p>Kylén et al (2019) point out that the home and its direct environment should facilitate social engagement and mutual help and support with others, primarily neighbours. Though these may be socially and demographically diverse, special worth is attached by respondents to the ability to engage meaningfully with peers. Lager et al (2013) point out that when a dwelling is situated in a neighbourhood where like-minded others are also domiciled, this contributes both to social activity and to personal wellbeing, as well as being associated with a sense of agency and emotional attachment to the living environment.</p> <p>Kramer et al (2016) find that "older people who are in touch with their children on a daily basis (and probably live in close proximity) less often have plans of moving upon retirement"</p> <p>The study specifically looks at willingness and motives to move house among German people of approaching retirement age (roughly, the baby boom generation) as well as their reasons for what the study calls "reasons for residential persistence".</p>	_5_SOCIAL	_5.1_Social_activity	5.1.3_Ability_to_find_social_contacts_outside_the_home	Kylén, M., Löfqvist, C., Haak, M., Iwarsson, S. (2019) Lager, D., van Hoven, B., Huigen, P.P.P. (2013) Kramer, C., Pfaffenbach, C. (2016)	Kylén et al is a qualitative study, but very well-defined with careful selection of respondents and well-designed interview and analysis protocols. Lager et al is well-grounded in literature and theory, but in itself small-scale, qualitative and case study based. Kramer et al is a well-designed study analysing a large body of material and taking into account different (sub)urban and socio-cultural settings. Interesting for its focus on the baby boom generation: predictive value for future demand.
Dwelling's immediate environment offers opportunities for informal social interaction	The dwelling's immediate environment offers opportunities for informal social interaction	_5_SOCIAL	_5.1_Social_activity	5.1.3_Ability_to_find_social_contacts_outside_the_home	Lager, D., van Hoven, B., Huigen, P.P.P. (2013)	Study well-grounded in literature and theory, but in itself small-scale, qualitative and case study based
Home's neighbourhood supports self-organization of social interaction	The dwelling is situated in a neighbourhood that offers older adults opportunities for co-creation and self-organization of social interaction. This contributes to sense of agency and emotional attachment to living environment, as well as stimulating meaningful interaction with others	_5_SOCIAL	_5.1_Social_activity	5.1.3_Ability_to_find_social_contacts_outside_the_home	Lager, D., van Hoven, B., Huigen, P.P.P. (2013)	Study well-grounded in literature and theory, but in itself small-scale, qualitative and case study based



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI cluster	Category	Sub category	Source	Quality and approach study
Home environment and neighbourhood support social participation/ help prevent social exclusion	<p>Home environment and immediate neighbourhood provides for a supportive physical environment that promotes mobility and does provides access to suitable socially-oriented activities for both older adults and their carer to attend together e.g senior centres, dementia cafes, etc</p> <p>Home environment provides for a supportive physical and social infrastructure that provides opportunities for meaningful interpersonal connections</p>	_5_SOCIAL	_5.1_Social_activity	5.1.3_Ability_to_find_social_contacts_outside_the_home	Levasseur, M. et al (2015) Scharlach, A. (2017)	



<p>Home environment provides spaces and design features conducive to spontaneous, proposed and organized interaction</p>	<p>To contribute to Friend bonding (dimension of place attachment), the home environment must provide spaces and design features conducive to spontaneous, proposed and organized interaction. In the immediate environment of the home, this includes the presence of multiple 'third place thresholds'</p> <p>Lies et al (2017) uses a five-dimensions model of place attachment developed by Raymond et al (2010), which breaks this down into:</p> <ul style="list-style-type: none"> * place dependence * place identity * nature bonding * friend bonding * family bonding <p>The present study examines the relative importance of these five dimensions and explores which design features of the home environment contribute to each dimension. The study took place among residents of a senior co-housing community in the US Midwest. Despite a number of communal facilities on-site, this concerns independent living and is thus in scope for H4L. The relative importance of the five dimensions in decreasing order of importance:</p> <ul style="list-style-type: none"> * Friend bonding * Nature bonding * Place dependence * Place identity * Family bonding <p>The design features associated with these types of interaction found in the study were:</p> <p>Spontaneous interaction</p> <ul style="list-style-type: none"> * Individual home front porch * Nodes and Sidewalk System * Clustered mailboxes * Clustered parking <p>Proposed interaction:</p> <ul style="list-style-type: none"> * Common House Game Room * Common House Hearth Room <p>Organized interaction</p> <ul style="list-style-type: none"> * Common House Dining Room * Common House Patio 	<p>_5_SOCIAL</p>	<p>_5.1_Social_activity</p>	<p>5.1.3_Ability_to_find_social_contacts_outside_the_home</p>	<p>Lies, M., Kang, M., Sample, R. (2017) Gardner, P. (2011)</p>	<p>Lies et al is a small-scale observational study, but well grounded in place making and place attachment theory. Exploratory in nature, and small scale, but very useful and practically applicable findings.</p> <p>If adopted in any of our certification pilots, verification could be through assigning a score based on the number of features present.</p> <p>Gardner focuses primarily on the neighbourhood as a "place of aging", referring to older studies on the home as a "place of aging". Interesting because it employs a qualitative, in-depth approach to gain a better understanding of those social and physical elements of the neighbourhood that contribute to well being.</p>
--	---	------------------	-----------------------------	---	---	--



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI cluster	Category	Sub category	Source	Quality and approach study
	* Individual Home Great Room According to Gardner (2011) According to the study, 'thresholds' "are the hybrid, semi-public spaces that straddle the private dwelling and public neighborhood, such as porches, patios, backyards and balconies. These in-between third places provide easy and readily available opportunities for social interaction, most commonly with neighbors." For those living in high-rise dwellings, balconies, lobbies and elevators took on the role of 'thresholds'.					
The social living environment of older people from migrant communities, is sensitive to their specific socio-cultural needs and preferences, and supports trust building and development of social capital	Very hard to see how we can make this verifiable: perhaps through qualitative evaluation of the (proposed) living environment by target group representatives. Nevertheless an important point made by the study: simply creating ethnically homogeneous living communities is not sufficient to support social connectivity, and in fact may have an adverse effect if such living arrangements are experienced as (socially) unsafe and/or adversarial by occupants	_5_SOCIAL	_5.1_Social_activity	5.1.3_Ability_to_find_social_contacts_outside_the_home	Luo, H. (2015)	Study's main interest is in examining the role of the housing environment in building and strengthening social capital for older immigrants. Applicability of its findings may be limited by the specificity of its study group (older Chinese migrants in Canada); on the other hand, ageing immigrant populations are a feature in many EU MSS. Fairly small-scale study (though part of a larger programme), conducted using a focus group approach



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI cluster	Category	Sub category	Source	Quality and approach study
The home and its environment (up to neighbourhood/villa ge level) offer accessible opportunities for engagement in meaningful activity and social contacts.	Next to practical considerations on home modifications, size, costs and so on, major drivers of desire/willingness to move home proved to be "uncertainty about the ability to actively engage in the community and the fear of becoming socially isolated". By implication, these are requirements to impose on suitable home environments. " The more so as participants in Martin et al (2019) also expressed concern that moving away from familiar surroundings would lead to emotional distress and/or social isolation. Darab et al (2018) point to the preference expressed by their study subjects for co-housing arrangements. This seems at odds with the great value placed on privacy and autonomy by the study group, but shows that in addition there is a deep need to satisfy social engagement needs	_5_SOCIAL	_5.1_Social_activity	5.1.3_Ability_to_find_social_contacts_outside_the_home	Martin, D., Long, O., Kessler, L. (2019) Darab, S., Hartman, Y., Holdsworth, L. (2018)	Martin et al is very much an exploratory, qualitative study, survey-based Interesting take, as such: study examines motives for relocation among older adults to infer conditions for successful ageing in place. Older adults here defined as those over 60 years of age, so a fairly broad definition. Follow-up survey questions were put to respondents who had answered "no" or "unsure" to the question "Do you want to stay in your own home as you grow older?" For Darab et al, a note of caution is sounded in the study itself that the regional/rural context of the study population may shape the group's preferences differently than those of their metropolitan counterparts
Appropriate social contact opportunities and services available within reachable distance of the home	Described in the article as elements of a home's neighbourhood that contribute towards the establishment of a supportive living environment	_5_SOCIAL	_5.1_Social_activity	5.1.3_Ability_to_find_social_contacts_outside_the_home	Molinsky, J., Forsyth, A. (2018)	



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI cluster	Category	Sub category	Source	Quality and approach study
Home is situated in an area that facilitates establishment of reciprocal social relationships with e.g. neighbours	<p>This contributes to a sense of safety and security and supporting the emergence of a sense of social cohesion.</p> <p>Fernandez-Carro et al (2019) observe that the home environment provides reassurance and sense of safety through existence of common and shared spaces e.g common room for meal taking, communal laundry, shared gardens and patios.</p> <p>Berglund-Snodgrass et al (2019) link this aspect on the one hand to the provision of spaces that offer conceptual continuity with occupants' previous lives, with spatial / architectural characteristics like subjective safety and non-institutionalized feel being referenced.</p>	_5_SOCIAL	_5.1_Social_activity	5.1.3_Ability_to_find_social_contacts_outside_the_home	Rowles, G., Bernard, M. (2013) Fernandez-Carro, C., Vlachantoni, A. (2019) Berglund-Snodgrass, L., Nord, C. (2019)	<p>Rowles et al is primarily a scene setting essay, intended as the opener and scene setter for a book featuring explorations of various aspects of environmental gerontology.</p> <p>Berglund-Snodgrass et al is a well executed case study, but quite small-scale, based on a comparative analysis at two ECH complexes. Study abandons traditional distinctions between inner and outer safety in favor of an approach in which these kinds of safety are considered as co-constitutive situational effects.</p> <p>The focus of the study is on Extra Care Housing, This is within H4L scope, as ECH is considered as a special type of ordinary housing (not as a "light" form of residential LTC facility)</p>
Home accommodates gendered differences in activity preferences	<p>Preferences in activities to achieve self-fulfillment and experience positive emotions differ markedly between genders, and in fact the specifically feminine character of spaces and opportunities for social engagement can be a hindrance to engagement in social activity by males.</p>	_5_SOCIAL	_5.1_Social_activity	5.1.3_Ability_to_find_social_contacts_outside_the_home	Sixsmith, J. et al (2014)	<p>Interesting study, part of the ENABLE-AGE project. Limited source of KPIs, but definitely worth another look as a source of NoPs</p>



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI cluster	Category	Sub category	Source	Quality and approach study
Availability of places with spiritual significance within accessible walking distance	<p>For many older adults, the availability of places with spiritual significance within walking distance (accessible routes) of the home is important to support sense of identity and emotional attachment</p> <p>Churches, in this study, but the type of space may of course vary.</p>	_5_SOCIAL	_5.1_Social_activity	5.1.3_Ability_to_find_social_contacts_outside_the_home	Smith, J., Cartlidge, M. (2011)	<p>Fairly specific case study, with some issues as to applicability in Europe: the study looks at the rebuilding of a rural community in Kansas after a 2007 tornado. Nevertheless, an interesting article: it investigates which elements of the cultural landscape promote emotional attachment to place in retirees. It also highlights some tensions between sustainability ambitions and affordability of dwellings.</p> <p>Difficult to gauge the quality of evidence: it is such a one-off situation. Apparently, the community in question (because it needed to rebuild almost entirely), turned into a living lab for all kinds of research.</p>



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI cluster	Category	Sub category	Source	Quality and approach study
Home's neighbourhood offers variety of spaces for socializing with other community dwellers	<p>The home should be situated in a neighbourhood that offers a variety of spaces suitable for socializing with other community dwellers. These spaces should be within walking distance (accessible routes). They should take the form of appropriate 'third place' destinations.</p> <p>Smith et al (2011) note that various kinds of spaces (indoor spaces generally) are used as socializing spaces by older adults (often impromptu): shops, restaurants, churches....</p> <p>Gardner (2011) introduces the concept of 'third places', using a definition from Oldenburg (1989) which says they are places "that are located outside of the home (first place) and work (second place) and share several essential features: they are on neutral ground, they act as 'levelers', conversation is the main activity, they are accessible, 'regulars' spend time in them, they are physically plain and unassuming, the mood is playful, and people feel like they are a 'home away from home'."</p> <p>Notable 'third places' identified by the subjects in Gardner (2011) were public parks, certain local businesses (with a strong preference for small single-purpose shops), community organisations and institutions</p>	_5_SOCIAL	_5.1_Social_activity	5.1.3_Ability_to_find_social_contacts_outside_the_home	Smith, J., Cartlidge, M. (2011) Gardner, P. (2011)	<p>Smith et al is a fairly specific case study, with some issues as to applicability in Europe: the study looks at the rebuilding of a rural community in Kansas after a 2007 tornado. Nevertheless, an interesting article: it investigates which elements of the cultural landscape promote emotional attachment to place in retirees. It also highlights some tensions between sustainability ambitions and affordability of dwellings.</p> <p>Difficult to gauge the quality of evidence: it is such a one-off situation. Apparently, the community in question (because it needed to rebuild almost entirely), turned into a living lab for all kinds of research. Gardner focuses primarily on the neighbourhood as a "place of aging", referring to older studies on the home as a "place of aging". Interesting because it employs a qualitative, in-depth approach to gain a better understanding of those social and physical elements of the neighbourhood that contribute to well being</p>



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI cluster	Category	Sub category	Source	Quality and approach study
Home's immediate environment has sitting spaces to enable social interaction.	<p>The home's immediate environment should have sitting spaces to enable social interaction. For homes inside apartment buildings or complexes, this space should be situated within the building/complex</p> <p>KPI from the literature review section of the study. Verification of the criterion can be done in conjunction with verification of any Outdoor access criteria we include for the home's immediate environment</p>	_5_SOCIAL	_5.1_Social_activity	5.1.3_Ability_to_find_social_contacts_outside_the_home	van Hees et al (2107)	Study uses photovoice methodology to elicit responses and opinions from a study population of 14 professionals and 18 older people. Haven't encountered this methodology much before, so hard to gauge the quality of evidence
Home is situated in a walkable neighbourhood with accessible public spaces and buildings	<p>According to WHO (2015) an indicator is the proportion of streets in the neighbourhood that have pedestrian paths which meet locally accepted standards.</p> <p>Also relevant according to WHO (2015): existence of sidewalks and bicycle lanes that are in good condition, frequent and safe pedestrian crossing as well as public seating options, median islands, etc.</p>	_5_SOCIAL	_5.1_Social_activity	5.1.3_Ability_to_find_social_contacts_outside_the_home	WHO (2015) Metlife Institute / Stanford Center on Longevity (2013)	
The home environment gives occupants virtual access to those in their social group	<p>The home environment must enable occupants to access those in their social group, either being able to visit locally or virtually, or allowing access to the home for people who visit.</p> <p>This KPI derives from one of the studies central concepts, namely that as people grow more housebound, the significance of the home shifts from being a safe haven and place of attachment, to a place from which escape is sought and which must function as a platform for engagement with the world beyond the front door. In terms of NoPs, this means that the outward-focused engagement role of the house takes on a more prominent role as people become more housebound. It also implies that people will have difficulties making accurate assessment of their own future needs and preferences, as these will shift according to how their individual life histories pan out.</p>	_5_SOCIAL	_5.1_Social_activity	5.1.4_Online_connectivity	Ewart, I., Luck, R. (2013)	An interesting innovative approach in this study is that it takes account of and tries to itemize a fundamental shift in the perception of home that occurs as people age, and encounter age-related issues: the home loses its significance "as a personal statement, or a reflection of identity, and becomes more important as a base for planning activities outside the immediate confines of the house." The home as somewhere you leave, and not only somewhere to reside.



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI cluster	Category	Sub category	Source	Quality and approach study
Home offers physical and/or virtual opportunities for social engagement	To tackle the risk of loneliness among occupants, the home must offer physical and/or virtual opportunities for social engagement with children, friends and relatives Though studies differ in their findings on the relative importance of contacts with relatives as opposed to friends and acquaintances, most studies do agree that older residents who are in frequent contacts with these others experience less loneliness and a higher level of well-being	_5_SOCIAL	_5.1_Social_activity	5.1.4_Online_connectivity	Gray et al (2018)	Interesting observation in the study with regards to financial feasibility of integration of features in the home environment: risk of loneliness and its attendant adverse effects is highest among older residents with lower SES, who tend to live in accommodation towards the lower end of the market (often rented) There is a table of factors contributing to higher loneliness and isolation in the study
The home and any assistive devices and monitoring systems deployed in it, are designed to allow occupants the opportunity to shape and alter their daily routines both in the short term and as regards longer term changes		_5_SOCIAL	_5.1_Social_activity	5.1.4_Online_connectivity	Mackenzie et al (2015)	Rather an extensive qualitative study cum literature review, making use of material from the Australian Housing and Independent Living study
Home environment supports sense of autonomy and purpose of informal carers	Home environment should be a place that promotes the wellbeing of informal carers by promoting their sense of autonomy and sense of purpose. There could potentially be several indicators, notably indicators that facilitate and promote access to social connections and social activities in and outside the home (both virtual and actual)	_5_SOCIAL	_5.1_Social_activity	5.1.4_Online_connectivity	Maquire, R. et al (2019)	



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI cluster	Category	Sub category	Source	Quality and approach study
Monitoring and care platforms deployed in the home environment of people living with dementia incorporate in their design the five key concern areas / Themes	The study suggests that in developing platforms for monitoring / intervention aimed at emotional wellbeing, a participatory design strategy is required which should take into account five key themes: Communication; Isolation; Frustration; Carer challenges; Interventions	_5_SOCIAL	_5.1_Social_activity	5.1.4_Online_connectivity	Mulvenna, M. et al (2017)	Sympathetic study, especially given its ICT-findings, but very small scale and anecdotal set-up
Information and support needs of carers are easily accessible and understandable, and include personalised tailored support services or tools	Home allows for home-bound carers to access relevant web-based information (community services, information needs, support needs) and to receive primary care services in the home. Additionally, home environment provides access to community services that are able to provide easily accessible and tailored support through a personalised assessment of needs of the informal carers.	_5_SOCIAL	_5.1_Social_activity	5.1.4_Online_connectivity	Plöthner, M. et al (2019) Walker, J. et al (2017) Greenwood, N. et al (2019) Lefranc, A. et al (2017)	



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI cluster	Category	Sub category	Source	Quality and approach study
The home environment enables the use of social technology software and systems to support occupants in fulfilling their social needs.	The article looks into the social needs of older people, the resources used to fulfill them and the relation of non-fulfillment to loneliness and isolation. Social technology is one of four resources, of which the other three are currently more important: relationships with other people, participating in activities and personal circumstances. The relatively minor role that social technology plays seems to be due to unfamiliarity and distrust, largely through lack of habituation in earlier life. it is to be expected that future generations of older occupants will attach more importance to the accessibility of social technology from within the home environment. For now, the KPI is mainly one of "readiness". Interesting point re NoPs: the article demonstrates that the social needs of older people are congruent with those in earlier life. In other words, social needs don't change, but fulfillment patterns do as resources people can call on become scarce. A finding at odds with some other models, that suppose social interests actually change with ageing. Verification of the KPI could be done in combination with Smart readiness assessment	_5_SOCIAL	_5.1_Social_activity	5.1.4_Online_connectivity	ten Bruggencate, T., Luykx, K., Sturm, J. (2019)	Qualitative study, well-grounded in literature but rather small-scale in execution
The home provides affordable internet access	Proportion of household with affordable internet access at home.	_5_SOCIAL	_5.1_Social_activity	5.1.4_Online_connectivity	WHO (2015)	
Home employment workers can easily and legally be accessed	Home environment provides visible and clear information concerning family and home employment options	_5_SOCIAL	_5.2_Employment	5.2.1_Suitability_of_the_home_as_a_place_of_work	EFFE (2019)	



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI cluster	Category	Sub category	Source	Quality and approach study
The home supports informal carers' work-life-care balance	Home environment is conducive (ICT ready) and allows cares to combine work with care responsibilities e.g. can work from home (ICT and fast wifi connection) or mean duration of commuting time (one-way) for working carers is less than 30 mins	_5_SOCIAL	_5.2_Employment	5.2.1_Suitability_of_the_home_e_as_a_place_of_work	van der Lippe, T., Lippényi, Z. (2018) Eurostat (2017)	
The home environment offers opportunities for engagement in volunteer activity	Proportion of older people in local volunteer registries.	_5_SOCIAL	_5.2_Employment	5.2.1_Suitability_of_the_home_as_a_place_of_work	WHO (2015)	
Housing is affordable for informal carers	Housing costs needs to be reasonable and affordable for informal carers (who often need to reduce working time, incl OPP): Best options to avoid housing cost overburden is to live in: - owner occupied housing with no more mortgage - have possibility to receive housing allowances - Possibility to relocate to public rental housing in the same community e.g. with secure and affordable tenures;	_5_SOCIAL	_5.2_Employment	5.2.2_Connection_to_place_of_employment	Eurostat (2019b) Eurostat (2017b) Glendinning, C. et al (2009) Pittini, A. (2012)	
The home supports informal carers' work-life-care balance	Home environment is conducive (ICT ready) and allows cares to combine work with care responsibilities e.g. can work from home (ICT and fast wifi connection) or mean duration of commuting time (one-way) for working carers is less than 30 mins	_5_SOCIAL	_5.2_Employment	5.2.2_Connection_to_place_of_employment	van der Lippe, T. Lippényi, Z. (2018) Eurostat (2017b)	
Home environment offers opportunities for paid employment	Proportion of older people who are currently unemployed. Primarily relevant at neighbourhood level (and above, but these larger scales are out of scope for Homes4Life)	_5_SOCIAL	_5.2_Employment	5.2.2_Connection_to_place_of_employment	WHO (2015)	Bit of mental agility required to frame this as KPI. But I suppose neighbourhood unemployment figures say something about the extent to which an older person or informal carer can find paid employment that can be accessed from the home



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI cluster	Category	Sub category	Source	Quality and approach study
Availability of accessible transportation options	<p>WHO (2015) lists as indicators the presence of accessible and affordable public transportation (e.g., bus, light rail, subway) and/or alternative (individualised) transportation service for people with mobility issues. And also points to the proportion of public transport services (incl. vehicles and stops) with designated places for older people or people who have disabilities. It refers to the ability of people with disabilities and older people to safely ride in a public transport vehicle in order to reach their destination</p> <p>Proportion of housing within walking distance (500 m) to a public transportation stop. Having an accessible stop is in favour of the older person, the informal carer, but also professional carers.</p> <p>NB: Additional indicators would be needed to take into consideration the safety and quality of the route to the transportation stop.</p>	_5_SOCIAL	_5.2_Employment	5.2.2_Connection_to_place_of_employment	WHO (2015)	



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI Cluster	Category	Sub category	Source	Quality and approach study
Acceptable earn-back time for investments in age-friendly housing	<p>Refers to the time required to recoup the funds expended in the investment of an AFH.</p> <p>Buildings Performance Institute Europe (2011) note "Payback expectations/Investment horizons: Even though many energy savings measures are financially rational in that they have a positive Net Present Value (NPV) or a high Internal Rate of Return (IRR), the time taken for the initial outlay to be recouped is a major barrier." Vanstraelen, L. et al (2015) observe that "Currently investors act on energy efficiency measures in buildings with short or medium pay back periods of less than 10 years, leading to energy efficiency of less than 30% savings. However, European targets for 2050 require energy savings of up to 80% in buildings, requiring investments with a much longer payback period, ranging from 20 to 40 years." Finally, Artola, I. et al (2016) find that "the (high) upfront costs of renovation and the long payback for some measures are probably the most important barriers found in literature."</p>	5_SOCIAL	6.1_Affordability	6.1.1_Objective_affordability	Buildings Performance Institute Europe (2011) Vanstraelen, L. et al (2015) Artola, I. et al (2016)	
Adequate maintenance must be possible within reasonable limits for housing cost expenditure	<p>To maintain affective ties to the home environment, and help preserve location-specific aspects of personal identity, adequate maintenance must be possible within reasonable limits for housing cost expenditure</p> <p><i>Study has an interesting take on home maintenance issues: where many studies consider these primarily from a Physical safety and comfort perspective, this paper finds that maintenance problems cause stress and anxiety, thus "rupturing affective ties to place, limiting access to preferred identities and reducing well-being. The paper also finds that an interdependence approach to maintenance, as a communal and self-help experience and at the direction of older people themselves, plays a part in maintaining and strengthening social</i></p>	6_ECONOMIC	6.1_Affordability	6.1.1_Objective_affordability	Coleman, T., Kearns, R., Wiles, J. (2016)	Well-executed study (case study and interview based, of course). Only drawback is the study population was quite specific (island community in the Auckland, New Zealand metropolitan area). Study subjects lived independently and were between 65 and 94 years of age.



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI Cluster	Category	Sub category	Source	Quality and approach study
	<p><i>relationships.</i></p> <p><i>The above is also an NoP issue: older people need to feel in control of the maintenance and upkeep of their living environment.</i></p> <p><i>Satisfaction of the criterion could look to the quantitative threshold for housing costs found in another article above (maintenance costs should fit within an envelope of 30% of income on housing costs for the lowest 40% earners). Depending on financial arrangements, depreciation costs for the investment could be assessed, or access to and terms of financing to cover the investment, or cost effects in terms of rent and service costs, depending on tenure and method of financing of maintenance work</i></p>					
Housing must be affordable for informal carers	<p>Housing costs needs to be reasonable and affordable for informal carers (who often need to reduce working time, incl OPP):</p> <p>Best options to avoid housing cost overburden is to live in:</p> <ul style="list-style-type: none"> - owner occupied housing with no more mortgage - have possibility to receive housing allowances - Possibility to relocate to public rental housing in the same community e.g. with secure and affordable tenures; <p>According to EUROSTAT, The proportion of the population whose housing costs exceeded 40 % of their equivalised disposable income was highest for tenants with market price rents (26.3 %) and lowest for persons in owner-occupied dwellings with a loan or mortgage (4.7 %)</p>	6_ECONOMIC	6.1_Affordability	6.1.1_Objective_affordability	<p>Eurostat (2019b)</p> <p>Eurostat (2017b)</p> <p>Glendinning, C. et al (2009)</p> <p>Pittini, A. (2012)</p>	<p>Important to note that the primary perspective for the KPI is that of the informal carer, and not necessarily a co-habiting informal carer</p>



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI Cluster	Category	Sub category	Source	Quality and approach study
Age-friendly homes must be affordable to all.	<p>According to Firdaus (2017), financial dependency is negatively associated with mental health. This is specifically so where there is financial dependency for housing arrangements.</p> <p>Molinsky et al (2018), quot a figure of 30 percent of income as being "a generally accepted indicator of housing unaffordability"</p> <p>WHO (2015) and Kano et al (2018) confirm this 30% figure and note that housing costs should be taken to include renting costs, mortgage payment, and repair and maintenance costs.</p> <p>Bates et al (2019) point out issues of precarity and resilience under adversity among low-income older renters. It shows that and how housing precarity negatively affects residents' physical, social and emotional wellbeing. The KPIs are formulated in terms of strategems to avoid these precarities. Note that the current exercise looks only at Emotional, Social and Economic clusters; the study also points out negative effects of precariousness in Physical and Outdoor access aspects of the home.</p> <p>EUROSTAT speaks of 'housing cost overburden rate', which represents the percentage of the population (so this varies per county) living in a household where total housing costs (net of housing allowances) represent more than 40% of the total disposable household income. By the same token, an age-friendly home is not a financial burden when the housing costs for an average older single-person or multi-person household are less than 40% of the average income/(state)pension in a particular country. In verification of the KPI, the 30% figure could be taken as optimum performance, the 40% threshold as the minimum standard to be achieved.</p>	6_ECONOMIC	6.1_Affordability	6.1.1_Objective_affordability	Firdaus, G. (2017) Molinsky, J., Forsyth, A. (2018) Bates, L. Wiles, J., Kearns, R., Coleman, T. (2019) WHO (2015) Kano, M. et al (2018) FEANTSA (2019)	<p>Although published in an academic journal, Molinsky et al is a position paper/white paper rather than a study.</p> <p>Bates et al is a well-executed study (questionnaire and interview based, of course). Only drawback is the study population was quite specific (low-income residents of an island community in the Auckland, New Zealand metropolitan area).</p> <p>Study defines older renters as those over 55 years of age, which fits well wit broad H4L scope</p>



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI Cluster	Category	Sub category	Source	Quality and approach study
The home environment must allow tailoring of adjustments and features to suit individual needs and preferences	Home adjustments are a very standard feature of course, but the study does highlight the importance of being able to decide and choose individually, on the basis of self-perceived needs and preferences. Arguably, this has an Economic component, as lower income groups may find it hard to have this need catered for	_6_ECONOMIC	_6.1_Affordability	6.1.1_Objective_affordability	Kylén, M., Löfqvist, C., Haak, M., Iwarsson, S. (2019)	Some of the occupants choices will concern goods and services, but where choices concern actual home components, evaluation could take place on the basis of the availability or not of customization options
Occupants must have long-term security on costs of housing	<p>To support personal sense of security and emotional wellbeing, occupants must have long-term security on costs of housing, or alternatively on the long-term availability of appropriate, affordable housing arrangements.</p> <p>Rental arrangements need to offer long-term security on costs of housing, or alternatively on the long-term availability of appropriate, affordable housing arrangements.</p> <p>Rented accommodation for older women living alone must offer long-term security on affordability.</p> <p>Tenancy contracts should offer long-term security on housing costs, and allow tenants to carry through modifications to improve the fit of the home environment to their personal preferences</p> <p>Bates et al (2019) focus specifically on (low-income) tenants, and note that Insecurity about future living arrangements contributes substantially to precarity and feelings of anxiety. For this, and for the other KPIs from this study, it is essential that strategies to satisfy them take account of and employ the resilience under adversity that older renters are shown by the study to possess. At the very least, this is</p>	_6_ECONOMIC	_6.1_Affordability	6.1.1_Objective_affordability	Mackenzie et al (2015) Bates, L. Wiles, J., Kearns, R., Coleman, T. (2019) Darab, S., Hartman, Y., Holdsworth, L. (2018) Szabo, A. et al (2017)	Mackenzie et al is rather an extensive qualitative study cum literature review, making use of material from the Australian Housing and Independent Living study. Bates et al is a well-executed study (questionnaire and interview based, of course). Only drawback is the study population was quite specific (low-income residents of an island community in the Auckland, New Zealand metropolitan area). Study defines older renters as those over 55 years of age, which fits well wit broad H4L scope. Szabo et al is a well-designed study, which also presents a good overview of relevant literature.



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI Cluster	Category	Sub category	Source	Quality and approach study
	<p>necessary to avoid stigmatization and establish and respect agency on the part of the older renters. The 'agency-enabling' aspect of the stratagems could be evaluated qualitatively.</p> <p>The focus of Darab et al (2018) is more specific still, zooming in on the needs of older, female tenants living alone. A large part of the value of this study (which merits being mentioned quite emphatically in general discussions) lies in elucidating how KPIs and NoPs defined elsewhere and/or more generally, specifically apply to the group of financially disadvantage older women living alone. While the study was conducted in Australia, this is also a large and growing group in much of Europe. it is moreover a group that suffers particularly from the 'home ownership' or 'wealthfare' fallacy that underpins policy in much of the Western world: it is assumed that the majority of older people will be homeowners and hence will have access to considerable capital vested in their property; however, there is a growing group of older people (especially women) that rely on rented accommodation while at the same time being in a low-income, low-capital situation). The rest of the KPIs proposed on the basis of this study should be seen with this in mind.</p> <p>The study gives a reference (Philips, 2011) for a definition of financial 'housing stress': when households in the lowest 40 per cent of the income distribution range spend more than 30 per cent of the household's income on housing costs</p> <p>The KPI ffrom Szabo et al (2017) has been Inferred on the basis of the literature and the study findings. It looks like the greater degree of autonomy and control afforded by home ownership is the central factor in improvements in QoL. Consequently, if similar levels of</p>					



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI Cluster	Category	Sub category	Source	Quality and approach study
	autonomy and control can be provided for tenants, similar beneficial effects on QoL should be evident					
Housing programmes and resources	availability of programmes for increasing accessibility, safety and adaptability of housing (e.g. hand rails, ramps);	6_ECONOMIC	6.1_Affordability	6.1.1_Objective_af fordability	Orpana, H. et al (2016)	
Availability of a choice of affordable housing, supported by programmes and resources	Orpana et al (2016) and Sheffield University (2017) Vavailability of affordable housing that is appropriately located, well-built, well-designed, secure and for which waiting times are short. availability of affordable multi-purpouse and ageing-in-place housing options. Orpana et al also note the importance in this respect of the availability of programmes for increasing accessibility, safety and adaptability of housing (e.g. hand rails, ramps);	6_ECONOMIC	6.1_Affordability	6.1.1_Objective_affordability	Orpana, H. et al (2016) Sheffield City Council (2017)	
Financial instruments in place for home ownership among less affluent older adults.	Where possible, financial instruments must be available to facilitate home ownership among older adults with lower and middle incomes The KPI is inferred from the marked differences noted in Szabo et al (2017) between home owners and tenants in the effects of loneliness and SES on quality of life. "Findings suggest that owners capitalise on their material and financial resources more than tenants in terms of their quality of life." Study findings suggest that home ownership is associated with sense of control and feelings of stability and security. Studies consulted by the authors find, among other things "...people strive to become home-owners for non-economic, lifestyle reasons. In particular, freedom of choice, power to control the home and	6_ECONOMIC	6.1_Affordability	6.1.1_Objective_affordability	Szabo, A. et al (2017)	Well-designed study, and a good overview of the literature



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI Cluster	Category	Sub category	Source	Quality and approach study
	possibilities for activities were mentioned as the most important motives for ownership by couples aged 60 or older." There are differences of opinion in the literature cited to what degree differences between home-owners and tenants are dependent on socio-economic factors (primarily SES). The consensus of opinion seems to be that differences between home-owners and tenants are at least partially independent of SES.					
Private and public sector operatives should have long-term security on market conditions. Proved demand of this profile of homes	<p>Demand for this profile of homes should be well-attested, and their should be solid predictions of a market growth rate of at least 3% in 10 years. Both private and public bodies in order to foster or /and invest in age friendly living environments should have the evidence to assure the demand, specially for the private companies profitability should be guaranteed.</p> <p>Building Radar (2015) notes the following on growth prognoses: "Further, we looked into different sectors of the construction industry which are expected to prosper in the near future and it is expected to have a steady growth pattern. 2015 was a very important year for the construction industry in Europe...By 2020, New Residential market growth rate: 7,6%"</p> <p>"Technological Developments in Europe. A major goal in the EU is to promote green energy and encourage "smart infrastructure". Policy aims include investing in technology, fostering innovation in the construction industry. Our research indicates that Europe has some of the most advanced energy efficient measures for the development of infrastructure. All these measures are part of the EU's strategy to promote eco-innovation and environmentally friendly techniques for development and infrastructure.</p>	_6_ECONOMIC	_6.1_Affordability	6.1.1_Objective_affordability	van Hoof, J. et al (21018) Silverbridge Properties Ltd (2016) Building Radar (2015) Ruddock, L., Ruddock, S. (2017)	



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI Cluster	Category	Sub category	Source	Quality and approach study
Affordable internet access	Proportion of household with affordable internet access at home.	_6_ECONOMIC	_6.1_Affordability	6.1.1_Objective_ affordability	WHO (2015)	
Viable public sector business case	This is a measure of the direct financial viability of the home from a public sector perspective. If less additional (semi)public money is required than for a 'normal' owner-occupied home than it is 'undersubsidized'. It should be noted that 'normal' owner-occupied homes receive various tax benefits, which can be seen as indirect forms of subsidy: "there is a generalised bias in favour of home ownership embedded in national fiscal codes in the euro area ... the user cost of owner-occupied housing is almost 40% below the efficient level under a neutral tax system where the netreturn to owner-occupiers is fully subject to taxation". Therefore, for a rental age-friendly home the subsidies should be less than 40% total housing cost (paid by tenant + subsidies). For a bought owner-occupied age-friendly home, the subsidies should be 0 (provided that the same tax rules apply as for 'normal' owner-occupied homes). This can be calculated in a single yes/no variable or it can be quantified in terms of an annual amount oversubsidized or undersubsidized.	_6_ECONOMIC	_6.1_Affordability	6.1.2_Willingness_to_pay	Fatica, S., Prammer, D. (2018)	
The home environment must allow tailoring of adjustments and features to suit individual needs and preferences	Home adjustments are a very standard feature of course, but the study does highlight the importance of being able to decide and choose individually, on the basis of self-perceived needs and preferences. Arguably, this has an Economic component, as lower income groups may find it hard to have this need catered for	_6_ECONOMIC	_6.1_Affordability	6.1.2_Willingness_to_pay	Kylén, M., Löfqvist, C., Haak, M., Iwarsson, S. (2019)	Some of the occupants choices will concern goods and services, but where choices concern actual home components, evaluation could take place on the basis of the availability or not of customization options



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI Cluster	Category	Sub category	Source	Quality and approach study
ROI between +/- 10% of non- age friendly homes, for both ownership and tenancy markets	To push the property developers to invest in age friendly housing bussiness model has to prove that it's profiteable. The % in based upon on the basis of the energy efficiency labels.	_6_ECONOMIC	_6.1_Affordability	6.1.2_Willingness_to_pay	Peine, A., Arentshorst, M. (2017) Sullivan, J. (2018) Khalfani-Cox, L. (2017) Murray, A. (2017)	
Viable business case in terms of nursing home and other healthcare cost savings	Ageing in place is often argued to be a more affordable option than aging in a nursing home. (The question is affordable for whom, we can focus only on the user or on the public sector as well). The costs of the potential remodeling project (i.e. all age-friendly adaptations as compared to a 'normal' appartement) multiplied by the estimated years of extension should be less than the nursing home costs that the of these extensions years. For other healthcare costs, the estimated home-based healthcare costs with home adaptations (e.g. AAL smart monitoring devices, telemedicine etc) + extended home-based care costs should be lower than the estimated out-of-home (e.g. hospital based) healthcare costs that would otherwise have been incurred. This can be a yes or no estimation (quantification is difficult for 'what if' situations)	_6_ECONOMIC	_6.1_Affordability	6.1.2_Willingness_to_pay	Retirement Living (2019)	
Proved demand of need of specific materials for age-friendly homes	the increasing demand of specific products for this type of housing will foster the research and innovation of the industry related to the construction sector to achieve more and better solutions for age friendly living environments .	_6_ECONOMIC	_6.1_Affordability	6.1.2_Willingness_to_pay	RIBA Architecture (2018) Coleman, R. (1998)	



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI Cluster	Category	Sub category	Source	Quality and approach study
Housing must be affordable for informal carers	<p>Housing costs needs to be reasonable and affordable for informal carers (who often need to reduce working time, incl OPP):</p> <p>Best options to avoid housing cost overburden is to live in:</p> <ul style="list-style-type: none"> - owner occupied housing with no more mortgage - have possibility to receive housing allowances - Possibility to relocate to public rental housing in the same community e.g. with secure and affordable tenures; <p>According to EUROSTAT figures, the proportion of the population whose housing costs exceeded 40 % of their equivalised disposable income was highest for tenants with market price rents (26.3 %) and lowest for persons in owner-occupied dwellings with a loan or mortgage (4.7 %)</p>	_6_ECONOMIC	_6.2_Choice	6.2.1_Dwelling_type	<p>Eurostat (2019b)</p> <p>Eurostat (2017b)</p> <p>Glendinning, C. et al (2009)</p> <p>Pittini, A. (2012)</p>	Important to note that the primary perspective for the KPI is that of the informal carer, and not necessarily a co-habiting informal carer
Availability of affordable housing is guaranteed in cases of upgrading/gentrification	<p>When homes are upgraded / gentrified, sufficient housing options should be available for residents in the income brackets represented in the home's neighbourhood before upgrading / gentrification</p> <p><i>Orpana (2016) and Sheffield University (2017) point to the importance of the availability of affordable housing that is appropriately located, well-built, well-designed, secure and for which waiting times are short. Availability of affordable multi-purposed and ageing-in-place housing options.</i></p> <p><i>Hui et al (2014) specifically note that upgrading and gentrification may have the effect of displacing original home occupants on financial grounds, thus negatively affecting their sense of belonging and identity.</i></p>	_6_ECONOMIC	_6.2_Choice	6.2.1_Dwelling_type	<p>Orpana, H. et al (2016)</p> <p>Sheffield City Council (2017)</p> <p>Hui, E.C.M., Wong, F.K.W., Chung, K.W., Lau, K.Y. (2014)</p>	Some care needs to be taken interpreting the results of Hui et al, as the study was carried out in a very different socio-cultural context (Hongkong)



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI Cluster	Category	Sub category	Source	Quality and approach study
Affordable rental accommodation needs to be situated within reach of social and healthcare services	Study points out tendency for affordable accommodation to shift to the periphery, away from services, as areas are redeveloped and gentrified. Evaluation could use distance criteria (plus accessibility of routes) also to be employed for other social NoPs/KPIs	_6_ECONOMIC	_6.2_Choice	6.2.2_Living_environment_type	Bates, L. Wiles, J., Kearns, R., Coleman, T. (2019)	Well-executed study (questionnaire and interview based, of course). Only drawback is the study population was quite specific (low-income residents of an island community in the Auckland, New Zealand metropolitan area). Study defines older renters as those over 55 years of age, which fits well with broad H4L scope
The home and its environment enable economic activity for its occupants, through access to transport	WHO (2015) mentions easy access, and proximity to affordable public transportation from home environment supporting access for example to social activities and other facilities. Among possible indicators it lists proportion of public transport services (incl. vehicles and stops) with designated places for older people or people who have disabilities. It refers to the ability of people with disabilities and older people to safely ride in a public transport vehicle in order to reach their destination Proportion of housing within walking distance (500 m) to a public transportation stop. Having an accessible stop is in favour of the older person, the informal carer, but also professional carers. NB: Additional indicators would be needed to take into consideration the safety and quality of the route to the transportation stop. The Metlife Institute and Stanford Center on Longevity (2013) report mentions the presence of accessible and affordable public transportation (e.g., bus, light rail, subway) and/or alternative (individualised) transportation service for people with mobility issues	_6_ECONOMIC	_6.2_Choice	6.2.2_Living_environment_type	WHO (2015)	



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI Cluster	Category	Sub category	Source	Quality and approach study
Access to general/indirect "carer" needs such as home care/home support services (primary target: care recipient)	Home care services are available and affordable in the community supporting independence of care recipient whilst helping caregivers feel more competent in caring for their relatives (e.g through providing respite, maintaining a supportive relationship with caregivers, teaching them new skills, and providing help to the caregivers to navigate the healthcare system)	_6_ECONOMIC	_6.2_Choice	6.2.3_Living_arrangement_type	Care Alliance Ireland (2014)	
Home employment workers can easily and legally be accessed	Home environment provides visible and clear information concerning family and home employment options	_6_ECONOMIC	_6.2_Choice	6.2.3_Living_arrangement_type	EFFE (2019)	
Home must offer opportunity to co-habit with self-selected others	Co-habitation with elected others is associated positively with mental health in older adults and with the perceived utility of the home. Conversely, co-habitation with non-elected others or under circumstances beyond the control of the subject are negatively associated with mental health	_6_ECONOMIC	_6.2_Choice	6.2.4_Neighbours_occupants	Firdaus, G. (2017) Hui, E.C.M., Wong, F.K.W., Chung, K.W., Lau, K.Y. (2014)	Some care needs to be taken interpreting the results of Hui et al, as the study was carried out in a very different socio-cultural context (Hongkong)
Positive attitude towards older people (or more widely: society cohesion)	Proportion of older people who report feeling respected and socially included in their community. Measures of social capital, such as social cohesion, may also be an indicator of the inclusiveness of a community, which can be assessed through self-report surveys.	_6_ECONOMIC	_6.2_Choice	6.2.4_Neighbours_occupants	WHO (2015)	
Age-friendly housing projects contribute to market leadership	Companies want to be positioned as leaders in the AFH market, and see positive value in identifying themselves with AFH concepts. Arentshorst, M., Peine, A. (2018) note that "stakeholders consulted in	_6_ECONOMIC	_6.2_Choice	6.2.6_Decision_making_authority	Abramsson, M. (2018) Arentshorst,	



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI Cluster	Category	Sub category	Source	Quality and approach study
and a positive brand image	[their] research indicated that the development of a shared vision should be developed by means of a multi-stakeholder process."				M., Peine, A. (2018) Zhang, Y. (2015) Afsana et al (2018)	
housing support awareness	Awareness of rent subsidy or other programmes among older people (e.g. home loans).	_6_ECONOMIC	_6.2_Choice	6.2.6_Decision_making_authority	Orpana, H. et al (2016)	
Tenancy contracts must allow modifications to homes on the initiative of tenants.	Tenancy contracts should offer long-term security on housing costs, and allow tenants to carry through modifications to improve the fit of the home environment to their personal preferences <i>Inferred KPI on the basis of the literature and the study findings. It looks like the greater degree of autonomy and control afforded by home ownership is the central factor in improvements in QoL. Consequently, if similar levels of autonomy and control can be provided for tenants, similar beneficial effects on QoL should be evident</i>	_6_ECONOMIC	_6.2_Choice	6.2.6_Decision_making_authority	Szabo, A. et al (2017)	Well-designed study, and a good overview of the literature
Cooperate Social responsibility	CSR is a business self-regulation that aims to contribute to societal goals by engaging on iethically-oriented practices. This type of policy must be aligned and integrated into the company's business model. Xia et al (2018) note "In the construction industry, CSR is becoming a growing agenda in recent years, mainly for two paradoxical reasons: On one hand, the construction industry is intrinsically 'irresponsible' (Lu et al., 2015) whereby different construction activities such as the extraction, processing and transportation of raw materials, design, construction, and demolition of built products use excessive resources and energy (Zhao et al., 2012).	_6_ECONOMIC	_6.2_Choice	6.2.6_Decision_making_authority	Xia, B. et al (2018)	



Criterion		Taxonomy cluster			Source details	Notes
Proposed title	Description	KPI Cluster	Category	Sub category	Source	Quality and approach study
	On the other hand, the construction industry is socially responsible as it materialises the built environment through the creation of a wide variety of necessary buildings, industrial plants and other infrastructures (Jiang and Wong, 2016), which are instrumental to enhancing the health, economic, social and cultural aspects of humanity (Xiong et al., 2016)."					
Availability of information about home adaptation options (?)	Availability of local sources providing information about possibilities (services and funds) to retrofit/adapt one's home.	_6_ECONOMIC	_6.2_Choice	6.2.7_Choice_infor mation		
Housing programmes and resources must be widely available	availability of a resource listing age-friendly home maintenance, support and care-giving services.	_6_ECONOMIC	_6.2_Choice	6.2.7_Choice_infor mation	Orpana, H. et al (2016)	



Appendix 4: Bibliographies

Sources for taxonomy

AARP (2018) AARP Livability Index - Great Neighbourhoods for All Ages. On-line assessment instrument with documentation. American Association of Retired Persons

Adams, S., Hodges, M. (2018) Adapting for ageing: Good practice and innovation in home adaptations. Centre for Ageing Better / Care & Repair England

All Party Parliamentary Group on Housing and Care for Older People (2009) Housing Our Ageing Population: Panel for Innovation. Housing LIN

All Party Parliamentary Group on Housing and Care for Older People (2012) Housing Our Ageing Population: Plan for Implementation. Housing LIN

All Party Parliamentary Group on Housing and Care for Older People (2016) Housing Our Ageing Population: Making Retirement Living a Positive Choice. Housing LIN

All Party Parliamentary Group on Housing and Care for Older People (2018) HAPPI-4: The Rural HAPPI Inquiry. Rural Housing for an Ageing Population: Preserving Independence. Housing LIN

Bigonnesse, C., Beaulieu, M., Garon, S. (2014) Meaning of Home in Later Life as a Concept to Understand Older Adults' Housing Needs: Results from the Age-Friendly Cities Pilot Project in Québec. *Journal of Housing for the Elderly* 28 , 357-382

Birov, S. et al (2017) MAFEIP User Guid: Version 2.0. Empirica/Open Evidence

Bond, R., Ferri Sanz, M., van Staalduinen, W., Garcés Ferrer, J., Hinkema, M. (2015) Social, Economic and Environmental Impact Tool (SEE-IT) - A protocol for European Regions, Local Authorities and Communities

Burton, E., Mitchell, L., Stride, C. (2011) Good places for ageing in place: development of objective built environment measures for investigating links with older people's wellbeing. *BMC Public Health* 11 , 839

Canada Mortgage and Housing Corporation (2016) Maintaining Seniors' Independence through Home Adaptations. Canada Mortgage and Housing Corporation

Carnemolla, P. (2018) Ageing in place and the internet of things - how smart home technologies, the built environment and caregiving intersect. *Visualization in Engineering* 6 , 7

Centre for Ageing Better (2019) Industrial Strategy Challenge Fund Healthy Ageing Challenge Framework. Centre for Ageing Better



Centre for Ageing Better (2019) The State of Ageing in 2019: Adding life to our years. Centre for Ageing Better

Chaudhury, H., Campo, M., Michael, Y., Mahmood, A. (2016) Neighbourhood environment and physical activity in older adults. *Social Science & Medicine* 149 , 104-113

Felix, E., de Haan, H., Vaandrager, L., Koelen, M. (2015) Beyond Thresholds: the Everyday Lived Experience of the House by Older People. *Journal of Housing for the Elderly* 29 , 329-347

Garin, N. et al (2014) Built Environment and Elderly Population Health: A Comprehensive Literature Review. *Clinical Practice & Epidemiology in Mental Health* 10 , 103-115

Government Office for Science (2016) Future of an Ageing Population - Foresight study. UK Government Office for Science

Greasley-Adams, C., Bowes, A., Dawson, A., McCabe, L. (2014) Good practice in the design of homes and living spaces for people with dementia and sight loss. University of Stirling

Guzman, S., Viveiros, J., Salomon, E. (2017) Housing Policy Solutions to Support Aging with Options. American Association of Retired Persons

ISSO (2016) ISSO-publicatie 77: Levensloopgeschied wonen. ISSO, Kennisinstituut voor Installatietechniek 2016

Iwarsson, S. et al (2004) The ENABLE-AGE Project: Multi-Dimensional Methodology for European Housing Research Manuscript version 2004-07-12

Lager, D. (2015) Perspectives on ageing in place: Older adults' experiences of everyday life in urban neighbourhoods. Groningen: University of Groningen

Lewis, A., Torrington, J. (2011) EVOLVE for Vision: Building evaluation tool. University of Sheffield

Lewis, A., Torrington, J., Barnes, S., Dartin, R., Holder, J., McKee, K., Netten, A., Orrell, A. (2010) EVOLVE: evaluation of older people's living environments. University of Sheffield

Lifetime Homes (2010) The Lifetime Homes Standard (revised edition, current from 5 July 2010). Lifetime Homes

Lloyd, J. (2015) Open Plan: Building a strategic policy towards older owners. The Strategic Society Centre

Marikyan, D., Papagiannidis, S., Alamanos, E. (2019) A systematic review of the smart home literature: a user perspective. *Technological Forecasting & Social Change* 138 , 139-154

Mittelmark, M., Sagy, S., Eriksson, M., Bauer, G., Pelikan, J., Lindström, B., Espnes, G. (eds) (2017) The Handbook of Salutogenesis. Springer Nature



Oswald, F., Wahl, H-W. (2005) Dimensions of the Meaning of Home in Later Life in Rowles, G., Chaudhury, H. (eds) Home and Identity in Late Life: International Perspectives. New York, Springer , 21-45

Pal, d., Funilkul, S., Charoenkitkarn, N., Kanthamanon, P. (2018) Internet-of-Things and Smart Homes for Elderly Healthcare: An End User Perspective. IEEE Access 6 , 10483-10496

Peine, A., Arentshorst, M. (2017) Towards a European Reference Framework for Age-Friendly Housing: Final report with recommendations for the European Reference Framework for Age-Friendly Housing. Utrecht University

Perek-Bialas, J. (2016) Active Ageing Index at the Local Level. Synthesis Report. European Commission DG Employment

Powell, J., Mackintosh, S. Bird, E., Ige, J., Garrett, H., Roys, M. (2017) The role of home adaptations in later life. Centre for Ageing Better

PRP Architects (2015) Older People's Housing Design Guidance. Royal Borough of Kensington and Chelsea

Rasmussen, B. (2018) Acoustic classification of buildings in Europe - Main characteristics of national schemes for housing, schools, hospitals and office buildings. Euronoise 2018 - Conference Proceedings

Smith, J. (2014) Homes and living spaces for people with sight loss: a guide for interior designers. Thomas Pocklington Trust

Torrington, J. (2014) What developments in the built environment will support the adaptation and 'future proofing' of homes and local neighbourhoods so that people can age well in place over the life course, stay safe and maintain independent lives? Future of an Ageing Population: evidence review. UK Government Office for Science

UNECE/European Commission (2019) Active Ageing Index (latest version). UNECE/European Commission

van Hoof, J., Demiris, G. , Wouters, E. (eds) (2017) Handbook of Smart Homes, Health Care and Well-Being. Springer Nature

World Health Organization (2007) Global age-friendly cities: a guide

World Health Organization (2015) Measuring the Age-friendliness of cities: a guide to using core indicators. WHO

World Health Organization (2017) Age-friendly environments in Europe - A handbook of domains for policy action

World Health Organization (2018) Age-friendly environments in Europe: Indicators, monitoring and assessments

World Health Organization (2018) WHO Housing and Health Guidelines



Sources for NoPs and KPIs

Abramsson, M. (2018) Housing for older people in small municipalities–ageing in place in a weak housing market. European Network for Housing Research. WG Housing and living conditions of ageing populations. Uppsala Sweden June 26-29 2018

Afsana, Farhia, Wood (2018) Marketing and branding strategies of the construction industry. Applied Management Conference, Wellington New Zealand, 23-25 October 2018

Afshar, P.F., Foroughan, M., Vedadhir, A., Tabatabaei, M.G. (2017) The effects of place attachment on social well-being in older adults. *Educational Gerontology* 43 (1) 45-51

Arentshorst, M., Peine, A. (2018) From niche level innovations to age-friendly homes and neighbourhoods: a multi-level analysis of challenges, barriers and solutions. *Technology Analysis & Strategic Management* 30 (11) 1325-1337

Artola, I., Rademaekers, K., Williams, R., Yearwood, J. (2016) Boosting Building Renovation: What Potential and Value for Europe? European Parliament Think Tank Report

Bailey Fausset, C., Kelly, A., Rogers, W., Fisk, A. (2011) Challenges to Aging in Place: Understanding Home Maintenance Difficulties. *Journal of Housing for the Elderly* 25 (2) 125-141

Bakker, R., Iofel, Y., Lachs, M. (2008) Lighting Levels in the Dwellings of Homebound Older Adults. *Journal of Housing for the Elderly* 18 (2) 17-27

Barry, A., Heale, R., Pilon, R., Lavoie, A.M. (2018) The meaning of home for ageing women living alone: An evolutionary concept analysis. *Health and Social Care in the Community* 26 (3) e337-e344

Bates, L., Wiles, J., Kearns, R., Coleman, T. (2019) Precariously placed: Home, housing and wellbeing for older renters. *Health and Place* 58

Begley, J., Lambie-Hanson, L. (2015) The Home Maintenance and Improvement Behaviors of Older Adults in Boston. *Housing Policy Debate* 25 (4) 754-781

Bentayeb, M. et al (2015) Indoor air quality, ventilation and respiratory health in elderly residents living in nursing homes in Europe. *The European respiratory journal* 45 (5) 1228-1238

Bergland, A., Slettebo, A. (2015) Health capital in everyday life of the oldest old living in their own homes. *Ageing and Society* 35 (10) 2156-2175

Berglund-Snodgrass, L., Nord, C. (2019) The Continuation of Dwelling: Safety as a Situated Effect of Multi-Actor Interactions Within Extra-Care Housing in Sweden. *Journal of Housing for the Elderly* 33 (2) 173-188



- Berridge, C. (2017) Active subjects of passive monitoring: Responses to a passive monitoring system in low-income independent living. *Ageing and Society* 37 (3) 537-560
- Blatteis, C.M. (2012) Age-dependent changes in temperature regulation - a mini review. *Gerontology* 58 (4) 289-295
- Boise, L., Wild, K., Mattek, N., Ruhl, M., Dodge, H.H., Kaye, J. (2013) Willingness of older adults to share data and privacy concerns after exposure to unobtrusive home monitoring. *Gerontechnology* 11 (3) 428-435
- Breeding, B. (2016) 3 Reasons Why Aging in Place May Not Be Cheaper. My LifeSite Online post
- Bruggencate, T.T., Luijckx, K.G., Sturm, J. (2019) When your world gets smaller: How older people try to meet their social needs, including the role of social technology. *Ageing and Society* 39 (8) 1826-1852
- Building Radar (2015) European Construction Market Forecast from 2015-2020. Building Radar website
- Buildings Performance Institute Europe (2011) Europe's buildings under the microscope: a country-by-country review of the energy performance of buildings. Building Performance Institute Europe
- Campbell, N. (2015) Designing for social needs to support aging in place within continuing care retirement communities. *Journal of Housing and the Built Environment* 30 (4) 645-665
- Care Alliance Ireland (2014) Literature Review on the Relationship between Family Carers and Home Care Support Workers. Care Alliance Ireland
- Carers UK (2016) Caring Homes: how the Carers Strategy can make housing suitable for carers. Carers UK public access publication
- Carnemolla, P., Bridge, C. (2019) Housing Design and Community Care: How Home Modifications Reduce Care Needs of Older People and People with Disability. *International Journal of Environmental Research and Public Health* 16 (11) E1951
- Carvalho, A. (2018) On the importance of common spaces in housing: Social interaction for elderly living. *Territorio* (86) 136-145
- CEF Digital: Connecting Europe (2019) Context Broker's smart services are making the city of Eindhoven a safer place. CEF Digital Success Stories online post
- Choi, N, DiNitto, D. (2016) Depressive Symptoms Among Older Adults Who Do Not Drive: Association With Mobility Resources and Perceived Transportation Barriers. *The Gerontologist* 56 (3) 432-443
- Christenson, M.A., Taira, E.D. (2014) Aging in the designed environment. *Aging in the Designed Environment* , 1-133



- Coelho, C., Steers, M., Lutzler, P., Schriver-Mazzuoli, L. (2005) Indoor air pollution in old people's homes related to some health problems: a survey study. *Indoor Air* 15 (4) 267-274
- Coleman, R. (1998) Improving the Quality of Life for Older People by Design. *Studies in Health Technology and Informatics* 48 , 74-83
- Coleman, T., Kearns, R.A., Wiles, J. (2016) Older adults' experiences of home maintenance issues and opportunities to maintain ageing in place. *Housing Studies* 31 (8) 964-983
- Cramm, J.M., Nieboer, A.P. (2014) Neighborhood attributes security and solidarity promote the well-being of community-dwelling older people in the Netherlands. *Geriatrics and Gerontology International* 14 (3) 681-688
- CRDS (2016) Future Services & Societal Systems in Society 5.0. Center for Research and Development Strategy Japan Science and Technology Agency
- Darab, S., Hartman, Y., Holdsworth, L. (2018) What women want: single older women and their housing preferences. *Housing Studies* 33 (4) 525-543
- Degnen, C. (2016) Socialising place attachment: Place, social memory and embodied affordances. *Ageing and Society* 36 (8) 1645-1667
- DG Enterprise and Industry - Joint Research Centre & Eurocodes (2008) The Role of EN 1990: The Key Head Eurocode
- Dickerson, A. et al (2007) Transportation and aging: a research agenda for advancing safe mobility. *Gerontologist* 47 (5) 578-590
- Ding, D., Cooper, R., Pasquina, P., Fici-Pasquina, L. (2011) Sensor technology for smart homes. *Maturitas* 69 (2) 131-136
- Ekström, H., Schmidt, S., Iwarsson, S. (2016) Home and health among different sub-groups of the ageing population: a comparison of two cohorts living in ordinary housing in Sweden. *BMC Geriatrics* 16 , 90
- Engel, L., Chudyk, A.M., Ashe, M.C., McKay, H.A., Whitehurst, D.G.T., Bryan, S. (2016) Older adults' quality of life – Exploring the role of the built environment and social cohesion in community-dwelling seniors on low income. *Social Science and Medicine* 164 , 1-11
- Eurocarers (2016) Information and Communication Technology (ICT) for Carers – factsheet. Eurocarers
- Eurocarers (2016) Towards community-based people-centred integrated care: the role of informal care
- Eurocarers (2017) Informal carers' skills and training - a tool for recognition and empowerment Eurocarers
- Eurocarers (2018) Informal care, poverty and social exclusion



Eurocarers (2019) The Work Life Balance Directive: what is in it for carers?

Eurocarers - TRACK project (2016) Baseline study "Informal caring and learning opportunities" Eurocarers - TRACK project

Eurocodes , Overview of EN Eurocode Parts EN 1990 - EN 1999

European Council (2019) Better work-life balance for EU citizens: Presidency reaches provisional agreement with the European Parliament. Press release

European Federation for Family Employment & Home Care (EFFE) (2019) Home & Family Employment and Home Care in the EU - A Civil Society Initiative. White Paper EFFE

Eurostat (2017) Review of the indicators on Work-Life-Balance. Presentation for expert group meeting on Measuring Quality of Employment 4-6 October 2017, Geneva

Eurostat (2019) Quality of life indicators - economic security and physical safety. Eurostat online publications

Eurostat (2017b) Housing cost overburden rate by tenure status, 2017. Eurostat online publications

Eurostat (2019b) Housing statistics. Eurostat online publications

Evidence Matters (2013) Measuring the Costs and Savings of Aging in Place. Evidence Matters online magazine, Fall issue

Ewart, I., Luck, R. (2013) Living from home older people looking beyond the house. Home Cultures 10 (1) 25-42

Ewing, G., Grande, G. (2013) Development of a carer support needs assessment tool (CSNAT) for end-of-life care practice at home: a qualitative study. Palliative Medicine 27 (3) 244-256

Ewing, G., Grande, G. (2016) The CSNAT approach: A person-centred process of carer assessment and support in palliative and end of life care. University of Manchester/University of Cambridge

Fang, M.L., Woolrych, R., Sixsmith, J., Canham, S., Battersby, L., Sixsmith, A. (2016) Place-making with older persons: Establishing sense-of-place through participatory community mapping workshops. Social Science and Medicine 168 , 223-229

Fatica, S., Prammer, D. (2018) Housing and the Tax System: How Large Are the Distortions in the Euro Area? Fiscal Studies 39 (2) 299-342

FEANTSA - Fondation Abbé Pierre (2019) European Index of Housing Exclusion 2019. FEANTSA



- Fernández-Carro, C., Vlachantoni, A. (2019) The role of social networks in using home care by older people across Continental Europe. *Health & social care in the community* 27 (4) 936-952
- Firdaus, G. (2017) Built Environment and Health Outcomes: Identification of Contextual Risk Factors for Mental Well-being of Older Adults. *Ageing International* 42 (1) 62-77
- Gabriel, M., Faulkner, D., Stirling, C. (2015) Housing priorities of people with dementia: Security, continuity and support. *AHURI Final Report* (242) 1-79
- Gabriel, M., Stirling, C., Faulkner, D., Lloyd, B. (2014) Future housing and support needs of people with dementia. *AHURI Positioning Paper* 159 , 1-61
- Garg, V., Camp, L.J., Lorenzen-Huber, L., Shankar, K., Connelly, K. (2014) Privacy concerns in assisted living technologies. *Annales des Telecommunications/Annals of Telecommunications* 69 (1-2) 75-88
- Geboy, L., Moore, K.D., Smith, E.K. (2012) Environmental gerontology for the future: Community-based living for the third age. *Journal of Housing for the Elderly* 26 (1-3) 44-61
- Gibson, B.E., Secker, B., Rolfe, D., Wagner, F., Parke, B., Mistry, B. (2012) Disability and dignity-enabling home environments. *Social Science and Medicine* 74 (2) 211-219
- Glendinning, C., Arksey, H. Tjadens, F. (2009) Care Provision within Families and its Socio-Economic Impact on Care Providers - Policy Briefing. University of York
- Golant, S.M. (2008) Affordable Clustered Housing-Care: A Category of Long-Term Care Options for the Elderly Poor. *Journal of Housing for the Elderly* 22 (1-2) 3-44
- Golant, S.M. (2012) Out of their residential comfort and mastery zones: Toward a more relevant environmental gerontology. *Journal of Housing for the Elderly* 26 (1-3) 26-43
- Gray, A., Worledge, G. (2018) Addressing loneliness and isolation in retirement housing. *Ageing and Society* 38 (3) 615-644
- Greenwood, N., McKevitt, C., Milne, A. (2018) Time to rebalance and reconsider: are we pathologising informal, family carers? *Journal of the Royal Society of Medicine* 111 (7) 253-254
- Greenwood, N., Pound, C., Brearly, S., Smith, R. (2019) A qualitative study of older informal carers' experiences and perceptions of their caring role. *Maturitas* 124 , 1-7
- Greenwood, N., Pound, C., Smith, R., Brearley, S. (2019) Experiences and support needs of older carers: A focus group study of perceptions from the voluntary and statutory sectors. *Maturitas* 123, 40-44
- Health in Aging Foundation (2019) Home Safety Tips for Older Adults. [HealthinAging.org](https://www.healthinaging.org)



Hillcoat-Nallétamby, S., Ogg, J. (2014) Moving beyond 'ageing in place': Older people's dislikes about their home and neighbourhood environments as a motive for wishing to move. *Ageing and Society* 34 (10) 1771-1796

Hojman, D.A., Miranda, Á. (2018) Agency, Human Dignity, and Subjective Well-being. *World Development* 101 , 1-15

Hui, E.C.M., Wong, F.K.W., Chung, K.W., Lau, K.Y. (2014) Housing affordability, preferences and expectations of elderly with government intervention. *Habitat International* 43, 11-21

Hutchings, B.L., Chaplin, E. (2017) The Relationship of Person-Environment Fit to Perceptions of Autonomy, Competency and Satisfaction Among Older Adults with Developmental Disabilities. *Journal of Policy and Practice in Intellectual Disabilities* 14 (3) 214-223

International Council for Research and Innovation in Building and Construction (2006) CIB W104 Open Building Implementation. International Council for Research and Innovation in Building and Construction

Jann, A. (2015) Reflections on the topic of good housing conditions and growing old: Not everybody has a choice [Reflexionen zur Frage des guten Wohnens beim Älterwerden: Nicht alle haben die Wahl] *Zeitschrift für Gerontologie und Geriatrie* 48 (3) 270-274

Jayson, S. (2019) How to Make a Home Safe for Your Aging Parent. AARP Online publication

Jegundo, A., Goncalves, G. (2018) Caregivers' role on ICT for AFE - White paper Caritas Coimbra, Inova+, EIP AHA

Kano, M., Rosenberg, P., Dalton, S. (2018) A Global Pilot Study of Age-Friendly City Indicators. *Social Indicators Research* 138 (3) 1205-1227

Karol, E. (2016) Tangible and intangible elements of design for well-being in the home. *Gerontechnology* 15 (4) 227-232

Kemperman, A., Timmermans, H. (2014) Green spaces in the direct living environment and social contacts of the aging population. *Landscape and Urban Planning* 129 , 44-54

Kenny, G., Yardley, J., Brown, C., Sigal, R., Jay, O. (2010) Heat stress in older individuals and patients with common chronic diseases. *Canadian Medical Association journal* 182 (10) 1053-1060

Khalfani-Cox, L. (2017) More Boomers and Retirees Choose to Rent. American Association of Retired Persons website

Klindtworth, K., Geiger, K., Pleschberger, S., Bleidorn, J., Schneider, N., Müller-Mundt, G. (2017) Living and dying with frailty: Qualitative interviews with elderly people in the domestic environment [Leben und Sterben mit Gebrechlichkeit: Qualitative Interviews mit älteren Menschen im häuslichen Umfeld] *Zeitschrift für Gerontologie und Geriatrie* 50 (2) 151-158



- Kramer, C., Pfaffenbach, C. (2016) Should I stay or should I go? Housing preferences upon retirement in Germany. *Journal of Housing and the Built Environment* 31 (2) 239-256
- Kylén, M., Ekström, H., Haak, M., Elmstahl, S., Iwarsson, S. (2014) Home and Health in the Third Age — Methodological Background and Descriptive Findings. *International Journal of Environmental Research and Public Health* 11 (7) 7060-7080
- Kylén, M., Löfqvist, C., Haak, M., Iwarsson, S. (2019) Meaning of home and health dynamics among younger older people in Sweden. *European Journal of Ageing* 16 (3) 305-315
- Lager, D., Van Hoven, B., Huigen, P.P.P. (2013) Dealing with change in old age: Negotiating working-class belonging in a neighbourhood in the process of urban renewal in the Netherlands. *Geoforum* 50 , 54-61
- Lefranc, A., Pérol, D., Plantier, M., Chatelain, P., de Rohan-Chabot, H., Schell, M. (2017) Assessment of informal caregiver's needs by self-administered instruments: a literature review. *European Journal of Public Health* 27 (5) 796-801
- Levasseur, M., Généreux, M., Bruneau, J., Vanasse, A., Chabot, E., Beaulac, C., Bédard, M. (2015) Importance of proximity to resources, social support, transportation and neighborhood security for mobility and social participation in older adults: results from a scoping study. *BMC Public Health* 15 , 503-
- Lie, M., Brittain, K. (2017) Technology and trust: Older people's perspectives of a home monitoring system [Technologie et confiance: Le point de vue des personnes âgées sur un système de télésurveillance à domicile] *Retraite et Societe* 75 (3) 47-72
- Lies, M.M., Kang, M., Sample, R.K. (2017) Place attachment and design features in a rural senior cohousing community. *Housing and Society* 44 (1-2) 41-63
- Lievesley, N. (2010) The future ageing of the ethnic minority population of England and Wales. *Runnymede: Intelligence for a Multi-ethnic Britain and Centre for Policy on Ageing*
- Lloyd, L., Calnan, M., Cameron, A., Seymour, J., Smith, R., White, K. (2017) Older people's perspectives on dignity: the benefits and challenges of a qualitative longitudinal approach to researching experiences of later life *International Journal of Social Research Methodology* 20 (6) 647-658
- Lorenzen-Huber, L., Boutain, M., Camp, L.J., Shankar, K., Connelly, K.H. (2011) Privacy, Technology, and Aging: A Proposed Framework. *Ageing International* 36 (2) 232-252
- Loughnan, M., Carroll, M., Tapper, N. (2015) The relationship between housing and heat wave resilience in older people. *International journal of biometeorology* 59 (9) 1291-1298
- Lu, X., Park, N., Ahrentzen, S. (2019) Lighting Effects on Older Adults' Visual and Nonvisual Performance: A Systematic Review. *Journal of Housing for the Elderly* 33 (3) 298-324



Luo, H. (2016) Strengthening Social Capital Through Residential Environment Development for Older Chinese in a Canadian Context. *Journal of Gerontological Social Work* 59 (1) 16-34

Mackenzie, L., Curryer, C., Byles, J.E. (2015) Narratives of home and place: Findings from the Housing and Independent Living Study. *Ageing and Society* 35 (8) 1684-1712

Majumder, S. et al (2017) Smart Homes for Elderly Healthcare - Recent Advances and Research Challenges. *Sensors (Basel)* 17 (11) 2496

ManuBuild project (2005) Open building manufacturing Research Project Grant agreement ID: 515825 on FP6-NMP. Available on Cordis website

Maquire, R., Hanly, P., Maquire, P. (2019) Beyond care burden: associations between positive psychological appraisals and well-being among informal caregivers in Europe. *Quality of life research* 28 (8) 2135-2146

Martin, D., Long, O., Kessler, L. (2019) Planning for Aging in Place: Incorporating the Voice of Elders to Promote Quality of Life. *Journal of Housing for the Elderly*

Meah, A., Jackson, P. (2016) Re-imagining the kitchen as a site of memory [Ré-imaginer la cuisine en tant que site de mémoire] *Social and Cultural Geography* 17 (4) 511-532

Melchiorre, M. et al (2018) eHealth in integrated care programs for people with multimorbidity in Europe: Insights from the ICARE4EU project *Health Policy* 122 (1) 53-63

Metlife Institute / Stanford Center on Longevity (2013) *Livable Community Indicators for Sustainable Aging in Place* Metlife Institute

Miedema, M., Gijsbers, G., , Innovation Ecosystem Development TNO

Miller, R.G. (2019) (Un)settling home during the Brexit process *Population, Space and Place* 25 (1) -

Molinsky, J., Forsyth, A. (2018) *Housing, the Built Environment, and the Good Life*. Hastings Center Report 48 , S50-S56

Moran, K. (2016) Sort it: Poor ventilation can have serious health consequences *Irish Times*

Mortenson, W.B., Sixsmith, A., Beringer, R. (2016) No Place Like Home? Surveillance and What Home Means in Old Age. *Canadian Journal on Aging* 35 (1) 103-114

Mulvenna, M., Zheng, H., Bond, R., McAllister, P., Wang, H., Riestra, R. (2017) Participatory design-based requirements elicitation involving people living with dementia towards a home-based platform to monitor emotional wellbeing. *Proceedings - 2017 IEEE International Conference on Bioinformatics and Biomedicine, BIBM 2017* 2017-January , 2026-2030

Murray, A. (2017) Rise of older renters: 'I sold up at 60 and will be a tenant for life'. *Daily Telegraph*, 18th July, 2017



- Nakhodaezadeh, M., Jafarabadi, M.A., Allahverdipour, H., Matlabi, H., Dehkordi, F.R. (2017) Home Environment and Its Relation with Quality of Life of Older People. *Journal of Housing for the Elderly* 31 (3) 272-285
- National Institute on Aging (2019) Featured research: Social isolation, loneliness in older people pose health risks. Website post
- National Research Council (U.S.) Committee on the Role of Human Factors in Home Health Care (2011) Chapter 6: The Home Environment Health Care Comes Home: The Human Factors
- Niezabitowski, M. (2012) Elderly people in residential environment. Developing the 'Sociology of Ageing': To Tackle the Challenge of Ageing Societies in Central and Eastern Europe , 139-161
- Noell-Waggoner, E. (2017) Lighting and the Elderly in Karlicek, R. et al (eds) *Handbook of Advanced Lighting Technology*
- OECD (2016) The Internet of Things: Seizing the Benefits and Addressing the Challenges OECD Digital Economy Papers, No. 252, OECD Publishing, Paris
- Oldman, J. (2014) Housing in Later Life. Age UK
- Orpana, H., Chawla, M., Gallagher, E., Escaravage, E. (2016) Developing indicators for evaluation of age-friendly communities in Canada: process and results. *Health Promotion and Chronic Disease Prevention in Canada* 36 (10) 214-223
- Orrell, A., McKee, K., Torrington, J., Barnes, S., Darton, R., Netten, A., Lewis, A. (2013) The relationship between building design and residents' quality of life in extra care housing schemes. *Health and Place* 21 , 52-64
- Pal, D., Triyason, T., Funikul, S. (2017) Smart Homes and Quality of Life for the Elderly: A Systematic Review Proceedings - 2017 IEEE International Symposium on Multimedia, ISM 2017 2017-January , 413-419
- Peine, A., Arentshorst, M. (2017) Towards a European Reference Framework for Age-Friendly Housing. Utrecht University
- Pereira, G.F., Lies, M., Kang, M. (2019) A case study of place attachment in rural and urban senior cohousing communities. *Housing and Society* 46 (1) 3-22
- Phibbs, P., Thompson, S. (2011) The health impacts of housing: Toward a policy-relevant research agenda. AHURI Final Report (173) 1-70
- Pittini, A. (2012) Housing affordability in the EU: Current situation and recent trends. *Housing Europe*



Plöthner, M., Schmidt, K., de Jong, L., Zeidler, J., Damm, K. (2019) Needs and preferences of informal caregivers regarding outpatient care for the elderly: a systematic literature review. *BMC Geriatrics* 19 , 82

Pottle, J., Hiscock, J., Neal, R., Poolman, M. (2017) Dying at home of cancer: whose needs are being met? The experience of family carers and healthcare professionals (a multi perspective qualitative study). *BMJ supportive & palliative care*

Price Waterhouse Coopers (2017) What doctor? Why AI and robotics will define New Health.. Price Waterhouse Coopers

Price Waterhouse Coopers (2018) Market study on telemedicine. European Commission - DG Health and Food Safety

Pynoos, J. (2018) Housing for older adults: A personal journey in environmental gerontology. *Annual Review of Gerontology and Geriatrics* 38 (1) 147-164

Pynoos, J., Steinman, B., Nguyen, A. (2010) Environmental Assessment and Modification as Fall-Prevention Strategies for Older Adults. *Clinical Geriatric Medicine* 26 (4) 633-644

Quehenberger, V., Krajic, K. (2016) Applications of salutogenesis to aged and highly-aged persons: Residential care and community settings. *The Handbook of Salutogenesis* , 325-335

Retirement Living (2019) The Cost of Aging in Place. Remodeling Retirement Living website

RIBA Architecture (2018) Age-friendly homes are becoming the new mainstream. RIBA Architecture website

Rogers, W.A., Mitzner, T.L. (2017) Envisioning the future for older adults: Autonomy, health, well-being, and social connectedness with technology support. *Futures* 87 , 133-139

Royal Society for the Prevention of Accidents , Safe at Home: Tips for the Over-65s

Ruddock, L, Ruddock, S. (2017) The Construction Sector and the Silver Economy: Addressing the Challenges and Opportunities. *IRC 2017 Welcome to delegates* , 67-75

Sanyal, S. (2018) How is AI Revolutionizing Elderly Care. *Forbes* online post

Scharlach, A. (2017) Aging in Context: Individual and Environmental Pathways to Aging-Friendly Communities—The 2015 Matthew A. Pollack Award Lecture. *The Gerontologist* 57 (4) 606-618

Schwarz, B. (2018) Finding place: An intellectual journey. *Annual Review of Gerontology and Geriatrics* 38 (1) 201-215

Senior Observatory , Domotics Designed for Older People: Gerontechnology. Online publication



- Seow, H., Bainbridge, D. (2018) A review of the essential components of quality palliative care in the home. *Journal of Palliative Medicine* 21 (1) 37-44
- Severinsen, C., Breheny, M., Stephens, C. (2016) Ageing in Unsuitable Places/ Housing Studies 31 (6) 714-728
- Sheffield City Council (2017) Older People's Independent Living Housing Strategy 2017 – 2022. Sheffield City Council
- Silverbridge Properties Ltd (2016) 5.3 Million New Homes Needed as the UK's Ageing Population Drives Demand. Silverbridge Properties Ltd website
- Sixsmith, J., Sixsmith, A., Fänge, A.M., Naumann, D., Kucsera, C., Tomsone, S., Haak, M., Dahlin-Ivanoff, S., Woolrych, R. (2014) Healthy ageing and home: The perspectives of very old people in five european countries. *Social Science and Medicine* 106 , 1-9
- Smith, J.S., Cartlidge, M.R. (2011) Place attachment among retirees in Greensburg, Kansas. *Geographical Review* 101 (4) 536-555
- Sullivan, J. (2018) Care and age-friendly housing catches the build-to-rent bug. Icenii website
- Szabo, A., Allen, J., Alpass, F., Stephens, C. (2019) Loneliness, socio-economic status and quality of life in old age: The moderating role of housing tenure. *Ageing and Society* 39 (5) 998-1021
- The Princess Royal Trust for Carers (2010) Carers and Housing: Addressing their needs
- Thomson, H., Thomas, S., Sellstrom, E., Petticrew, M. (2013) Housing improvements for health and associated socio-economic outcomes. the Cochrane Database of systematic reviews
- van den Berg, P., Kemperman, A., de Kleijn, B., Borgers, A. (2016) Ageing and loneliness: The role of mobility and the built environment. *Travel Behaviour and Society* 5 , 48-55
- van der Lippe, T., Lippényi, Z. (2018) Beyond Formal Access: Organizational Context, Working From Home, and Work–Family Conflict of Men and Women in European Workplaces. *Social Indicators Research*
- van Dijk, H., Cramm, J., Nieboer, A. (2013) The experiences of neighbour, volunteer and professional support-givers in supporting community dwelling older people. *Health and Social Care in the Community* 21 (2) 150-158
- Van Dijk, H.M., Cramm, J.M., Van Exel, J., Nieboer, A.P. (2015) The ideal neighbourhood for ageing in place as perceived by frail and non-frail community-dwelling older people. *Ageing and Society* 35 (8) 1771-1795
- Van Gennip, I.E., Pasman, H.R.W., Oosterveld-Vlug, M.G., Willems, D.L., Onwuteaka-Philipsen, B.D. (2016) How Dementia Affects Personal Dignity: A Qualitative Study on the



Perspective of Individuals with Mild to Moderate Dementia. *Journals of Gerontology - Series B Psychological Sciences and Social Sciences* 71 (3) 491-501

van Hees, S., Horstman, K., Jansen, M., Ruwaard, D. (2017) Photovoicing the neighbourhood: Understanding the situated meaning of intangible places for ageing-in-place. *Health and Place* 48 , 11-19

van Hoof, J., Kazak, J., Perek-Bialas, J., Peek, S. (2018) The Challenges of Urban Ageing: Making Cities Age-Friendly in Europe. *International Journal of Environmental Research and Public Health* 15 , 2473-

Vansteenwinke, I., Baumers, S., Heylighen, A. (2012) Home in later life: A framework for the architecture of home environments. *Home Cultures* 9 (2) 195-217

Vanstraelen, L., Marchand, J., Casas, M., Creuepelandt, D., Steyaert, E. (2015) Increasing capacities in Cities for innovating financing in energy Efficiency. A review of local authority innovative large scale retrofit financing and operational models. CITYNVEST WP2 Final Report

Vega, W., Wallace, S. (2016) Affordable Housing: A Key Lever to Community Health for Older Americans. *American Journal of Public Health* 106 (4) 635-636

Walker, J., Crotty, B., Dierks, M., Lipsitz, L., Safran, C. (2017) Addressing the Challenges of Aging: How Elders and Their Care Partners Seek Information. *The Gerontologist* 57 (5) 955-962

White, G., Evans, R., Connelly, K., Caine, K. (2014) Designing aging-in-place technologies to reflect the lifestyles and precious artifacts of urban and rural older adults. *Proceedings of the Human Factors and Ergonomics Society* 2014-January , 145-149

WHO Europe (2007) Housing, Energy and Thermal Comfort - A review of 10 countries within the WH European Region

Wiles, J. et al (2012) The Meaning of "Aging in Place" to Older People. *The Gerontologist* 52 (3) 357-366

Wiles, J.L., Rolleston, A., Pillai, A., Broad, J., Teh, R., Gott, M., Kerse, N. (2017) Attachment to place in advanced age: A study of the LiLACS NZ cohort. *Social Science and Medicine* 185 , 27-37

World Health Organization (2007) Global age-friendly cities: a guide

World Health Organization (2007) WHO Global Report on Falls Prevention in Older Age

World Health Organization (2015) Measuring the Age-friendliness of cities: a guide to using core indicators WHO

World Health Organization (2017) Age-friendly environments in Europe - A handbook of domains for policy action



World Health Organization (2018) WHO Housing and Health Guidelines

World Health Organization (2019) Age Friendly Strategy - Transportation Online post

Xia, B., Olanikepun, A., Chen., Q, Xie, L., Liu, Y. (2018) Conceptualising the state of the art of corporate social responsibility (CSR) in the construction industry and its nexus to sustainable development. *Journal of Cleaner Production* 195 , 340-353

Zhang, Y. (2015) The Impact of Brand Image on Consumer Behavior: a Literature Review *Open. Journal of Business and Management* 3 , 58-62