Co-Living	Deliverable reference: **D 7.5**	Date: 30.09.2011
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Project Title: Virtual Collaborative Social Living Community for Elderly **Co-Living** Contract no. 60-61700-98-009	Responsible partner: Philips	
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AAL AMBIENT ASSISTED LIVING ASSOCIATION **AAL-2009-2**	Approved by: Jerome de Barros (reviewer) Cindy Wings-Kölgen (technical manager)	
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Abstract:

This report presents the relation of and strategy for Co-Living with standards and standardisation. The Co-Living approach to standardisation is to align the work of the project with the relevant interoperability standards. The goal of this report is to contribute to the specification of standards for elderly care provision assistance by leveraging Co-Living results. This analysis considers which Co-Living functionalities could be standardised, what the relevant standards and standardisation bodies for Co-Living and AAL functionalities could be, and what the subsequent opportunities for contributions from Co-Living to standards would be. The overview finds that the most promising Co-Living functionalities for standardisation include the topics of social collaborative network, AAL services with social elements, and security and privacy for user empowerment. These belong to the Co-Living innovation areas. The analysis shows that Continua Health Alliance, IEC Strategic Group 5, CEN/TC 251 and OASIS are standardisation bodies that may adopt some of the Co-Living results. However, none of these have proven themselves in the AAL space yet. Therefore, a dedicated AAL standardisation forum may be appropriate to get sufficient traction and to be able to cover the full AAL functionality scope, i.e., beyond healthcare. IEC Strategic Group 5 may prove to become such a forum.

The following actions as part of the Co-Living standardisation strategy are proposed:

- refine selection of topics for standardisation,
- communicate need and rally support for dedicated AAL standardisation forum ,
- promote Co-Living use cases and concepts, and
- contribute Co-Living solutions.

Actual technical interoperability standardisation follows after these steps, but it is expected that this exceeds the horizon of the Co-Living project.

Keywords: AAL, standardisation

Document History

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September 05, 2011	0.9	First complete version for review
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List of Figures

No figures appear in this document.

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1 Introduction

1.1 Summary

This report presents the relation of and strategy for Co-Living with standards and standardisation. The Co-Living approach to standardisation is to align the work of the project with the relevant interoperability standards and open interfaces. The goal of this report is to contribute to the specification of service standards for elderly care provision by increasing interoperability of functionalities and services for elderly care assistance.

The scope of Co-Living to interoperability standardisation includes the middleware web services technology layer and also the application services layer. This for example includes those web services that provide the building blocks of a Social Community Network (SoCo-net) for elderly care.

The Co-Living standardisation strategy is approached using the following questions:

- Which Co-Living functionalities could be standardised?
- What are the relevant standards and standardisation bodies for Co-Living / Ambient Assisted Living / Independent Living functionalities?
- What are the opportunities for contributions from Co-Living to standards?

Answers to these questions are provided on the one hand by an overview of what exists and what does not exist and on the other hand through a gap analysis.

1.2 Structure of this document

The structure of this document follows the key questions introduced above. Chapter 2 presents AAL standards and standardisation bodies relevant for Co-Living. Chapter 3 presents standardisation opportunities for Co-Living functionalities. Chapter 4 presents the strategy with respect to standardisation.

1.3 Relationships with other deliverables

This deliverable holds a relationship with WP2 – WP5 which discuss architecture and design for the Co-Living system and its parts. At the time of writing only WP2 and WP5 had finished deliverables. The following deliverables are deemed relevant and taken into account in the analysis:

D2.1 – Overall system design [2]

D2.2 – Design of SoCo-net and of a security and privacy Infrastructure [3]

D2.3 – Design of ICT based services [4]

D5.1a – Privacy and security infrastructure specification [5]

D5.2a – Specification of Co-Living system integration [6]

1.4 Contributors

Table 1: Deliverable Contributors

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2 AAL standards and standardisation bodies

A proper content match is key for any successful standardisation. For this purpose this chapter presents standards and standardisation bodies related to AAL. Furthermore, it presents a first estimate on the relevance of these standards to Co-Living. Relevance is considered both from the perspective of Co-Living using a standard and influencing a standard. The most tangible form of influencing a standard is of course contributing with technical functionality.

2.1 Scope

Many forms of standards exist varying from architectural models to language vocabularies to technical interoperability standards. This analysis mainly focuses on tangible technical interoperability standards for e.g. protocols, application programming interfaces, data formats, etc.

2.2 Related work

From other assisted and independent living projects and initiatives, the universAAL project has published on standards and standardisation. It provides an overview of standards that may be relevant to AAL [1]. universAAL does this from the perspective of defining a universal architecture for AAL. It should be noted that both the scope and technical approach of universAAL differs from Co-Living. For example, healthcare as part of AAL is in focus of AAL while Co-Living focuses on a much more selected set of application which are not healthcare oriented.

2.3 Approach

This analysis builds on the available related work. For this purpose the standards overview from universAAL [1] is taken as a basis. This is complemented with other potentially relevant standards. The consolidated list is annotated to indicate relevance to Co-Living.

2.4 Criteria and Co-Living scope

Relevance of standards and standardisation bodies is determined according to a number of criteria. The scope and ambition of Co-Living is important here. For example, Co-Living takes a practical approach to support social collaborative living. For this purpose it develops application and supporting services for e.g. social networking and security on top of the mPower platform. Intended use of this implementation targets validation in a trial. To stay focused, Co-Living also on beforehand makes some choices not to do certain work, in particular the project will not work on developing new sensors and instead will use off-the-shelf devices.

2.5 Standards and standards bodies relevance

Table 2 lists the relevance of standards and standards bodies to Co-Living, both for using the standards in Co-Living services and as a place to standardize Co-Living results. Table 2 is ordered from high relevance to low relevance, where the ‘influence’ column has precedence over the ‘use’ column.

Of special interest is the IEC Strategic Group 5 [8], which is being established by the IEC. Since no actual standardisation work is being done yet in this group, it is difficult to accurately judge its relevance. Therefore, its relevance should be re-evaluated again in due time, see section 4.2.

Table 2: Relevance of standards and standards bodies to Co-Living (based on Table 4-1 of [1])

Standard	**Relevance to Co-Living**		**Why and where to be used**
	Use	Influence	
Continua Guidelines	potentially relevant	potentially relevant	Continua guidelines represent profiles of selected set of standards by main industrial players in personal health, ambient assisted living and wellness domains. Therefore these guidelines are highly relevant to Co-Living. It should be noted that the current (v2.0) guidelines do not include specific guidelines to support independent living. It does profile the IEEE 11073 Independent Living Activity Hub device profile.
IEC Strategic Group 5	potentially relevant (to be revised when this group has completed its work plan)	potentially relevant (to be revised when this group has completed its work plan)	On the topic of Ambient Assisted Living (AAL), the Standardisation Management Board (SMB) of the IEC agreed in June 2011 to establish Strategic Group 5 to provide strategic guidance and roadmaps on specific areas of technical activity for AAL, for coordination for both new initiatives and on-going work in this area. SMB expects to reaffirm its decision at its Melbourne meeting in October when it reviews the proposed scope, terms of reference, work plan and review date for the completion of the SG work. IEC will coordinate with ISO in this area. (SMB Decision 141/9)
OASIS	relevant	potentially relevant, but not very likely	OASIS is in charge of developing ebusiness and web service standards, which may be used by Co-Living, e.g. web-services, XACML, etc. It is unlikely that Co-Living results would be input for standardisation in OASIS.

Standard	**Relevance to Co-Living**		**Why and where to be used**
	Use	Influence	
CEN/TC 251	potentially relevant	potentially relevant, but not very likely	This committee provides a set of European standards in the field of Health Information and Communications Technology (ICT). Some of these standards might be relevant for Co-Living. However, CEN/TC 251 is very healthcare oriented while Co-Living is not. Also, most standards are not direct technical interoperability standards. CEN/TC 251 Published standards does list the EN ISO 11073-10471:2011 'Personal health device communication - Part 10471: Device specialization - Independent living activity hub' and related technical 11073 standards. Co-Living results may follow the footsteps of this standard.
microformats	potentially relevant	potentially relevant, but not likely	Microformats provides a set of (draft) specifications for data formats of which many target the area of social networking, e.g. calendar, address information, geo coordinates, products, resumes and recipes. Co-Living may use some of these guidelines. Co-Living may also contribute to microformats although this may not be very likely as the focus of Co-Living delivers less generic results.
OpenSocial	potentially relevant	potentially relevant, but not likely	OpenSocial enables apps, containers, and other clients to collaborate and move the social web forward. It defines protocols and data formats to exchange and express data related to social networks, e.g. activities, person profile, groups, address, media, etc. Co-Living may use some of these guidelines. Co-Living may also contribute to microformats although this may not be very likely as the focus of Co-Living delivers less generic results.

Standard	Relevance to Co-Living		Why and where to be used
	Use	Influence	
Internet Engineering Task Force (IETF)	relevant	not relevant	IETF provides the RFC documents for internet services. Co-Living uses IETF protocols for basic communication using e.g. HTTP. Potentially, Co-Living may also use application level protocols or data formats standardized by IETF.
Simple Object Access Protocol (SOAP)	relevant	not relevant	Co-Living uses SOAP through the web-services platform provided by the mPower platform adopted by Co-Living.
HTTP The Hypertext Transfer Protocol	relevant	not relevant	Protocol for distributed, collaborative, hypermedia information systems on the World Wide Web. Co-Living uses HTTP both for machine to machine and machine to user (web-browser) communication.
IHE Patient Care Device Technical Framework (PCD)	potentially relevant	not relevant	IHE PCD provides a technical framework for communication between medical devices and enterprise information systems. This standard may be relevant for AAL applications mostly inside care facilities. However, IHE PCD may also be used for data obtained from e.g. IEEE 11073 Independent Living Activity Hub (as done by Continua Health Alliance), which involves data that may be of use beyond pure healthcare purposes. Therefore, it may be relevant for Co-Living. It is not expected that Co-Living influences IHE PCD as Co-Living will use commercially available off the shelf sensors.
Universal Plug and Play (UPnP)	potentially relevant	not relevant	Provides service discovery in a local network and particular application services such as e.g. audio/video sharing in a home network. May be used in Co-Living, but not contribution to standard not expected.

Standard	Relevance to Co-Living		Why and where to be used
	Use	Influence	
Konnex Association (KNX)	potentially relevant	not relevant	KNX is an open and widely adopted standard for home and building controls (e.g. lighting controls). As ambient assisted living is somewhat related to home automation, this standard might be relevant for Co-Living. Standardisation of Co-Living results in KNX is not expected.
Mobile Data Services: Short Message Service (SMS)	potentially relevant	not relevant	Service for messaging for mobile phones. It can be used for the connection to mobile devices for user interaction. As mobile phones are taking prominent role in AAL applications, GSM standard (SMS) is potentially relevant to Co-Living. If Co-Living is to adopt SMS it cannot abstract completely from it as it comes with particular limitations and interaction models.
Mobile Data Services: Multimedia Message Service (MMS)	potentially relevant	not relevant	Standard for a telephony messaging systems that allow sending messages that includes multimedia objects (images, audio, video, rich text). It can be used for the connection to mobile devices for user interaction. As mobile phones are taking prominent role in AAL applications, MMS is potentially relevant to Co-Living. If Co-Living is to adopt MMS it cannot abstract completely from it as it comes with particular limitations and interaction models.
Internet Message Format (RFC2822)	potentially relevant	not relevant	IMF specifies syntax for text messages used for E-Mail exchange between users. It is potentially relevant for Co-Living as a communication means between care provider and elderly. Co-Living may use E-mail. It is not expected that Co-Living results influence E-mail standards.
Multipurpose Internet Mail Extensions (MIME, RFC2045 – 2049)	potentially relevant	not relevant	MIME can help to extend the functions of general mail message. It is potentially relevant for Co-Living as a communication means between care provider and elderly. Co-Living may use MIME. It is not expected that Co-Living results influence MIME standards.

Standard	Relevance to Co-Living		Why and where to be used
	Use	Influence	
E-Mail Protocols Simple Mail Transfer Protocol (SMTP, RFC2821)	potentially relevant	not relevant	SMTP is specified for outgoing mail transports. It can be used in the email system when the service provides the email function. Therefore it can be relevant for Co-Living. Co-Living may use E-mail. It is not expected that Co-Living results influence E-mail standards.
Post Office Protocol version 3 (POP3, RFC1939)	potentially relevant	not relevant	POP3 is used to access a mailbox from a remote server. Co-Living may use E-mail. It is not expected that Co-Living results influence E-mail standards.
Internet Message Access Protocol (IMAP, Version 4: RFC3501)	potentially relevant	not relevant	IMAP is used remotely so that emails remain on server side. They are be used by the email system. Co-Living may use E-mail. It is not expected that Co-Living results influence E-mail standards.
EXtensible Markup Language (XML)	potentially relevant	not relevant	XML allows information and services to be encoded with meaningful structure and semantics. It can be a multi-purpose standard so it may be used in many situations in the Co-Living platform.
ISO 15000 - Electronic Business using eXtensible Markup Language (ebXML)	potentially relevant	not relevant	Provides an open infrastructure to exchange business information, including transport, routing and packaging of business transactions. Co-Living may use ebXML. It is not expected that Co-Living results will be standardized in ebXML.
ISO EN 11073 family	potentially relevant	not relevant	This standard is used to format data that is sent from sensors or medical devices to e.g. a home hub. It is also referred by Continua. It may be relevant for Co-Living if sensors are to be used for which an 11073 device profile exists. Co-Living will not standardize results in 11073 as it will use off the shelf sensors.

Standard	**Relevance to Co-Living**		**Why and where to be used**
	Use	Influence	
ETSI Human factors	potentially relevant	not relevant	ETSI HF (Human factors) has representatives from research bodies, manufacturers, service providers, users and consumers. It provides specifications on user interfaces for the following work areas: internet, mobile communications, multimedia and video telephony, and network management, and numbering and user identification. Co-Living may use EG 202 325 'User Profile Management', but no standardisation of Co-Living results is expected.
W3C usability guidelines	potentially relevant	not relevant	W3C Web Content Accessibility Guidelines (WCAG) covers a wide range of recommendations for making Web content more accessible. This makes content accessible to a wider range of people with disabilities, including blindness and low vision, deafness and hearing loss, learning disabilities, cognitive limitations, limited movement, speech disabilities, photosensitivity and combinations of these. Co-Living may use these guidelines, but no standardisation of Co-Living results is expected.

Standard	**Relevance to Co-Living**		**Why and where to be used**
	Use	Influence	
ISO 9241	potentially relevant	not relevant	ISO 9241 covers ergonomics of human-computer interaction. ISO 9241 part 171 “Guidance on software accessibility” provides ergonomics guidance and specifications for the design of accessible software covering issues associated with designing accessible software for people with disabilities and the elderly. ISO 9241 part 210 “Human-centred design for interactive systems” provides guidance in which components of interactive systems can enhance human–system interaction. This standard also defines User Experience (UX) that investigates the users' emotions, beliefs, preferences, perceptions, physical and psychological responses, behaviours and accomplishments that occur during interaction. Co-LIVING could consider and follow UX, which extends traditional usability issues. It is not expected that Co-Living results will influence the ISO 9241 standard.
EN 14908	potentially relevant	not relevant	Open data communication in Building Automation, Controls and Building Management – Control Network Protocol
Digital Living Network Alliance (DLNA)	unlikely relevant	not relevant	DLNA provides the design guideline for interoperability framework for industrial products to join the network and interoperate. This may be useful if any of Co-Living scenarios include data sharing (e.g. photos, videos) among digital devices (e.g. mobile phones). Co-Living may use DLNA standard, e.g. its UPnP profile. Standardisation of Co-Living results in DLNA is not expected.

Standard	**Relevance to Co-Living**		**Why and where to be used**
	Use	Influence	
CEN/TC 293 ISO/TC 173	marginally relevant	not relevant	CEN/TC 293 'Assistive products for persons with disability' (and ISO/TC 173 'Assistive products for persons with disability') standardize products that are frequently used by elderly people. However, until now CEN/TC 293 has only published standards for requirements, test methods, classification and terminology (e.g. ISO 9999 'Assistive products for people with disabilities'), but not technical interoperable IT standards. Not relevant for Co-Living unless radical scope increase.
ISO/TC 215	not relevant	not relevant	This committee provides a set of international standards in the field of Health Information and Communications Technology (ICT). Strict focus on healthcare instead of AAL and therefore not relevant for Co-Living.
ISO/TR 16056:2004 - Health informatics - Interoperability of telehealth systems and networks	not relevant	not relevant	Standard gives a brief introduction to interoperability of telehealth systems and networks. Developed in ISO/TC 215. Not relevant for Co-Living because of strict focus on healthcare.
Healthcare Services Specification Project (HSSP)	not relevant	not relevant	HSSP is not a standards development organization. Instead, HSSP implements certain standards important for healthcare use cases. The technical interoperability standards of HSSP are in the area of identity and directory and not expected to be very applicable to independent living as in Co-Living.
Health Level Seven (HL7)	not relevant	not relevant	HL7 is widely used to exchange healthcare data. Although some applications in independent living relate to health, these standards are not relevant to Co-Living.

Standard	**Relevance to Co-Living**		**Why and where to be used**
	Use	Influence	
European Telecommunications Standards Institute (ETSI)	not relevant	not relevant	Communication standards created by ETSI, such as GSM are potentially relevant for Co-Living, because these standards are needed for the communication between the elderly and caregivers and to transfer data in a secure way. However, from the perspective of Co-Living communication means are a commodity and therefore not relevant from a standardisation perspective.
Integrating the Healthcare Enterprise (IHE)	not relevant	not relevant	IHE profiles healthcare standards, covering also remote patient management to certain extent. In general these healthcare standards are not relevant to the independent living scope of Co-Living. An exception may be certain parts of IHE PCD which may be used to exchange sensor information which may have a broader use than just healthcare, e.g. activity.
3rd Generation Partnership Project (3GPP)	not relevant	not relevant	3GPP helps to improve the evolved GSM and UMTS, which may be used in Co-Living. Mobile phones may take a prominent role in AAL applications and as a consequence GSM and UMTS standards may be used for Co-Living applications. However, from the perspective of Co-Living communication means are a commodity and Co-Living system should be agnostic from them. Therefore, wireless communication protocols from 3GPP are not relevant for Co-Living.
OSGi	not relevant	not relevant	OSGi provides a set of specifications that define a dynamic module system for Java. OSGi simplifies modularization of platforms. The Co-Living architecture is based on mPower, which does not utilize OSGi and therefore OSGi is not relevant to Co-Living.

Standard	Relevance to Co-Living		Why and where to be used
	Use	Influence	
Bluetooth (IEEE 802.15)	not relevant	not relevant	Bluetooth is a standard for wireless communication and can be used for communication between devices inside home or care facilities (for example between a fall detector or alarm button of a PERS and a home hub). It is referenced by Continua. However, as Co-Living is agnostic of communication means it is classified as not relevant.
Wi-Fi (IEEE 802.11)	not relevant	not relevant	Wi-Fi is widely used form communication between devices in home (e.g. between laptops, set-top boxes, printers, digital cameras). It can also be used in care facilities providing high bandwidth data communication. As Co-Living is agnostic of communication means it is classified as not relevant.
ZigBee	not relevant	not relevant	ZigBee provides wireless low power LAN communication (e.g. between different sensors and home gateway) and therefore may indirectly be relevant for Co-Living, but not directly because Co-Living is agnostic of communication means. It is also referenced by Continua.
Global System for Mobile Communication (GSM)	not relevant	not relevant	GSM is a fully digital standard for mobile networks, which is primarily used for telephony, but also for circuit and packet switches data transmission and short messages. As mobile phones are taking prominent role in AAL applications, GSM standard is potentially indirectly relevant to Co-Living, but not directly as Co-Living is agnostic of communication means.
General Packet Radio Services (GPRS)	not relevant	not relevant	GPRS enables mobile surfing in the internet via the GSM network. As mobile phones are taking prominent role in AAL applications, GPRS standard is potentially indirectly relevant to Co-Living, but not directly as Co-Living is agnostic of communication means.

Standard	**Relevance to Co-Living**		**Why and where to be used**
	Use	Influence	
Universal Mobile Telecommunications System (UMTS)	not relevant	not relevant	UMTS is a standard for a faster wireless data transmission than by second generation. As mobile phones are taking prominent role in AAL applications, UMTS standard is potentially indirectly relevant to Co-Living, but not directly as Co-Living is agnostic of communication means.
Mobile Data Services: Wireless Application Protocol (WAP)	not relevant	not relevant	Standard for applications that use wireless communication. WAP as technology is deprecated and therefore not relevant to Co-Living.
Ethernet (IEEE 802.3)	not relevant	not relevant	Its purpose would be the wired communications between nodes in home or inside care facilities. Co-Living is agnostic of communication means and therefore this standard is not relevant.
USB	not relevant	not relevant	USB allows high-speed, easy connection of peripherals and other devices (such as medical devices or environmental sensors, and cameras) to a PC. Therefore it is used in AAL applications. Continua is also referencing this standard. However, as Co-Living is agnostic of communication means this standard is not relevant.
Cross-enterprise Clinical Document Sharing (IHE XDS)	not relevant	not relevant	XDS helps to facilitate the registration, distribution and access across health enterprises of patient electronic health records. Since Co-Living does not target healthcare applications within the independent living domain, IHE XDS is not relevant to Co-Living.
Universal Remote Console (URC)	not relevant	not relevant	The standard describe methods a product can use to provide user interface information for any remote console or artificial agent. This information is sufficient to construct a full-function user interface for the product without any prior knowledge of the product or product type. It is not expected that it is relevant for Co-Living.

Standard	**Relevance to Co-Living**		**Why and where to be used**
	Use	Influence	
epSOS (Smart Open Services for European Patients)	not relevant	not relevant	epSOS is the main European electronic Health (eHealth) interoperability project co-funded by the European Commission and the partners. It focuses on improving medical treatment of citizens while abroad by providing health professionals with the necessary patient data. The strict healthcare focus of epSOS makes it not relevant for Co-Living.
OAuth	not relevant	not relevant	OAuth is a security protocol that enables users to grant third-party access to their web resources without sharing their passwords. It is not expected that Co-Living may use OAuth given the difference in architectural approach.

3 Standardisation opportunities for Co-Living functionality

This section analyses the Co-Living functionality in order to search for standardisation opportunities. An overview of Co-Living functionality and standardisation opportunities is given in Table 3. The overview demonstrates that the most promising topics include social networking, services and security.

Table 3: Standardisation opportunities for Co-Living functionalities

Co-Living functionality	Category	Reference(s)[1]	Standardisation opportunity
mPower	middleware / platform / base protocols	D2.1a	Standardisation of mPower (extensions) is out of scope of Co-Living standardisation.

SoCo-net
• social community
  o user mgt
  o team mgt
  o profile mgt
• behaviour analysis
  o physical behaviour analysis
  o social behaviour analysis
• education / feedback
  o remote training
  o motivation
	services / protocols / data formats	D2.1a, D2.2	Basic social networking and profile management may be a topic for standardisation as this is a generic functionality. Network protocols and data formats to manage social networks and profiles may be a topic for standardisation.
			For dependent topics of behavioural analysis and education/feedback opportunities may be further out in the future. Particular aspects for standardisation for behaviour analysis are protocols and data formats and vocabularies to support the gathering of behavioural events.
			Service implementations themselves, i.e., the processing and direct interaction with users through web-services, are not eligible for standardisation.

ICT-based services
• care & wellness
  o activity program
  o fitness plan
  o leisure group activities
  o skills exchange
• communication
  o alarming
  o external notification
	services / protocols / data formats	D2.1a, D2.3	AAL services provide an opportunity for standardisation. Information data which is input or output to services is a first candidate for standardisation. This is followed by application specific methods belonging to a service.
			The standardisation opportunity is inhibited by the fact that services and protocols in Co-Living are based on mPower, which by itself is

[1] References identity Co-Living project deliverables

• guidance
  ○ weather forecast
  ○ walking directions
  ○ reminder
  ○ medication
• mobility monitoring
  ○ activity follow-up
  ○ fall detection
  ○ mobility motivation
  ○ friend collision
  ○ location nearness
• scheduler
  ○ calendar
• sensor related
  ○ device mgt
  ○ location / real time outdoor localization
  ○ indoor monitoring
  ○ walking monitoring
  ○ physical activity monitoring
  ○ indoor support
  ○ object tracking
			not a standard. Features and functionalities should however be mappable to other frameworks and technologies.
			No prioritization of opportunities can be provided. As a rule of thumb the services implemented by Co-Living and validated in the trials are likely first candidates.

database	database structure	D2.1a	Co-Living database structure(s) are not eligible for standardisation.
sensor communication	network protocols / data formats	D2.1a	Co-Living uses off the shelf sensor technology. It is therefore not eligible for standardisation.
security & privacy • authentication / SSO • authorization • auditing • token mgt • policies • policy transfer • obligations • user / role mgt • PKI mgt • secure communication	services / data formats / protocols	D2.1a, D2.2, D2.3, D5.1a	Co-Living does not provide a direct opportunity for standardisation of its security and privacy solutions. The reason is its tight integration with the mPower platform. Indirectly, concepts may be used as a basis for other systems and standards after proper re-mapping of the technology.

user interface	guidelines	D2.1a	User interfaces and interaction provide no standardisation opportunities.

4 Standardisation strategy

4.1 Discussion

From the perspective of standardisation, some leads are provided by the Continua Health Alliance, IEC Strategic Group 5, CEN/TC 251, OASIS, OpenSocial and microformats, but for each of them it should be said that the likelihood of direct standardisation of Co-Living results is limited. A major reason for this is that, except for IEC Strategic Group 5, these bodies are not broad AAL application oriented bodies, but mainly focussed on the healthcare side of AAL or otherwise not AAL specific. Given the scope of Co-Living, which is largely non-healthcare, a standardisation body that is open to cover the full scope of AAL is desired. Continua could be such body as it has independent living in its scope, but still has to prove itself in this field. Furthermore, Continua is a standards profiling organization and needs standards to build on. IEC Strategic Group 5 is dedicated to AAL. However, this group is in the process of being established still and its real relevance must be re-evaluated when it is fully operational.

Also from the perspective of standardisation it turns out that the architectural approach of e.g. Continua differs from Co-Living. Continua has – extremely simplified – a store and forward architecture of measurements, messages and health reports from sensor to service to (personal) health record, whereas Co-Living builds on mPower which has an architecture of collaborating services with a rich functionality exposed through service APIs. Harmonization or translation of concepts is required to bridge these differences.

From the perspective of Co-Living, innovation contribution to standards could be in the areas of social collaborative network, AAL services with social elements, and security and privacy for user empowerment. This is logical as the strength of Co-Living should be in its services. These topics touch on data formats, network protocols and APIs, and vocabularies, which could be subject to standardisation. In many of these areas Co-Living is doing first-of-a-kind work. Furthermore, Co-Living has a very practical orientation with as a goal to validate concepts in trials rather than creating a theoretic generic solution. Although essential to develop good standards, this alone is typically not sufficient as a standards process is often evolutionary and about bringing generic and best elements of multiple solutions together. Co-Living however can play a role in demonstrating a first proof of concept and demonstrate the need for particular standards. Therefore, a realistic target for standardisation is the re-use of Co-Living concepts once they are proven rather than direct standardisation of the precise technical realization in Co-Living.

From a business perspective on standardisation it is key to know what the dominant model of Co-Living-like services will be: a set of services under the umbrella of a central party or a set of independent services operated by different parties? The answer determines the priority of standardisation of particular interfaces and the need for technical interoperability standards, because the willingness to share valuable information depends on the business models it needs to support. Only the market can answer these questions and signals from potential interested parties like service providers should be taken into account.

4.2 Conclusions

The results of chapters 2 and 3 with the reasoning above are consolidated in a strategy for standardisation. The following actions are proposed:

1. Refine selection of topics for standardisation
   This report provides an initial section of promising topics for standardisation (social collaborative network, AAL services with social elements, and security and privacy for user empowerment), but this must be made more concrete. This action should identify commonly

used network protocols, data formats and vocabulary in Co-Living. It should focus on the topics that receive major development and verification attention.

2. Communicate need and rally support for dedicated AAL forum
   In order to gain enough traction and proper coverage of functionality a good home is needed for AAL standardisation such as for example a dedicated work group in an existing standards development organization. This can be done by raising the topic of the need for standardisation of AAL technologies in AAL events such as workshops that are organized in the AAL community, signalling the need in related fora like Continua, and in direct communication with policy makers. It is recommended to team up with other AAL initiatives on this topic, e.g. universAAL which develops a reference architecture and also pursues standardisation. Furthermore, IEC Strategic Group 5 should be monitored. This group could prove to become an important standards body for AAL systems.

3. Promote Co-Living use cases and concepts
   To support standardisation the value of the Co-Living contribution must be made tangible. The foreseen areas of innovation (social network, services, security) must have stories attached to them that sit in the centre of AAL and are recognized by a wide audience. It may be useful to link it to other initiatives and results, e.g. to link the Co-Living functionality to the active aging scenarios developed by the BRAID project [7].

4. Contribute solutions
   It is not to be expected that Co-Living solutions are directly ready for standardisation as they will not have the necessary level of genericness. However, once ready, the Co-Living solutions can be promoted and shared as a first step towards standardisation.

Actual technical interoperability standardisation follows on these steps, but it is expected that this exceeds the horizon of the Co-Living project.

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