Development of SRD 63416 “Ethical Considerations of AI when Applied in the AAL Context”

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Population ageing and the value of AAL

• The global population is ageing.
  • “United Nations World Population Prospects 2019”
  • In 2018, for the first time in human history, persons aged 65 years or over outnumbered children under five years of age worldwide.
  • In 2050 the 1.5 billion people aged 65 years or over worldwide will outnumber adolescents and youth aged 15 to 24 years (1.3 billion).

• Reducing the burden of long-term care for older persons becomes a major policy issue in every country. **Active Assisted Living (AAL) systems help older persons' daily living so that they can live independently as long as possible.** AAL can be a solution to population ageing.
What AAL can do

• For the well, AAL can provide an increase in:
  • Convenience
  • Time-saving
  • Self-reliance
  • Ability to monitor their own health
  • Enjoyment of life

• For the vulnerable, AAL can reduce
  • Fear - of falls, of adverse events, of dying and no-one knowing
  • Frustration - the loss of ability to do ordinary tasks
  • Forgetfulness - medication, appointments, cooking, location…
  • Social isolation
Establishment of IEC SyC AAL in 2015

• The Systems Committee shall:
  • Create a vision of Active Assisted Living that takes into account the evolution of the market
  • Foster standardisation which: enables usability and accessibility of AAL systems and services

• Enables cross-vendor interoperability of AAL systems, services, products and components

• Addresses systems level aspects such as safety, security and privacy

• Communicate the work of the SyC appropriately to foster a strong community of stakeholders
Organization and participation in IEC SyC AAL
Chair: U. Haltrich (DE)/Sec.: M. Siket (CO)

• 14 P members: CA, CN, FR, DE, IN, IT, JP, KR, NL, NZ, SE, CH, GB, US
• 12 O Members: AT, BE, HR, CZ, DK, FI, HU, MY, NO, RU, SG, ES

• AG 1: Chair's Advisory Group
• JAG 8: Joint Advisory Group linked to TC 100 and TC 124

• WG 1: User Focus
• WG 2: Architecture and Interoperability
• WG 3: Quality and Conformity assessment
• WG 4: Regulatory Affairs
• WG 5: AAL in the connected home environment
• WG 7: Cooperative multiple systems - Functional safety
• MT 6: IEV - Part 871
AAL use case two-dimensional classification

- **Use case category**
  - Prevention and management of chronic long-term conditions
  - Social interaction
  - Mobility
  - Health & wellness
  - (Self-)management of daily life activities at home

- **AAL care recipient’s level of assistance**
  - Level 0: Independent
  - Level 1: Some assistance
  - Level 2: Assistance with IADL (transportation, housekeeping, medication management, etc.)
  - Level 3: Assistance with ADL (walking, bathing, grooming and getting dressed, continence and eating, etc.)
AAL use case examples

• **Personal Health check**
  • The care recipient wears, or is monitored by, sensors that collect vital signs and transmit these to a monitoring centre. The system uses AI to monitor the incoming data, assesses any changes in ongoing physical or cognitive health or potential concerns, notifies the user and/or physician of these concerns.

• **Wandering Detection and Diversion (WDD) for persons with Dementia**
  • In some cases persons with dementia are exit seeking and frequently try to leave their residences. … A WDD system may interact with the person to dissuade them from exiting (e.g. encourage a return to bed during the night). …
Cost effectiveness of AAL system
(IEC SRD 63234-2:2020)

• In case of potential concerns, “Personal Health check” system displays an ‘Alert’ to a Clinician/Nurse at the centre.

• If deemed appropriate, the Clinician/Nurse will contact the patient or dispatch a homecare nurse to visit the patient.

• Cash Flow Analysis Scenario A – Ramp up to 100,000 patients in five years demonstrates Return on Investment of 172%.

• Cash Flow Analysis Scenario B – Ramp up to 10,000 patients in five years demonstrates Return on Investment of 147%.
Changing conditions of AAL care recipients

• The AAL care recipients’ conditions change over the years.
• With this change, the degree of physical activity may decline and simultaneously their cognition and self-judgment ability may also decline.

*Cluster analysis on aging of Japanese male (H. Akiyama)*

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>13-65</td>
<td>19%</td>
</tr>
<tr>
<td>66-68</td>
<td>19%</td>
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<tr>
<td>84-86</td>
<td>11%</td>
</tr>
<tr>
<td>87-89</td>
<td>11%</td>
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</tbody>
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- Resilient (10.9%)
- Early Decline (19.0%)
- Gradual Decline (70.1%)
Considerations necessary in the context of AAL: Prior consent

• Since many AAL systems use the user's personal data to provide services to the AAL care recipient, the consent should be obtained in advance regarding the use of AAL system.

• No matter what level the AAL care recipient is, the principle of protecting the dignity of that person shall not be violated.

• For level 0 AAL care recipient, the prior consent of the user can be obtained without problem.

• In the case of Level 3 AAL care recipient, it is appropriate to seek the consent of not only the AAL care recipient but also of designated parties such as family members or other substitute decision makers.
Considerations necessary in the context of AAL: Autonomy or safety

• All individuals have the right to engage in activities that may put themselves at risk.

• However, as cognition declines, users may make a request of a system that puts their own safety at a higher level of risk and the AI must determine if the level of risk is still appropriate before acting while maximizing the user’s autonomy.

• The AAL care recipient requests assistance to go for a walk outside on a cold day,

• the AI system must decide:
  • to allow this request without notification to other family members (respecting autonomy and privacy); or
  • to reject this request for the safety of the AAL care recipient.
Considerations necessary in the context of AAL: Fail safe

• When the “Personal Health check” system asks to dispatch a homecare nurse to visit the patient,
• At the same time if the Wandering Detection and Diversion system locks the door of the person’s house,
• What will happen?

• Multiple AAL systems operate simultaneously for the AAL care recipient must not be independent but communicate each other and operate based on the principle of Fail Safe.
Conclusions: The Needs of developing guidance document for the use AI in AAL

• The use of AI in AAL must consider ethical considerations such as privacy, accountability, safety and security, transparency and explainability, fairness and non-discrimination etc. that are provided by various standards and consortia activities.

• In addition, the use of AI in AAL must take into account declines of physical, cognitive and/or self-judgment abilities of AAL care recipients.

• SyC AAL needs to develop an ethical document treating issues such as who to ask prior consent, balance between safety and autonomy, and fail safe.
Thank you!