Standards and guidelines on SHAFE

Report

International Interdisciplinary Network on

Smart Healthy Age-Friendly Environments | NET4Age-Friendly

COST Action 19136 (2020-2024)

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EXECUTIVE SUMMARY

This report reflects the results of a desk research in different European and international online resources regarding guidelines and standards that may be applicable for the implementation of Smart Healthy Age-Friendly Environments (SHAFE). The desk research and report were supported as a virtual mobility grant. I am grateful for this opportunity.

CONTENTS

1. INTRODUCTION

From March till the end of April 2024, Willeke van Staalduinen performed a desk research - secondary research, performed online – on the topic of existing standards and guidelines for Smart Healthy Age-Friendly Environments (SHAFE). COST Action 19136 supported one of the members through a Virtual Mobility (VM) Grant to perform this task. The purpose of this grant was to collect existing standards and guidelines that support the implementation of SHAFE, which will be included in the final deliverable of the COST Action: the Reference Framework.

This report is accompanied by the Excel file "Overview existing SHAFE Standards and guidelines'. The Excel file is available [here]. This report starts with a description of the methodology and further provides an overview of the main findings.

2. CONCEPTS AND METHODOLOGY

To guide the reader, it is worth first presenting some basic definitions concerning standards and guidelines for Smart, Healthy, Age-Friendly Environments (SHAFE).

A **standard** is "a document that provides requirements, specifications, guidelines or characteristics that can be used consistently to ensure that materials, products, processes and services are fit for their purpose".[1]

"Standards allow technology to work seamlessly and establish trust so that markets can operate smoothly. They:

- provide a common language to measure and evaluate performance,
- make interoperability of components made by different companies possible, and
- protect consumers by ensuring safety, durability, and market equity."

A **guideline** is "information intended to advise people on how something should be done or what something should be".[2]

Even if, in some cases, these concepts may be interlinked, the main difference is that standards are higher in authority and limited in application, while guidelines are lower in authority and usually more general in their application.[3]

Smart Healthy Age-Friendly Environments (SHAFE) are "smart, adaptable and inclusive solutions that can help improve and support independent life throughout the course of life, regardless of age, gender, disabilities, cultural differences and personal choices."[4]

Based on this conceptualisation, desk research was performed, with results limited to those from 2014 to 2024.

The relevant SHAFE stakeholders that may use the standards and guidelines presented as results of this desk research are the defined personas in Working Group 5:

- SHAFE Health & Social Care: professional carers providing or coordinating the provision of health and social care services to people.
- SHAFE Policymakers at all geographical levels: people who contribute to the definition of public policies, strategies and funding programmes.

- SHAFE Multi-disciplinary project teams: groups of practitioners from multiple domains involved in designing, planning, implementing, integrating and maintaining SHAFE.
- SHAFE Promoters/developers: People or companies developing a building or a service to be used by people.

The desk research started with collecting standards organisations. Standards' information was obtained from the standardisation organisations CEN CENELEC, ISO, ETSI, IEEE, ANSI, AFNOR and DIN.

The desk research started with an in-depth search of the publications of the World Health Organization in the IRIS library[5] with the terms "age-friendly environments", "smart&healthy", and "built healthy". The global search delivered 7,190 results, and about 2,000 were evaluated for relevancy for SHAFE. The search was narrowed to focus on the publications from the WHO Regional Office for Europe (results 855). 100 WHO publications were evaluated as standards and guidelines applicable to the implementation of SHAFE and are listed in the Excel file.

The second broader search was conducted using the CORDIS files.[6] The search terms "standard&smart", "standard&built", "standard&healthy", "guideline&smart", "guideline&healthy", and "guideline&built" were used to search the project results of the CORDIS database. The first query showed a result of 2317. By adding domains of application it, the total results were narrowed to 700. A total of 79 relevant standards and guidelines were reported in the project results.

Additionally, standards and guidelines were found in the United Nations Sustainable Development Goals, Eurofound, and European Observatory. Digital Watch Standards guide the manufacture and use of digital devices and services.

Other searches were less successful. The Centre for Digital Built Britain does not exist anymore. The standards in the United Nations [7] concern the UN Standard Products and Services Code (UNSPC), which is a global classification system of products and services.

The results of this search were organised with two existing frameworks related to SHAFE. Since 2020, COST Action NET4Age-Friendly has worked on an ontology of SHAFE. A glossary has been developed consisting of 43 definitions (see Annex 1). To categorise the desk research findings, each entry has been tagged with one item in the glossary. Additionally, the entries have been tagged in a different column to connect the results to the social innovation Coordination and Support Action SIRENE.[8]

3. RESULTS

3.1 Standards

This section gives an overview of different organisations that offer standards.

CEN, the European Committee for Standardization, is an association that brings together the National Standardization Bodies of 34 European countries.[9] CENELEC is the European Committee for Electrotechnical Standardization.[10] CEN and CENELEC do not distribute or sell standards. They direct the reader to the CEN National Members, CEN affiliates, CENELEC National Committees, and CENELEC Affiliates.[11] The members or affiliates publish information on standards in their national languages. CEN-CENELEC topics[12] are the following:

- Accessibility
- Artificial intelligence

- Ecodesign, energy labelling and material efficiency
- Energy efficiency and management
- Environment and sustainability
- Organ on chip
- Personal protective equipment
- Public procurement
- Quantum technologies
- Smart grids and meters
- Smart manufacturing

CEN and CENELEC each divide the standards into CEN or CENELEC sectors. Such as CEN: construction, healthcare, household appliances, digital society or CENELEC sectors: Electric equipment and apparatus, lighting equipment and electric lamps, but also healthcare and household appliances.[13], [14]

The International Organization for Standardization has developed over 25,321 International Standards, all of which are included in the ISO Standards catalogue.[15] The ISO standards have been categorised into 40 groups. The SHAFE-relevant standards have been further detailed and linked in the Excel file. The standards can be purchased.

The IEEE Standards Association (IEEE SA)[16] is a leading consensus-building organisation that nurtures, develops and advances global technologies through IEEE. IEEE offers standards for interactive cityscapes, soccer stadiums, vaccination, healthcare and capabilities.[17] The standards can be purchased.

The American National Standardization Institute offers Standards Packages, such as medical devices, quality management, occupational health and safety. The Excel file further details the SHAFE-relevant standards that can be purchased from ANSI.[18]

ETSI (European Telecommunications Standards Institute) provides members with an open, inclusive and collaborative environment. This environment supports the timely development, ratification and testing of globally applicable standards for ICT-enabled systems, applications and services.[19] ETSI has grouped standards in different collections. For example: Home & Office, Better Living with ICT, Interoperability, Public Safety and Security.[20] ETSI offers standards for free download.

The AFNOR Group[21] designs and deploys solutions based on voluntary standards around the world. The Group serves the general interest in its standardisation activities and provides services such as training, information and intelligence, assessment and certification. They offer a search functionality to identify standards per geographic zone, country, thematic or collection names.[22] The standards can be bought.

DIN, the German Institute for Standardization, is the independent platform for standardisation in Germany and worldwide.[23] DIN Standards are the results of work at national, European and/or international levels. Anyone can submit a proposal for a new standard. Once accepted, the standards project is carried out according to set rules of procedure by the relevant DIN Standards Committee, the relevant Technical Committee of the European standards organisation CEN (CENELEC for electrotechnical standards) or the relevant committee at the international standards organisation ISO (IEC for electrotechnical projects). DIN offers standards to purchase.

3.2 Guidelines

Multiple guidelines would fit the field of SHAFE, and they can be found in many places. Related to SHAFE, the IRIS database of the WHO[5] and CORDIS[6] databases proved to be most appropriate. In the Excel file, the links to the SHAFE-relevant publications are provided.

3.3 Overview of SHAFE related standards and guidelines

The guidelines and standards are reported in the accompanying Excel file, which has 215 entries. According to the SHAFE ontology, they are grouped in the following way (see Table 2). Sometimes, the standards and guidelines overlap. The choices were based on the description of the entries.

Glossary item SHAFE	Number of entries
Ageing	5
Building	7
Caregiver	3
City	21
Computer	1
Disease	14
Education	18
Ethic	13
Healthcare	43
Housing	4
Industry	3
Interoperability	1
Medical science	1
Outdoor	1
People	2
Policymaker	2
Security	3
Sustainability	30
Technology	31
Transportation	4
Wellbeing	8
TOTAL	215

Table 1: Identified categories according to SHAFE ontology

Below, the categories are described shortly. Per category, the main SHAFE stakeholders are added.

3.3.1 Ageing

The ageing category includes standards and guidelines that focus on assistive technology for independent living, intergenerational connectivity, and the engagement of older workers.

These standards and guidelines are specifically of interest for the SHAFE health and social care professionals and SHAFE promoters/developers.

3.3.2 Building

Building standards and guidelines in this overview focus on workplaces, construction materials and building, heritage, energy-saving buildings and the use of online tools.

These standards and guidelines are specifically interesting for SHAFE promoters/developers and the SHAFE multidisciplinary teams.

3.3.3 Caregiver

The standards and guidelines regarding caregivers pay attention to strengthening the health and care workforce by education, determinants of health and promoting the investment in the health and care workforce by enhancing the efficiency of spending and rethinking domestic and international financing.

These standards and guidelines are specifically interesting for SHAFE health and care professionals, especially in maintaining their own health or for employers in the sector.

3.3.4 City

The city entries concentrate on (green) environment and health in European cities, the livability of cities, empowerment of citizens, smart cities and communities, urban agriculture, sustainability, transportation (including digitalisation), changing populations (more older people) and urban planning.

These standards and guidelines will interest SHAFE policymakers, SHAFE promoters/developers, and SHAFE multidisciplinary teams.

3.3.5 Computer

The entry on computer technology is a standard collection from IEEE and includes 1401 results.

This standard is most appropriate for SHAFE developers.

3.3.6 Disease

Obesity prevention is the main focus of the entries with the tag disease. Other main topics are guidelines regarding people with disabilities and prevention from mental health issues.

All SHAFE stakeholders could be interested in these standards and guidelines.

3.3.7 Education

On the one hand, the entries tagged with education focus on training construction professionals to use ICT tools or to apply green principles, such as energy saving. Training also focuses on helping employees gain skills to fulfill their jobs for longer. Another aspect is training for younger people, such as sports and health emergencies. The last group of entries focus on citizen engagement: evidence-informed policy-making or meaningful engagement of living with noncommunicable diseases or mental health conditions. ISO also developed standards on education, learning and training.

The standards and guidelines are of specific interest for SHAFE citizens, SHAFE promoters/developers, and SHAFE policymakers.

3.3.8 Ethics

The entries tagged with "ethics" focus on one hand on ethics in developing or applying technological solutions. In the sense of the definition of ethics in "right or wrong", a second group of entries focus on health inequities. To be more specific: these entries focus on reducing inequities in health across the life course and monitoring social determinants of health equity.

This group of standards and guidelines are dedicated to SHAFE health and social care professionals, SHAFE policymakers and SHAFE promoters/developers.

3.3.9 Healthcare

The largest group of entries tagged with healthcare can be divided into the following categories: 1. Prevention (mental, physical activity, public health, resilience and empowerment) 2. Health technologies, 3. Integrated care and dignity, 4. Health literacy, 5. Health and care systems and organisation, 6. Monitoring and health impact assessment, 7. Healthy cities and age-friendly environments. IEEE scored 4652 results on healthcare IT.

These standards and guidelines are of specific interest to SHAFE health and social care professionals, SHAFE policymakers and SHAFE promoters/developers. Also SHAFE multidisciplinary teams can benefit from it.

3.3.10 Housing

Housing focuses on policy and cross-border cities and is an exercise in the creation of a virtual environment. The link to standards on Domestic and commercial equipment is provided. SHAFE promoters and developers will be interested.

3.3.11 Industry

Standards and guidelines for industry include rural entrepreneurship only. SHAFE multidisciplinary teams and SHAFE promoters/developers will be interested.

3.3.12 Interoperability

ETSI provides standards on interoperability in the fields of eHealth, Internet of Things and Smart Cities.

This contribution is most appropriate for SHAFE developers.

3.3.13 Medical science

The entry on medical science focuses on evidence on how physical and emotional stress can have an impact on cognition, triggering the release of hormones that act on a specific part of the brain. SHAFE health and social care professionals are the involved stakeholders.

3.3.14 Outdoor

The single outdoor entry sheds light on the connection between the improvement of an area and resulting gender relations. The SHAFE multidisciplinary teams will be interested.

3.3.15 People

Social movements, local action and participatory health research with migrants regard the standards and guidelines on people.

SHAFE policymakers and SHAFE health and social care professionals will benefit from these standards and guidelines.

3.3.16 Policymaker

SHAFE policymakers will be interested in these standards and guidelines regarding better economic forecasting and promoting health policies at the local level.

3.3.17 Security

Standards from ANSI and ETSI provide information on societal security, public safety, cybersecurity, artificial intelligence, Internet of Things.

These standards may be interesting for SHAFE developers.

3.3.18 Sustainability

The standards and guidelines tagged with sustainability focus on health and environment, energy efficiency, social innovation, outdoor air quality, sustainable development goals and their impacts, involving older people, urban green and blue values, waste management and circular economy.

All SHAFE stakeholders will be interested in these standards and guidelines.

3.3.19 Technology

Technology to support workers, making healthier food choices, social interaction, public services, climate and water resilience, smart sitting, construction decisions, promotion of physical activity, mental health, health data and information systems. Web portals for Digital standards and Standards in Europe are added in this group. SHAFE promoters and developers are the main interest group.

3.3.20 Transportation

Standards and guidelines in this category provide information on buses of the future, wheelchair friendly cars and smart and sustainable mobility.

SHAFE promoters and developers are the main interest group of this category.

3.3.18 Wellbeing

Wellbeing is the last group of standards and guidelines. Wellbeing at work, integrating wellbeing in public health, social prescribing and mental health are the topics.

SHAFE health and social care professionals are the main group of interest.

4. CONCLUSION

This desk research has been performed to provide extra input to the Reference Framework and its modules. The acquired knowledge can be added to the modules in the appearance of good practices or further reading.

This database will be further sustained in the results of the COST Action NET4Age-Friendly and the CSA project SIRENE.

5. RESOURCES

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ANNEX 1: GLOSSARY OF SHAFE ONTOLOGY

GLOSSARY OF THE ONTOLOGY ON SHAFE	
acceptance	a disposition to tolerate or accept people or situations
aging	the organic process of growing older and showing the effects of increasing age
building	a structure that has a roof and walls and stands more or less permanently in one place
caregiver	a person who is responsible for attending to the needs of a child or dependent adult
citizen	a native or naturalized member of a state or other political community
city	a large and densely populated urban area
comfort	a state of being relaxed and feeling no pain
community	a group of people living in a particular local area
computer	a machine for performing calculations automatically
computer science	the branch of engineering science that studies (with the aid of computers) computable processes and structures
courtyard	an area wholly or partly surrounded by walls or buildings
device	an instrumentality invented for a particular purpose
disease	an impairment of health or a condition of abnormal functioning
doctor	a licensed medical practitioner
education	the activities of educating or instructing
emergency	a sudden unforeseen crisis (usually involving danger) that requires immediate action
ethic	the principles of right and wrong that are accepted by an individual or a social group
family	primary social group
friend	a person you know well and regard with affection and trust

health professional	a person who helps in identifying or preventing or treating illness or disability
healthcare	the preservation of mental and physical health by preventing or treating illness through services offered bt the health professional
housing	structures collectively in which people are housed
impairment	the condition of being unable to perform as a consequence of physical or mental unfitness
industry	the people or companies engaged in a particular kind of commercial enterprise
interoperability	the ability to exchange and use information
medical science	the science of dealing with the maintenance of health and the prevention and treatment of disease
neighbor	a person who lives (or is located) near another
nurse	one skilled in caring for young children or the sick (usually under the supervision of a physician)
outdoor	located, suited for, or taking place in the open air
patient	a person who requires medical care
people	any group of human beings (men or women or children) collectively
place	any area set aside for a particular purpose
policy maker	someone who sets the plan pursued by a government or business etc
privacy	the quality of being secluded from the presence or view of others
researcher	a scientist who devotes himself to doing research
safety	the state of being certain that adverse effects will not be caused by some agent under defined conditions
security	the state of being free from danger or injury
sensor	any device that receives a signal or stimulus (as heat or pressure or light or motion etc
sustainability	the property of being sustainable
technology	the practical application of science to commerce or industry
terrace	usually paved outdoor area adjoining a residence
transportation	a facility consisting of the means and equipment necessary for the movement of passengers or goods
wellbeing	a contented state of being happy and healthy and prosperous

ANNEX 2: REPOSITORY OF SIRENE

REPOSITORY OF SIRENE
Community interventions
Health and social care
Housing
Policy and funding
Urban transformation
ICT for independent living
Information technology