DIGITAL LITERACY OF SENIORS IN THE CONTEXT OF THE ELECTRONIC HEALTH RECORD

C. Gellner[1], L. Perotti[2], A. Koppenburger[3], I. Buchem[1], M. Dietrich[4], A. Heimann-Steinert[2]

[1]Berliner Hochschule für Technik (previous Beuth University of Applied Sciences Berlin) (GERMANY), [2]Charité – Universitätsmedizin Berlin (GERMANY),
[3]RWTH Aachen University (GERMANY), [4]Deutsches Forschungszentrum für Künstliche Intelligenz GmbH (DFKI) (GERMANY)

BHT Berliner Hochschule für Technik | CHARITÉ UNIVERSITÄTSMEDIZIN BERLIN | RWTHAACHEN UNIVERSITY | DFKI | iCERi 2021 | ePA coach | Federal Ministry of Education and Research

INTRODUCTION

The introduction of the **electronic health record** (EHR) (German: Elektronische Patientenakte, ePA) in 2021 as a service offered by health insurance companies is intended to ensure all relevant patient health data availability during treatment. **The use** of this digital service **depends on the digital literacy of the citizens**. For **older people**, who often have less experience using digital technologies, the electronic health record may be a **challenge for digital sovereignty** in the sense of equal participation in the health care system.

The **ePA-Coach project** addresses this problem and aims to develop an **interactive learning platform** to support the DIGITAL LITERACY **of** older people for the competent and self-determined use of the ELECTRONIC HEALTH RECORD.

We describe the **initial** COMPETENCY MODEL, which was developed based on the European Digital Competence Framework (DigComp).
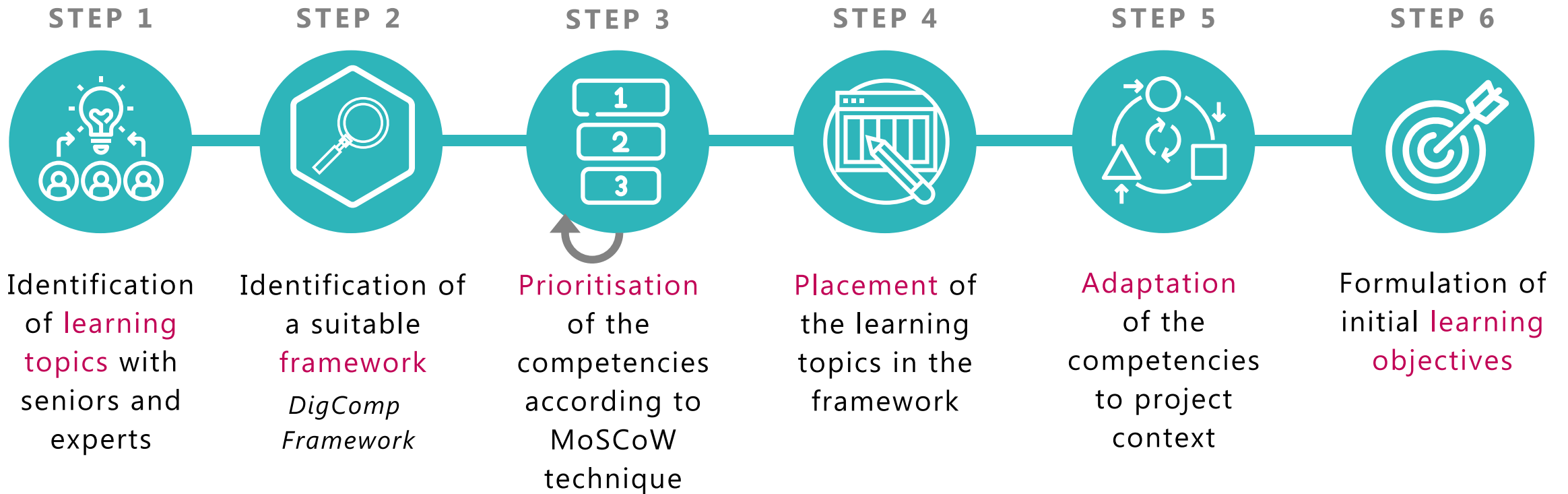
DIGITAL LITERACY AND THE DIGCOMP FRAMEWORK

Various terms for DIGITAL LITERACY appear in literature, such as media literacy, information literacy or computer literacy. Digital literacy is usually framed in the context of the effective use of information and communication technology (ICT), and comprises several literacies[7]
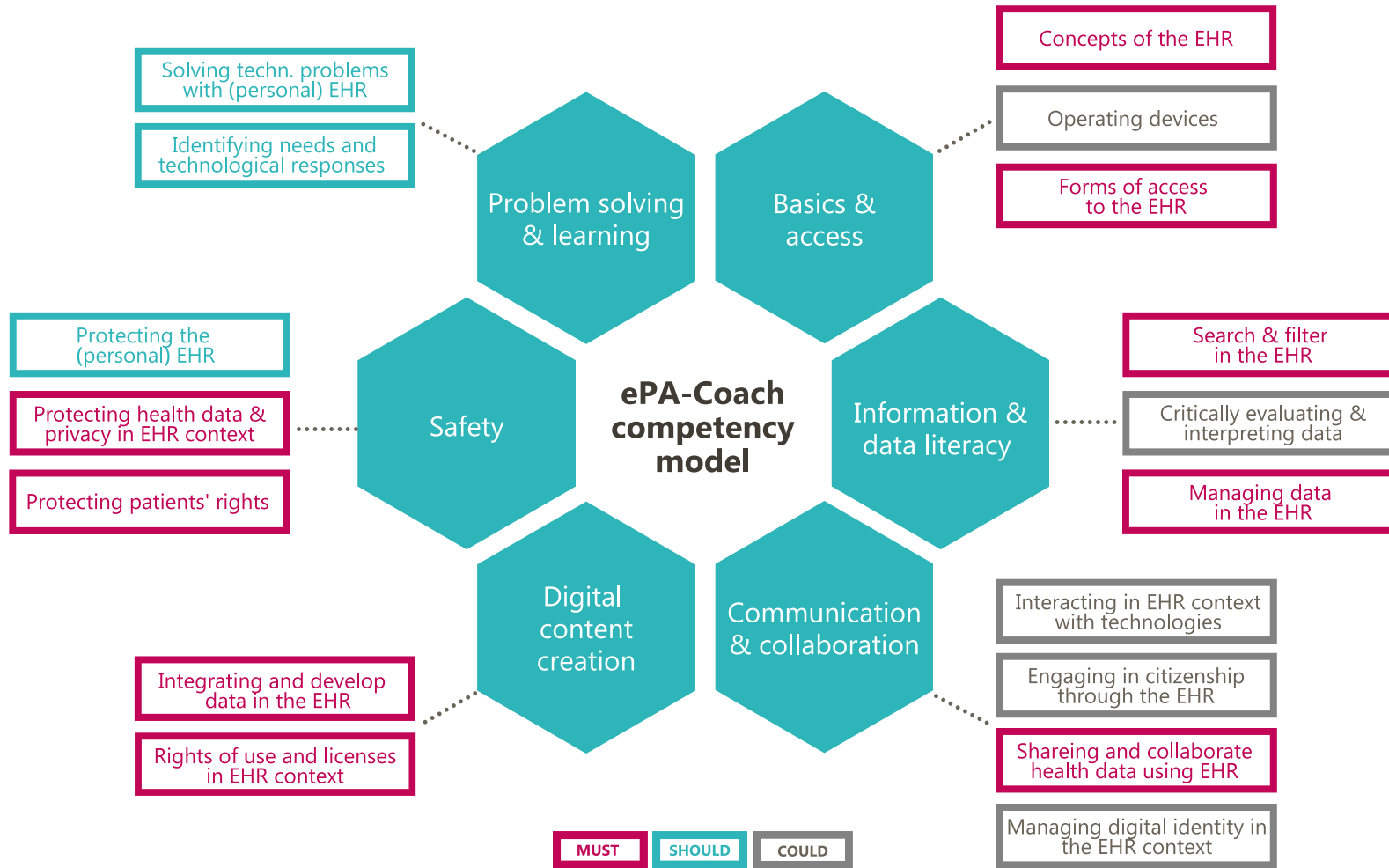
DIGCOMP – EUROPEAN DIGITAL COMPETENCE FRAMEWORK [9,10,11]

- developed by the European Commission
- 21 competencies - distributed over five competence areas (Version 2.1)
- eight proficiency levels
- Austrian version 2.2 AT include partly adapted, extended, and into German translated competencies

DEVELOPMENT PROCESS

Following the development of the DigComp, the ePA-Coach competency model was developed with several steps and methodologies including stakeholder surveys and experts' option.

STEP 1

Identification of learning topics with seniors and experts

STEP 2

Identification of a suitable framework

DigComp Framework

STEP 3

Prioritisation of the competencies according to MoSCoW technique

STEP 4

Placement of the learning topics in the framework

STEP 5

Adaptation of the competencies to project context

STEP 6

Formulation of initial learning objectives

EPA-COACH COMPETENCY MODEL

ePA
coach

Solving techn. problems with (personal) EHR

Identifying needs and technological responses

Concepts of the EHR

Operating devices

Forms of access to the EHR

Problem solving & learning

Basics & access

Protecting the (personal) EHR

Protecting health data & privacy in EHR context

Protecting patients' rights

Safety

ePA-Coach competency model

Information & data literacy

Search & filter in the EHR

Critically evaluating & interpreting data

Managing data in the EHR

Integrating and develop data in the EHR

Rights of use and licenses in EHR context

Digital content creation

Communication & collaboration

Interacting in EHR context with technologies

Engaging in citizenship through the EHR

Shareing and collaborate health data using EHR

Managing digital identity in the EHR context

MUST   SHOULD   COULD

The model extends across all areas of competence of the DigComp and includes 17 competencies with a *must*, *should*, or *could* prioritization. Competences prioritized as *won't* are not included.

The total of 58 learning topics have been assigned to these competencies.

EPA-COACH COMPETENCY MODEL

MUST COMPETENCIES AND LEARNING TOPICS (1)

The ePA-Coach competency model consists of nine *must*-have competencies, each with several learning topics. The learning content for these competencies is the first to be conceptualized and implemented for the ePA-Coach learning application.

Area	ID	Competence	Learning topics
Basics & access	0.1	Understand concepts of the EHR	Basic terms from the EHR context
			Basic functions of the EHR
			Actors of the EHR and their tasks
			Authorized persons for data maintenance
			Data that can be stored in the EHR
			Main components of an EHR
			Differences EHR and PHR
			EHR versions and development steps
			Specific EHR per health insurance fund
	0.3	Know and use forms of access to the EHR	Where can I get the EHR?
			Special apps from the various health insurances
			Forms of access to the EHR
			Authentication (process)
			Logging into the EHR and setting it up
			Personal access & activation process
			Technical access options to the EHR (devices)

EPA-COACH COMPETENCY MODEL

MUST COMPETENCIES AND LEARNING TOPICS (2)

Area	ID	Competence	Learning topics
Information & data literacy	1.1	Searching and filtering data, information and digital content in the EHR	Search and find a document in the EHR Search & filter options in the EHR View a document in the EHR Sort functions
	1.3	Managing data, information and digital content in the EHR	Duration of data storage Requirements for subsequent data entry Deleting documents from the EHR
Communication & collaboration	2.2	Sharing and collaborate of health data through the EHR	Grant access rights for doctors, among others Revoke access rights Manage duration of access rights Data use in the EHR (e.g. for research)

EPA-COACH COMPETENCY MODEL

MUST COMPETENCIES AND LEARNING TOPICS (3)

Area	ID	Competence	Learning topics
Digital content creation	3.2	Integrating and developing digital health data / content in the EHR	Loading documents into the EHR Enter metadata for a document Turn (analogue) documents into usable files Incorporate old health data (e.g. from GDR)
	3.3	Copyright and licenses in the EHR context	Management of access rights Authorized persons for data maintenance Involvement of relatives and deputies Setting up a deputy person
Safety	4.2	Protecting personal data and privacy in the EHR context	Measures to protect sensitive health data
	4.4	Protecting against fraud and abuse of patients' rights in the EHR context	Assess the consequences of data sharing Risk of data misuse and security breaches What are the consequences?

EPA-COACH COMPETENCY MODEL

SHOULD COMPETENCIES AND LEARNING TOPICS

Furthermore, the ePA-Coach competency model consists of three *should*-have competencies and learning topics. The learning content for these competencies will not be developed until the learning content for the must-have competencies is implemented.

Area	ID	Competence	Learning topics
Safety	4.1	Protecting the (personal) EHR	Password creation Consequences of a device loss
Problem solving	5.1	Solving technical problems with the (personal) EHR	Contact person for technical questions about the EHR Problems with the authentication
	5.2	Identifying needs and technological responses in the context of the EHR	Identify responsibilities for the completeness of the correctness of the data Contact for questions regarding the content of the EHR Adjust general settings in the EHR Accessibility (language, font size, brightness etc.)

EPA-COACH COMPETENCY MODEL

COULD COMPETENCIES AND LEARNING TOPICS

Finally, the competency model consists of five could-have competencies and learning topics across three competency areas. The learning content for these competencies will not be developed until the learning content for the must- and should-have competencies is implemented. For some of these competencies, the learning topic assignment did not result in any topics, so that these would still have to be worked out.

Area	ID	Competence	Learning topics
Basics & access	0.2	Operating (patient) devices for the EHR	--
Information & data literacy	1.2	Critically evaluating and interpreting data, information and digital content in the EHR	Check and recognize the correctness of the data Types of health data Methods for decision-making for doctor-dependent relevance of health data
Communication & collaboration	2.1	Interacting in the EHR context with the help of digital technologies	--
	2.3	Engaging in citizenship through the EHR	Health data donation Higher-level competence resulting from the other competencies
	2.6	Managing digital identity in the EHR context	Effects of a change of health insurance Higher-level competence resulting from the other competencies

EPA-COACH *WON'T* COMPETENCIES

The *won't* competencies include **(A)** contents and aspects that are **not given in the context** of the EHR, for example, programming, making sales or protecting the environment. Some of the competencies are rather **(B) general and cross-contextual**, making the ePA-Coach too extensive, e.g. netiquette or health protection. Finally, some competencies seemed **(C) redundant** to other competences to the project consortium in relation to the EHR, e.g. content developing.

Area	ID	Competence	Unsuitable because ...
Communication & collaboration	2.4	Carry out purchases and sales	A
	2.5	Use appropriate forms of expression / Netiquette	B
Digital content creation	3.1	Developing digital content	C
	3.4	Programming	A
Safety	4.3	Protecting health and well-being	B
	4.5	Protecting the environment	A
Problem solving & learning	5.3	Creatively using digital technologies	A, B
	5.4	Identifying digital competence gaps	B

EPA-COACH PROFICIENCY LEVELS

Based on the proficiency levels 1 to 6 of the DigComp framework, three competency levels were derived for the ePA-Coach. Each competency level is based on the level of task **complexity**, the level of **autonomy** needed to complete a task and the **cognitive dimension** involved in solving the task.

Level	Task complexity	Autonomy	Cognitive dimension
Level 1: Beginner	Simple tasks	Independently; with guidance if required	Remember
Level 2: Advanced	Clearly defined tasks; everyday and non-everyday problems	Independently	Understand
Level 3: Expert	Best possible solution for tasks and problems of any kind	Guide others; able to adapt to the needs of others	Apply, evaluate

The implementation of the learning content for **level 1** is oriented towards the instructional paradigm and primarily covers the basics on the respective topic. On the other hand, the learning contents for **levels 2 and 3** deepen from the first level and are implemented in an **application-oriented manner** and orientation to the problem-solving paradigm [16].

EXAMPLE: *UNDERSTANDING CONCEPTS OF THE EHR*

Taking the example of competence *0.1 Understanding concepts of the EHR*, the assigned topics of this competence were specified, resulting in a total of nine learning topics. These topics were assigned to the three competence levels and in a further step initial learning objective were formulated. This competence covers rather general information about the EHR.

	Level 1: Beginner	Level 2: Advanced	Level 3: Expert
Learning topics	Basic terms in the EHR context Basic functions of the EHR Actors of the EHR and their tasks	Authorized persons for data maintenance Data that can be stored in the EHR Main components of the EHR	Differences EHR and PHR EHR versions and development steps Specific EHR per health insurance
Learning objectives	The learner is able to … … associate the most important terms in the EHR context with their meanings. … list the basic functions of the EHR. … name actors of the EHR and allocate their scope of tasks in the EHR context.	The learner is able to … … identify actors and persons generally authorized to maintain data. … give examples of health data stored in the EHR. … derive main components of an EHR.	The learner is able to … … distinguish an EHR from an PHR. … allocate EHR versions and development steps to the respective years.

CONCLUSIONS

This presentation showed the initial version of the ePA-Coach competency model for **supporting digital literacy and sovereignty of the senior citize**ns which aims to support competent and self-determined use of the electronic health record (EHR).

The model was **developed based on the European Digital Competence Framework** (DigComp), learning topic identification within the requirements analysis with the target group, experts and the project consortium, and prioritization and adaptation of the competencies of the DigComp framework to the project context.

ePA-Coach competency model includes ...

- 17 corresponding to the MoSCow technique prioritized **competencies** (must=9, should=3, could=5)

- 58 learning topics distributed to these competencies

- three proficiency levels *beginner*, *advanced* and *expert*

CONCLUSIONS: FURTHER STEPS

... *in the ePA-Coach project*:

- Iterative evaluations, optimization and extension of the model

- Formulation of learning objectives for all competencies and the development of learning content

---

... *in research*:

- ePA-Coach competencies are **primarily adapted to the topic of the EHR**, not concretely to the target group → **future research** could address **different digital literacy needs of younger and older people** concerning the HER

- **Process** for developing the ePA-Coach competency model **could be repeated** at a later stage when the EHR is more established in Germany

- Current version of the ePA-Coach competency model could **help researchers and educators develop digital literacy interventions**

REFERENCES

(1)   L. Floridi, *The Onlife Manifesto*. Cham: Springer International Publishing, 2015.

(2)   J. Pohle, 'Digitale Souveränität', in *Handbuch Digitalisierung in Staat und Verwaltung*, T. Klenk, F. Nullmeier, and G. Wewer, Eds. Wiesbaden: Springer Fachmedien, 2020.

(3)   A. Pott, 'EHR and PHR : Digital records in the German healthcare system', Mar. 2019. https://www.gesundheitsindustrie-bw.de/en/article/news/ehr-and-phr-digital-records-in-the-german-healthcare-system (accessed Apr. 15, 2021).

(4)   Bundesministerium für Familie, Senioren, Frauen und Jugend. „Ältere Menschen und Digitalisierung. Erkenntnisse und Empfehlungen des Achten Altersbericht," Berlin, 2020.

(5)   D. Schaeffer *et al.*, 'Gesundheitskompetenz der Bevölkerung in Deutschland vor und während der Corona Pandemie: Ergebnisse des HLS-GER 2', report, 2021.

(6)   U. Felt, S. Öchsner, and R. Rae, 'The Making of Digital Health: Between Visions and Realizations', in *Digitaler Humanismus Menschliche Werte in der virtuellen Welt*, J. Fritz and N. Tomaschek, Eds. Münster New York: Waxmann, 2020.

(7)   T. Koltay, 'The media and the literacies: media literacy, information literacy, digital literacy', *Media, Culture & Society*, vol. 33, no. 2, pp. 211–221, 2011, doi: 10.1177/0163443710393382.

(8)   I. Mariën, D. Baelden, and C. Iordache, 'Developing Digital Skills and Competences: A Quick-Scan Analysis of 13 Digital Literacy Models', *Italian Journal of Sociology of Education*, vol. 9, no. 02/2017, pp. 6–30, 2017, doi: 10.14658/pupj-ijse-2017-1-2.

(9)   S. Carretero Gomez, R. Vuorikari, and Y. Punie, *DigComp 2.1: The Digital Competence Framework for Citizens. With eight proficiency levels and examples of use*. Luxembourg: Publications Office of the European Union, 2017.

(10)   Bundesministerium für Digitalisierung und Wirtschaftsstandort, 'Digitales Kompetenzmodell für Österreich. DigComp 2.2 AT', Wien, 2018.

(11)   European Commission, 'DigComp Gallery of Implementations', *European Commission*, 2020. https://ec.europa.eu/jrc/en/digcomp/implementation (accessed Sep. 16, 2021).

(12)   L. Perotti and A. Heimann-Steinert, 'Promoting Self-determined and Informed use of Personal Health Records (PHR) among Older Adults: Assessment of Attitudes Towards the PHR and Requirements for an eLearning Platform', preprint, Feb. 2021. doi: 10.21203/rs.3.rs-150958/v1.

(13)   S. Stoyanov, J. Janssen, and Institute for Prospective Technological Studies, *Online consultation on experts' views on digital competence.* Luxembourg: Publications Office, 2013.

(14)   A. Ferrari, Y. Punie, B. N. Brečko, and Institute for Prospective Technological Studies, *DIGCOMP: a framework for developing and understanding digital competence in Europe.* Luxembourg: Publications Office, 2013.

(15)   A. Hudaib, R. Masadeh, M. H. Qasem, and A. Alzaqebah, 'Requirements Prioritization Techniques Comparison', *MAS*, vol. 12, no. 2, p. 62, Jan. 2018, doi: 10.5539/mas.v12n2p62.

(16)   S. Blömeke and C. Buchholtz, 'Veränderung von Lehrerhandeln beim Einsatz neuer Medien. Design für die theoriegeleitete Entwicklung, Durchführung und Evaluation einer Intervention', *MedienPädagogik*, no. MedienPäd.Retro: Jahrbuch Medienpädagogik 5 (2005), pp. 91–106, 2017, doi: 10.21240/mpaed/retro/2017.09.06.X.

CONTACT & ACKNOWLEDGEMENTS

Carolin Gellner
Berliner Hochschule für Technik
Research Associate
M.Sc. Computer Science and Digital Media
carolin.gellner@bht-berlin.de

Anika Heimann-Steinert, PhD
Charité - Universitätsmedizin Berlin / Geriatrics Research Group
Head of Working Group "Aging & Technology"
Project coordinator ePA-Coach
anika.heimann-steinert@charite.de