

Digital Skills Workshop: Modelling, Capturing, Cataloguing, Processing and Certification

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The use of digital technologies in the education system and its administrative institutions promotes greater permeability and transparency in the certification of acquired competences and/or qualifications. More and more learning scenarios are being implemented digitally and outside of formal education. At the same time, *blended learning* formats and pure online learning platforms are increasingly establishing themselves in formal educational settings. Considering this development, it is a major disadvantage for educational institutions, teachers and learners, if competency-based credentials or qualification certificates continue to be issued exclusively as paper-based or electronic documents (e. g. scan or PDF). At the same time, such certificates represent a challenge for machine processing, as they do not allow connection to the *semantic web* and thusly slow down progress in the digitisation of higher education institutions (teaching, administration). For classical proofs, manual steps of interpretation are necessary to determine to what extent someone fulfils the competence/qualification requirements for a subsequent module, course, or workplace. Due to the growing diversity of learners and the world of work, simple credentials and certificates as described above are no longer sufficient.

The main scientific challenges in the modelling of semantic competence definitions are

- The development of decentralised expandable, application-oriented schemes for the description of competencies,
- Granularity of modelling,
- The use of *semantic web* technologies for cross competence framework networking and similarity determination of competences,
- The consideration of the requirements of the educational system and the world of work for the fit of individual educational biographies, acquired competences and job requirements,
- The use of *machine learning* for semi-automated generation of semantic competence models.

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Some solutions exist, for example for semantic modelling⁶ and for linking educational qualifications and job requirements⁷. The continuous use of the existing partial solutions from the beginning of an educational career, through entry into working life and continuing throughout lifelong learning enables individual (automated) recommendations for competence development and job placement.

Digital credentials based on open, metadata-based standards, such as Open Badges or blockchain-based certifications of acquired competences and/or qualifications, are flexible enough to validate and recognise successes in all forms of learning. Additionally, digital, metadata-capable verification formats can be combined with semantic technologies in order to recognise and relate competences and to compare competence/qualification profiles. The application of such methods across domain boundaries (including so-called soft skills) and across languages, is a challenge that computer science, especially the disciplines of graph theory, semantic technologies and machine learning, have been addressing in the recent years. The interdisciplinary cooperation with researchers specialising in digital tools for competence tests (e. g. e-assessments) and educators has been advancing related research.

In the third edition of this workshop at DELFI 2020, the following topics, among others, were presented and discussed in the online workshop (original titles, followed by article language DE/EN):

- Eine Neuausrichtung universitären Lehrens, Prüfens und Zertifizierens im digitalen Zeitalter (DE)
- *Skills-Matching* und *Skills Intelligence* durch kuratierte und datengetriebene Ontologien (EN)
- Competency Mapping 3.0 (DE)
- Taxonomic Competence Modelling – Observations from a Hands-on Study and Implications for Modelling Strategies (EN)
- Semantic Competence Modelling – Observations from a Hands-on Study with HyperCMP Knowledge Graphs and Implications for Modelling Strategies and Semantic Editors (EN)
- Automatisierte Extraktion semantischer Kompetenzbeschreibungen am Beispiel von deutschsprachigen Modulbeschreibungen aus der Hochschullehre (DE)

The submitted papers were peer reviewed by at least two researchers in the field as specified in the Call for Papers⁸. Accepted contributions are published in this volume.

⁶ Schema.org Alignment: <https://schema.org/AlignmentObject> , Retrieved 21/07/2020

⁷ European Skills/Competences, qualifications and occupations framework, <https://ec.europa.eu/esco/portal/howtouse> , Retrieved 21/07/2020

⁸ Official Workshop website <https://projekt.beuth-hochschule.de/delfi-wsdq/> Retrieved 21/07/2020