ARISE digital skills maturity model

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This article focuses on a digital skills maturity model for applied digitalisation in sync with application of sustainable energy skills in construction works. This model was developed as a part of the ARISE project, it served as a basis for development of a task-based upskilling qualification framework for renewable energy skills with digitalization and applied use of the Building Information Model as an accelerator.

The skills maturity analysis model is intended for individuals and organisations, so that they can gain a clear view on how to proceed in the next steps of applied digitalisation. The model connects maturity levels for digitalisation to recommended skill-levels for different involved professions. This gives organisational leaders a view on what their employees will have to learn in order to make the organisation grow towards the next level of applied BIM and digitalisation. The model is integrated within the BUILD UP Skills advisor-app to advise learners on personalised learning pathways. These pathways are generated based on data from a self-assessment in this app. For companies a group assessment can be done by collating the self-assessments of the individuals in a group.

The skills maturity model addresses four professional groups (designers, contractors, clients, and public administration) active in the building life cycle

(design, construction, operation). In this way, the recommended level of proficiency for each professional involved is mapped for each maturity level.

Digitalisation in Construction ambition levels					
Ambition level	Level 0 Fundamentals	Level 1 Data and processess internally	Level 2 Digital collaboration in projects	Level 3 Digital collaboration between projects	Level 4 Digital collaboration in digital data ecosystem(s)

Figure 1. The ARISE maturity levels for applied digitalisation

To give an in-depth recommendation ARISE works for each maturity level with a set of 18 related specialisms. The definition of these specialisms is based on 4 main categories where most digitisation skills will take root:

1. BIM Basics (BB)
2. BIM Application (BA)
3. BIM Utilisation (BU)
4. BIM Support (BS)

These categories are interdependent as is shown in Figure 2.

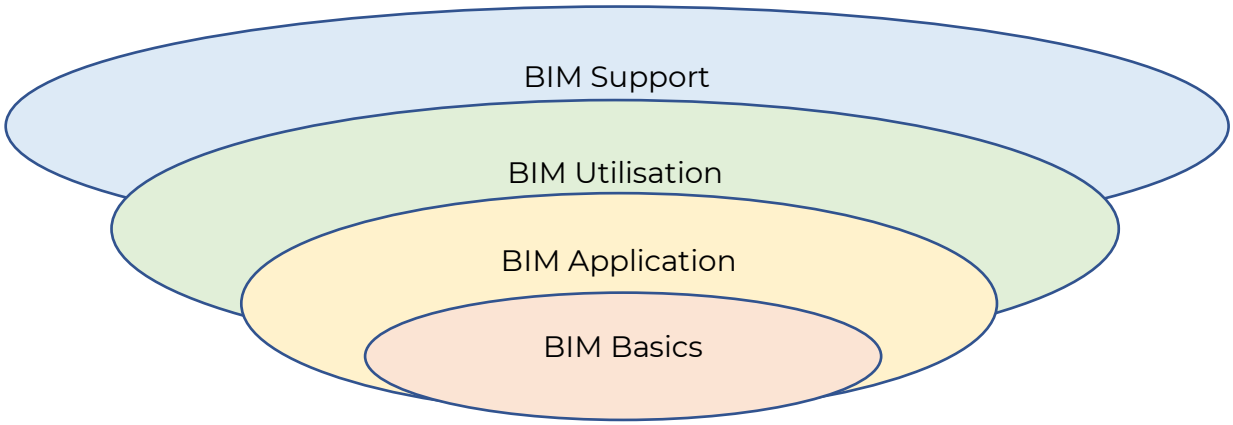


Figure 2. ARISE categories of digitalisation specialisms

For each specialism the ARISE team in dialogue with experienced frontrunners decided to what extent each professional should be able to master the specialism. After all, not all professions are expected to acquire a similar level of skills for all the identified specialisms (Cromwijk, 2022). For each of the 4 maturity levels, each specialism and each group of professions a recommendation for the required skill level is given.

			Designers				Contractors							
Code	Specialism	Description	Architect				Project Manager				Forperson			
			D1				Co1				Co2			
			1	2	3	4	1	2	3	4	1	2	3	4
BB	BIM Basics													
BB-1	BIM Basics	Basic understanding of BIM	1	3	4	5	1	3	4	5	1	3	4	5
BA	BIM Application													
BA-1	BIM Management (Strategic)	Management (strategic) level. Focus on BIM-implementation in the organization. Creates conditions to use BIM in projects and implements (BIM) lessons learnt from projects. Relevant labels: BIM implementation plan, BIM work method …	1	3	4	5	1	3	4	5	0	0	1	1
BA-2	BIM Management (Project)	Management (project), BIM-process level. Focus on BIM aspects of project management. Relevant labels: BIM/Information protocol, EIR, BIM Execution Plan, data drops …	2	2	3	4	2	2	3	4	0	0	1	1
BA-3	BIM Coordination	Technical, BIM-process level. Focus on BIM use in projects and coordination of models. Relevant labels: model checking, clash control, model federation, open/closed BIM, BCF …	0	1	2	2	0	1	2	2	0	0	1	1
BA-4	BIM Modelling	Technical level. Focus on vocation specific BIM-creation. Relevant labels: objects, families, discipline models, aspect models …	1	3	4	5	0	0	1	1	0	0	1	1
BA-5	BIM Engineering	Technical level. Focus on vocation specific use (I/O) of information in BIM. Relevant labels: properties, parameters, discipline models, aspect models …	0	1	2	2	0	1	2	2	0	1	2	2
BA-6	BIM Programming	Technical level (note: might be a different 'technical' than in previous specialisms). Focus on automation of BIM processes and AI-like BIM use. Relevant labels: scripting, parametric, algorithms…	0	1	3	4	0	0	1	1	0	0	0	0
BU	BIM Utilisation													
BU-1	BIM Data Capturing and Representing	Using software tools and specialized equipment to capture and represent/visualize current and future physical spaces and environments (such as 3D scanners, drones, Lidar, etc.)	1	3	4	5	0	1	2	2	1	3	4	5
BU-2	BIM Planning and Conceptualising	Using software tools for conceptualization and planning	1	2	3	3	1	3	4	5	0	1	2	2

Figure 3. Fragment of the skills mapping that connects maturity levels to professions and specialisms

The skill levels have been defined in order to appoint calibrated numbers (See Figure 4). The skill levels used to map the current and future skills are interchangeable with the European Qualification Framework (EQF) (Cromwijk J. M.-C.-E., 2017). EU-funded project TRAIN4SUSTAIN has successfully demonstrated the use of skill levels in relation to EQF-levels (CEN Workshop Agreement (CWA 17939:2022 E), 2022).

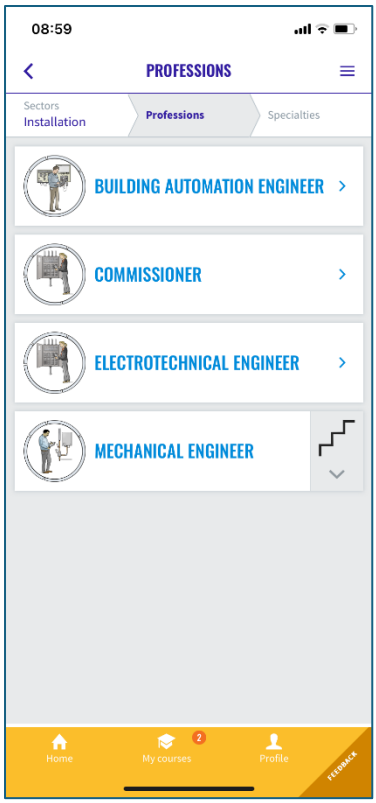
Skill level definitions	
0	Not applicable / no knowledge and skills required
1	Has **little knowledge and skills** with respect to the relevant field / technology
2	**Understands basic knowledge** and has practical skills within the field, is able to solve problems by selecting and applying basic methods, tools, materials and information
3	Has c**omprehensive, factual and theoretical knowledge**, is capable of solving problems within the field
4	Has **advanced knowledge involving** a critical understanding of theories and principles and skills, required to solve complex and unpredictable problems in the field and is aware of the boundaries
5	Has **specialised knowledge and problem-solving skills**, partly at the forefront of knowledge in the field, in order to develop new knowledge and procedures and to integrate knowledge from different fields

Figure 4. Skills levels for the skills mapping

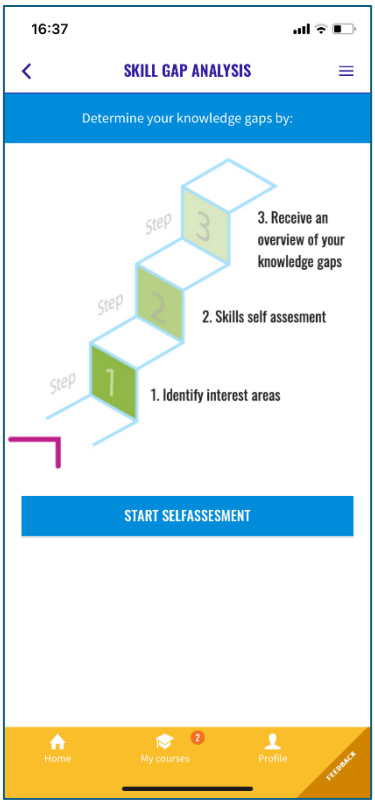
To make the digital skills maturity model for applied digitalisation usable for individuals and organisations it has been implemented in the BUILD UP Skills advisor-app. This also as part of the gamification approach in the ARISE project, with as objective to promote a sense of achievement and involvement, encouraging self-study through structured and organised content sharing, alongside training tools and hands-on work, clarifying learning objectives, strategies, and their relevance to the industry and trainees' careers.

Figure 6. A fragment of data entry within the BUILD UP Skills advisor-app

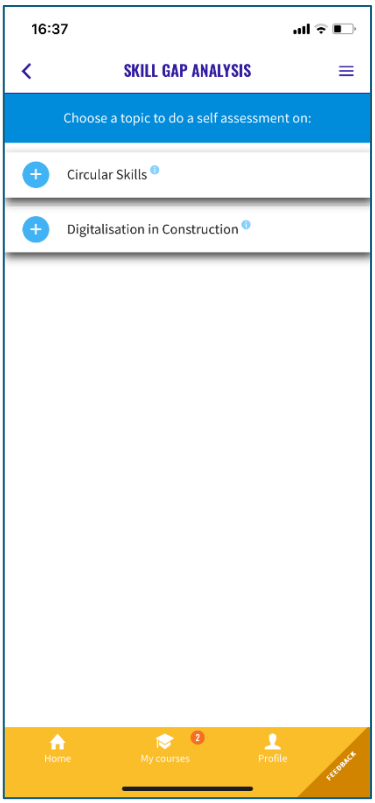
The user journey of an induvial skill maturity assessment is given in several screenshots from the BUILD UP Skills advisor-app in action.



Select profession



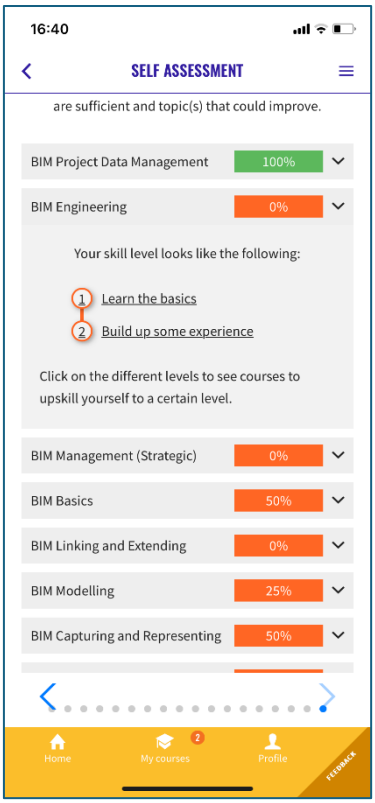
Start Selfassessment

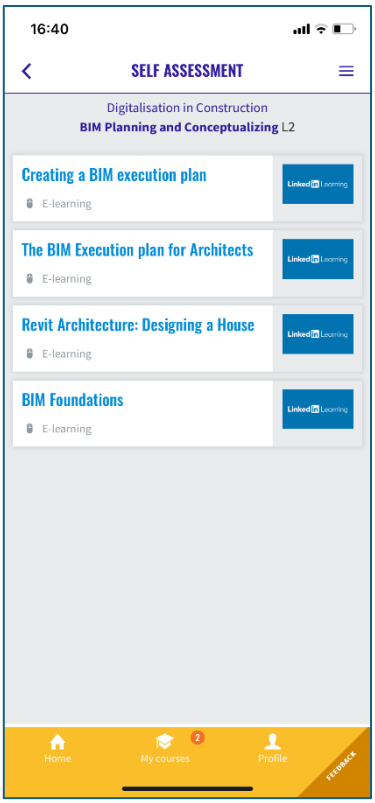


Select a topic

Select ambition level

Indicate skill-level done by the professional





Insight of current fit for selected ambition level

Recommended upskilling