1 Introduction

The transformation from an industrial to a knowledge society is changing values and traditional work structures. The digitalization of the working environment has fundamentally affected the requirements and needs of employees and, therefore, the way work processes are designed in companies. New Work describes this comprehensive structural transformation of our working world. A central aspect of the concept is communication with digital media in today’s global society and digital age. Digital communication is ubiquitous and a central success factor for companies. Its ubiquity affects the organization of work processes significantly.

Such processes are characterized by a liberated way of working and increased flexibility. Vital online communities within companies are an essential component of new ways of working. Internal corporate communities are online knowledge structures that are established to counteract the fragmentation of knowledge and promote the emergence of new ideas by fostering collective thinking. Employees interact across departmental and hierarchical boundaries on a regular basis and work together on topics and goals, sharing and generating knowledge and making it available for further value creation (Brueck et al., 2022). Corporate Community Managers (CCMs) are responsible for the planning, development, operation, growth and success of such internal communities. They support knowledge sharing by promoting active participation and communication.

Jobs in the field of New Work and digital communication, as the CCM, are characterized by continuous development, complex requirements for a broad spectrum of competences and a lack of comprehensive qualification programs, such as fixed study courses. These jobs are often done by lateral entrants and employees with different prior knowledge and personal background, who continue their qualification on-the-job. One approach to resolve this issue is the provision of individualized and competence-oriented qualification programs in form of micro qualification modules. However, due to the differences in knowledge and experiences, a self-evaluation of the individual competences is crucial to identify suitable qualification programs.
So far, there are no established process models and solution approaches for a concrete platform-based implementation of a competence-oriented self-evaluation tool. To address this gap, a competence profile for CCMs was developed (Leichsenring & Clauss, 2020) and didactically as well as content-wise specifically prepared (Jautelat & Clauss, 2022) within a design science research (DSR) process. To fill the lack of orientation and principles for the concrete design of a competence-oriented self-evaluation tool, a prototypical design should provide insights into users’ application processes and requirements and allow a derivation of design principles. This article illustrates how the design measures were identified and implemented, following the DSR paradigm to answer the following questions:

RQ 1: Which requirements and design principles have to be considered, when designing a competence-oriented self-evaluation tool for CCMs?

RQ 2: How do practitioners in the field of New Work and digital communication assess the benefit of a competence-oriented self-evaluation tool?

2 Research background and related work
This paper is part of a DSR project (see figure 1) to develop an innovative platform to qualify CCMs (A). The central element of the platform is a self-evaluation tool for individual competences (B). The basis for the self-evaluation tool is the comprehensive competence profile for CCMs developed by Clauss (2018) and Leichsenring and Clauss (2020) through expert interviews, which describes CCM’s activities on different levels of proficiency (novice, intermediate, expert) with detailed anchor examples. The profile and the anchor examples were evaluated and iteratively refined by Jautelat and Clauss (2022) using a comprehensive Delphi study with professional and methodological experts. This preliminary research forms the scientific basis for the prototype, which is designed to benchmark individual competences against an ideal CCM profile. Through this comparison, competence gaps can be identified (B). In the subsequent phase a competence development guide gives concrete, scientifically based recommendations for the design of specific micro-qualification modules to close previous competence gaps (C). The platform can be extended to a competence shop, which allows commercial providers to offer qualification programs in a competence-oriented way (D). Finally, users have the possibility to evaluate how the qualification programs have contributed to their individual competence acquisition (D).
3 Design, development and evaluation

Prototyping is the process of developing a partial system before the final target system is determined and realized. Therefore, the prototype is an incomplete initial version of the target system (Asur & Hufnagel, 1993). Prototypes represent essential features of the target system in a vivid and easily modifiable form and can be the basis for specifications. They represent functionality more effectively than textual descriptions or static models (Pomberger, Pree, & Stritzinger, 1992). As much functionality as needed must be implemented in each case to verify the intended functions (Pomberger et al., 1992). The exploratory prototype selected in this research clarifies the requirements and desirable features of the target system and eases the discussion of possible alternative solutions (Floyd, 1984). This prototype facilitates insights into users’ application processes and helps to identify unclear perceptions and needs of the system’s requirements (Carr & Verner, 1997). In this research, according to Carr & Verner (1997) a vertical prototype is used to represent specific parts of the target system across all layers in their final form, to show selected aspects of functionality – in this case, the usability for competence oriented self-evaluation for CCMs. The steps of the prototype design and the assigned chapters are presented in figure 2 following the DSR paradigm according to Hevner (2004), the structure follows Rietsche et al. (2018) as good practice.
3.1 Extraction of the exact problem statement and use cases

CCM have a complex job profile, with diverse competence requirements (BVCM, 2016; Leichsenring & Clauss, 2020) (P1), which is characterized by lateral entrants and a lack of qualification opportunities (P2) (Clauss et al., 2019). Furthermore, CCMs also develop their competences along with the growth of the community to provide adequate support at different levels of development (P3) (Schwartz, 2017). Competence-oriented qualification formats based on individual self-evaluations are thus a conceivable approach (Jautelat & Clauss, 2022; Leichsenring & Clauss, 2020).

Therefore, the primary use case focuses on employees who are already working in companies or have professional experience, as well as people interested in the profession of CCM, informing themselves about competence development potentials and, in the future, about the corresponding qualification programs, in a self-directed manner without external pressure especially from superiors (U1). A second subordinated use case focuses on the iterative further development of the self-evaluation tool to react adequately to changing circumstances in the profession as well as to consolidated results of the tool usage (U2).

3.2 Derivation of requirements from the knowledge base

For applicability in a professional context, two guidelines were identified as crucial for prototype development. First, the design will be based on the recommendations of the “International Guideline for Computer-based and Internet-based Testing” published by the International Test Commission (ITC, 2005). In total eight technical requirements (TR1–8) were identified. The required self-evaluation-specific requirements of the prototype are derived from DeGEval (2004), as widely established guideline for the development of self-evaluations. The selection focuses on the evaluation aspects (E) relevant in independent and voluntary self-evaluations (see U1–2). In total seven requirements were identified regarding the usefulness (EU1–7), two regarding practicability (EP1–2), three regarding fairness (EF1–3) and seven regarding accuracy (EA1–7). The detailed descriptions of the identified requirements can be found in appendix 1.
3.3 Derivation of design principles

The identified requirements for the prototype allow a comprehensive understanding of the aspects, which must be considered when designing a competence-oriented self-evaluation tool. However, the high level of specificity reduces the transfer potential. For this purpose, the requirements were condensed and summarized to derive the following six design principles.

DP1: The design processes need a scientifically well documented basis and need to be based on scientific procedures (SP1; SA1–7).

DP2: It is necessary to document and communicate the self-evaluation’s background including all basic assumptions and expectations in line with the design of specific, systematical and comprehensive evaluation objects (TR5; EU1–EU5; SA1–7).

DP3: Technically the design needs to use asynchronous and standardized web-based questionnaire tools, with adequate technical support to maximize usability and provide unhindered access (TR1–4; EU6).

DP4: Within the design, high security standards, intense data protection and comprehensive privacy standards need to be fulfilled (TR6–8; SF1).

DP5: The design needs to focus exclusively on information that is necessary for the evaluation purpose, enabling to maximize the evaluation’s quality with a necessary minimum level of personal information (SP2; SF2).

DP6: Within the design a clear communication of the intended usage of the results, including the exposition of all (intended) future beneficiaries of the collected data is necessary (SF3).

The derived design principles must be implemented based on the given use cases (U1–2) during the development process. The stated problems (P1–P3) must be considered as cross-sectional aspects.

3.4 Design of the software artifact

The primary objective of the prototype application is to enable users to self-evaluate their competences and thus identify personal qualification gaps. For this purpose, the self-evaluation must represent a protected space in which the users can reflect descriptions of required competences uninfluenced. The information collected serves only to inform the user (U1) and to support the continuous tool development (U2).
Disclosure to colleagues or superiors is excluded (DP4). The tool must provide a comprehensive insight into the necessary competences and facilitate their understanding compromising between length and significance (DP1–2).

The tool should enable a comprehensive self-evaluation by benchmarking the personal profile against an ideal-typical profile of the CCM (DP5–6). For this purpose, the competence profile from Leichsenring and Clauss (2020) and Jautelat and Clauss (2022) is used (DP1; DP5). The profile covers the identified competences completely. The anchor examples focus on key aspects to describe the behavior according to the respective skill level (DP5). The prototype only includes and analyzes these identified aspects.

Since concrete competence requirements are analyzed, a specific competence profile needs to be used, therefore the use of standardized tests to describe the competences is deliberately avoided (DP1–2). As a result, further explanations and definitions need to be offered, especially in the context of professional competences (DP1–2). The aim is to provide anchor examples for concrete competence related behavior. These anchor examples reflect highly specific, observable actions by describing individual work performances at different levels of proficiency (DP1–2). These practical descriptions facilitate self-evaluation (Leinweber, 2013), but are therefore highly detailed and need to be presented in a comparable way. This is reflected in the evaluation items, which, in contrast to standardized tests, do not have to be as compressed as possible so they can be answered in the shortest possible time – these items here should be highly specific, comprehensive, and understandable, compromising between length and significance (DP1–2; DP5).

By comparing individual competences based on the specific anchor examples, specific qualification gaps can be identified (DP6). These should be presented to the users in a competence-specific way so that possible gaps can be identified in relation to each competence level (DP1, DP5). In later stages of development, it will be possible for qualification providers to specifically fill these gaps with offers. For this purpose, it should be possible to determine qualification demands from the collected data (DP6).

3.5 Implementation of the software artifact

The prototype is implemented using the software SoSci Survey (Leiner, 2022), as it provides most functionalities that were identified as requirements and fulfill the design principles (DP3–5). SoSci Survey is browser-based and works without installation. The software is a product of a German company using German servers. The software complies with the local legal data protection requirements, ensuring data protection and allowing access through an initial user identification, which supports the confidentiality of results and user management (DP3–4) (Leiner, 2022).
In general, the prototype is created in compliance with a consistent design. Thus, the instruction texts and the prompts have a constant screen position, the name of the survey appears continuously at the top of the screen and all content-related questions are numbered consecutively. The processing instructions are always in the same position at the beginning of the page and the text of participants’ error messages is formulated on an appropriate language level (DP2). The answer options result from the anchor examples. The permanent display of all options enables the participants to compare the answer options. This requires less mental capacity than displaying the options in a drop-down menu, since remembering the differences is not necessary (DP3). After answering the block of questions on the domain competences, the participants proceed to the social competences and then to the personal competences. All of them are described and structured according to the same scheme (DP3). Figure 3 shows the presentation of the domain competence “networking and knowledge management” as an example, including the anchor examples on the respective proficiency levels and further explanations. Original screenshots from the prototype are presented in German language, translations can be found in the appendix 2.

Figure 3: Example of the competence description, anchor examples and further explanations
After completing the comparison with the anchor examples the results are compared with the ideal-typical profile (DP6). Below the introductory text, the results are displayed in order of the questions. In the analysis, the respective competence designation is named, then the required level and in third place the participants’ answer. Depending on the relation of the required level to the selected answer, recommendations are displayed (DP1). The evaluation is comprehensible and on an understandable level. Based on these statements, qualification offers can be integrated as shown in chapter 2 (DP1–2). The presentation of the results can be seen in figure 4 (translation in appendix 3) as an example.

Die Kompetenz Organisations- und Entwicklungsfähigkeit sollte auf dem Niveau ExpertIn vorhanden sein.
Dein Niveau ist ExpertIn. Du hast bereits das erforderliche Niveau für diese Kompetenz.

Die Kompetenz Fachliche Expertise sollte mindestens auf dem Niveau Intermediate vorhanden sein.
Dein Niveau ist ExpertIn. Deine Fähigkeiten übersteigen sogar das erforderliche Niveau.

Die Kompetenz Kenntnisse zum Monitoring und Reporting sollte auf dem Niveau ExpertIn vorhanden sein.
Dein Niveau ist Intermediate. Hier existiert bei dir Potenzial zu weiterer Qualifizierung.

Figure 4: Example of results presentation

3.6 Evaluation of the software artifact

Evaluation preparation: For the evaluation of the prototype, a comparative analysis was carried out before and after the use of the prototype. The prototype was evaluated by a group of eight practitioners for the alpha, six for the beta and five for the gamma version. All 19 participants took part in a qualification course for CCMs. They answered on a four-point Likert scale (strongly disagree, somewhat disagree, somewhat agree, strongly agree). A four-point scale was used to avoid a tendency toward the middle and thus to increase the clarity of the statements.

Regarding the given problem statements and use cases, the prototype evaluation compared the status before using the CCM self-evaluation tool with the status after the usage. The evaluation observed on the one hand the improvement of understanding (U1) regarding…

1. domain, social and personal competences (P1)
2. behaviors and activities describing the competences on different proficiency levels (P1)
And on the other hand, the evaluation focused on the improvement in the ease of…

3. evaluating the current level of competences (P1–2)
4. identifying potentials for competence improvement (P1–3)
5. identification of qualifications to close competence gaps (P1–3)

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**Evaluation results**: The evaluation survey was conducted with qualified practitioners – 95% of the participants are aware of the domain, social and personal competences that characterize the CCM’s job description. The vast majority of evaluators indicated that they gained a better understanding of the competences while using the self-evaluation tool, 13 agreed and 3 fully agreed. Further, respondents indicated that using the prototype made it clearer to them what specific activities describe the CCM’s competences at different levels of proficiency. This is indicated by a 31% increase in agreement to 89% after using the tool.

Before using the prototype, 63% of the respondents stated that it was easy for them to evaluate at which level they had the necessary competences to work as CCM. By using the prototype, this number was increased to 89%. Small increases can also be seen in the identification of potential for improvement, with the agreement to the statement “Self-evaluation makes it easy for me to assess potential for competences improvement” rising from 84% to 89%. The agreement with the statement: “It is easy for me to identify further qualification programs to close competence gaps” increased more significantly from 63% to 84%, which corresponds to an increase of 21%.

Due to their limited number the results can be seen as anecdotal. However, the expertise of the qualified practitioners was also reflected in concrete qualitative recommendations:

- The necessity of reformulating specific anchor statements, that refer to how one is perceived by others – as this is not always conscious – was described.
- It was noted that the evaluation tool primarily addresses a specialist target group that already has initial experience in the professional field and is familiar with subject terminology. For absolute newcomers or career changers from completely different fields, the described novice level is already too high.

These comments were considered in iterative revision processes. Text modules were modified accordingly. Further selected aspects were derived from the application and organizational background of the users. These aspects can only be represented to a limited extent in the prototype:

- Not every component of the ideal-typical competence profile is required in this form in all companies, so it is possible that users who do not correspond to the ideal picture in all areas nevertheless perceive individual competence descriptions as inapplicable or see no need for further qualification.
- In the specific company organization, certain aspects and tasks can be excluded from the CCM’s responsibilities. It is also possible that the role of the CCM is divided among several people with different, distinct tasks. These people have detailed knowledge that the organization may not allow them to apply.
3.7 Documentation of design knowledge

Finally, regarding DSR, the knowledge gained from the process should contribute to expanding the knowledge base by documenting the gained design knowledge. For this purpose, Gregor and Jones (2007) formulate the components: purpose and scope (see 3.1), constructs (see 3.2), principles of form and function (DPs) (see 3.3), which are described in detail in the previous chapters as well as artifact mutability, testable propositions and justificatory knowledge. Regarding artifact mutability, the described process for the derivation of competences and the creation of a competence-oriented self-evaluation tool can be used for multiple job profiles. Regarding the testable propositions, the prior research, especially the Delphi study gave a solid scientific foundation for the descriptions and, therefore for the conclusions that can be drawn from the comparison to the ideal typically competence profile. Since the users can use the self-evaluation tool uninfluenced, external biases hardly come into play – unrestricted repeatability can reduce internal personal biases. The focus of an extended quantitative justificatory analysis should be on the aspects described in the previous chapter 3.6.

4 Conclusion

Since there are no established process models and solution approaches for a platform-based implementation of competence-oriented self-evaluation tools so far, a prototypical design is used to gain insights into the application processes and usage requirements to enable a derivation of design principles, giving orientation for their design.

For this purpose, various requirements regarding computer-based testing (ITC, 2005) and self-evaluation design (DeGEval, 2004) were identified within this research and addressed in six design principles. The identified principles lay the foundation for transferring the design of the self-evaluation tool from CCM to other professions in New Work and digital communication (RQ1).

The designed prototype fulfills the identified requirements and the evaluation results provide first indications for its effectiveness. All users were experienced practitioners. The vast majority agreed that applying the prototype led to a better understanding of the competences needed for CCM jobs. They stated that the tool makes it easier for them to recognize competences with potential for improvement. The tool can ease the selection of suitable qualification programs to close the identified competence gaps. Due to their limited number, the results of the prototype evaluation can be seen as anecdotal. However, the expertise of the qualified practitioners was also reflected in further concrete qualitative recommendations, which were used for the iterative prototype development (RQ2).
In future research, the transferability of the scientific approach to other job profiles in New Work and digital communication should be examined. In this process, the identified requirements, the derived design principles, and their implementation in the prototype should be critically reflected from multiple perspectives. An expert focus group with scientific experts from education and pedagogy as well as practical experts from the fields of digital transformation and education is a conceivable research approach for this purpose. Furthermore, the use of the prototype needs to be evaluated by significantly more users. For example, this can be realized through quantitative usage analysis within the Federal Association for Community Management (BVCM) as a large specialist target group. These approaches allow to gain further scientific findings on the design and concrete implementation of competence-oriented qualification programs, which will undoubtedly be of increased importance in the future for the job profile of CCMs and further aspects of New Work and digital communication in general.

**Online appendix**
The online appendix is available at:
https://cloudstore.zih.tu-dresden.de/index.php/s/5kpXLmNezN88w5K

**Literature**


