



PPGCA
Programa de
Pós-graduação
em Gestão em
Ciências Contábeis
e Administração

ISSN: 1983-6635



RGO
Revista Gestão
Organizacional



fapesc
Fundação de Amparo à
Pesquisa e Inovação do
Estado de Pernambuco



OPEN ACCESS

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METACOGNITIVE COMPETENCIES OF INNOVATION PROFESSIONALS

COMPETÊNCIAS METACOGNITIVAS DE PROFISSIONAIS DE INOVAÇÃO

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Scientific Editor: Juliana Fabris

Submitted: April 28, 2025. Revised: July 03, 2026. Accepted: July 20, 2026. Published: October 15, 2026.

How to cite: Souza-Leão, A. L. M. de, Moura, B. M., Sampaio, A. C. A., & Moraes, J. M. V. de. (2026). Competências metacognitivas de profissionais de inovação. RGO - Revista Gestão Organizacional, 19(2), 143-171. <http://dx.doi.org/10.22277/rgo.v19i2.8446>.

ABSTRACT

Aim: Identifying clear metacognitive competencies linked to professional practices adopted by professionals in the information and communication technology, and creative economy fields.

Method/approach: Qualitative approach based on long interviews scrutinized through interpretative content analysis. Nineteen semi-structured interviews were conducted with ICT and CE professionals.

Main findings: The study highlighted five metacognitive dimensions helping these professionals to accomplish their work tasks.

Theoretical, practical/social contributions: It contributed to this field by presenting how metacognitive competencies are empirically expressed in activities performed by innovation professionals.

Originality/relevance: Metacognitive skills form an important *construct* still poorly investigated.

Keywords: Metacognitive skills. Information and Communication Technology. Creative Economy. Innovation Professionals.

RESUMO

Objetivo: O presente artigo tem como objetivo identificar quais competências metacognitivas se evidenciam na prática profissional dos profissionais das áreas de atuação de tecnologia da informação e comunicação e economia criativa.

Método/abordagem: Para essa pesquisa optou-se por uma abordagem qualitativa, através do método de entrevista longa, escrutinadas por meio de análise de conteúdo interpretativa. Para tal foram realizadas 19 entrevistas semiestruturadas com profissionais dos segmentos de TIC e EC.

Principais Resultados: Os achados evidenciaram cinco dimensões metacognitivas essenciais para o desenvolvimento das atividades laborais desses profissionais.

Contribuições teóricas/práticas/sociais: A pesquisa contribui para o campo ao apresentar como as competências metacognitivas são expressas empiricamente nas atividades dos profissionais da inovação.

Originalidade/relevância: As competências metacognitivas formam um importante construto, ainda pouco investigado pela área.

Palavras-chave: Competências metacognitivas. Tecnologia da Informação e Comunicação. Economia criativa. Profissionais de inovação.

1 INTRODUCTION

The post-industrial era set new production arrangements that have been reshaping production and work modes (Antunes, 2018; Gondim et al., 2024; Greenhaus et al., 2018; Tomasello, 2023; Tse & Shum, 2022). Social changes driven by technological advancements point to both electronic devices refinement and people's adjustment to them by incorporating them into their daily routines (Orji et al., 2020). Individuals intertwine their daily practices

across media and platforms in these new routines and overcome the physical barriers known for limiting their scope of action in the past. Consequently, they engage in participatory actions that help other members of their associated cultural context, as well as the organizations they interact with (Kozinets & Jenkins, 2022; Moura et al., 2023).

The way people incorporate technologies into their lives has straight impact on their work activities. Sectors depending on Information and Communication Technology (ICT) professionals (Kellog, 2022; García-Morales et al., 2021; Paletta et al., 2021; Dubey & Tiwari, 2020) and the Creative Economy (CE) (Allagui, 2023; Azim et al., 2019; Da Silva et al., 2019; Duff & Sumartojo, 2017; Lwakatare et al., 2019; Peukert, 2018) are among the most affected ones, so they can be highlighted as particularly significant fields. Creative economy professionals are embedded in the digital transformation process and belong to professional segments closely connected to the use of technological platforms (Peukert, 2018; Balsmeier & Woerter, 2019; Flew, 2018).

Their impact stems from how the use of electronic devices has exponentially broadened the windows of possibilities for professional careers and economic gains due to information and services shared among individuals with the same interests. Yet, the refined ICT application across all sectors led to new academic and professional qualification demands (Alves et al., 2014; Kipper et al., 2021). Understanding that competence corresponds to the mobilization of knowledge (Neitzel & Schwengber, 2019; Noronha et al., 2022; Santos & Santos, 2022; Rosamilha et al., 2022), this scenario of reconfiguration of social and labor practices also evidences transformations in market demands placed on these professionals. Cognitive and metacognitive skills stand out among these competencies as, to a certain extent, they are associated with the "soft skills" Category.

Soft skills regard "non-technical" competencies related to communication, cooperation and adaptability, in other words, to behavioral and socio-emotional skills essential to the professional environment. Unfortunately, they remain as a gap for ICT and CE professionals (Kano et al., 2026; Dubey & Tiwari, 2020). Although metacognitive competencies are essential among the associated ones, they are not granted with the necessary emphasis. They are observed in reflections on one's own cognition, when individuals become aware of their own knowledge, learning and limitations (Gewehr et al., 2020).

Therefore, the aim of this research is to analyze clear metacognitive competencies in the professional practice of individuals working in the ICT and CE sectors. Finding answers to this study matter enables discussing the unique competencies and skills of ICT and CE professionals.

This study also sought to fill up a gap in the literature by broadening the discussion on metacognitive competencies within strategic sectors, such as ICT and CE. Few studies have already addressed this topic, but they mostly focused the Education field (e.g., Rocha & Malheiro, 2019), rather than the workplace or empirical contexts (e.g., Estrela et al., 2021; Saini et al., 2022). This study contributed to both boosting the academic debate and formulating public policies and management strategies tailored to these professionals. This aim was achieved by exploring the association between these competencies and professional practice.

Although the classical literature defines metacognition as processes aimed at monitoring and self-regulating one's own cognition (Flavell, 1979), more recent studies have broadened its application to levels beyond a strictly process-oriented conception. It was done by acknowledging its role in competencies formulation within learning and work contexts. Metacognition has been linked to the development of cognitive and professional

competencies, mainly to those concerning lifelong learning, problem-solving and adjustment to complex environments (Jain et al., 2023; Medina et al., 2017). Evidence indicates that metacognitive processes are linked to cross-sectional competencies and situated work practices that help knowledge mobilization in dynamic professional settings (Munby et al., 2003; Spencer & Lucas, 2021). Metacognition was herein employed as a broadened analytical principle to help better understanding competencies linked to one's reflexivity, autonomy and management of one's own professional practice. This is not limited to metacognitive processes, but interpreted as a constitutive dimension of competencies observed in professional practices.

2 INFORMATION AND COMMUNICATION TECHNOLOGY PROFESSIONALS AND THE CREATIVE ECONOMY

The term "information technologies" encompasses a wide variety of knowledge fields and gives rise to multiple definitions. However, there is no consolidated definition of ICT professional. Moura & Helal (2014) and Steil et al. (2022) saw this lack of a conceptual uniformity associated with the difficulty in characterizing professionals in the technology sector.

ICT professionals are often associated with members of organizations belonging to the CE sector due to their multiple professional skills or to the technologies they employ (Azim et al., 2019; De Oliveira et al., 2022; Rehman et al., 2019). Similar to ICTs, there appears to be no consensus or uniformity regarding the boundaries featuring CE-associated professionals (Allagui, 2023; Ferreira et al., 2019; Gill et al., 2019; Nicolaci-da-Costa, 2014).

CE works as an arrangement of economic activities reliant on symbolic practices, according to which, creativity emerges as the most significant factor for goods and services production (Allagui, 2023; Coll-Martínez, 2019). There is a close association between these elements and the broadened possibility for combining economic, cultural and social aspects by using technology and these professionals' intellectual skills (Malik et al., 2023; Oliveira et al., 2013).

On the one hand, it is possible identifying an overlap between these two segments as ICT professionals perform activities matching those of professionals in the creative class, such as designers, engineers, among. On the other hand, the technological aspect is already incorporated into discussions about CE creative economy, mainly when it comes to audiovisual media and new media like software, games and creative digital content (Almeida & Dias, 2021; Castro & Tumibay, 2021; Malik et al., 2023). Differences between professionals in these sectors stand out in the literature. ICT professionals are characterized by their functional role and by improvements they achieve in organizational processes. Creative economy professionals, in turn, are associated with creative practices defined by their symbolic and cultural nature (De Oliveira et al., 2013; Saura et al., 2023; Steil et al., 2022). Despite the overlap between segments, which is the object of this study, there are some creative economy aspects missing in ICTs, such as historical heritage. Consequently, these two professional fields are clearly addressed together in discussions on innovation (Hotho & Champion, 2010; Saura et al., 2023) and on the management of both creativity or creative careers (Calasans & Davel, 2020 and Maciel et al., 2020).

Therefore, innovation is associated with creativity and it can be enhanced at organizational level through creative capital management (Acar et al., 2019; Muzzio & Paiva Júnior, 2018). Cognitive competencies stand out among the ways to manage professionals'

creative capital as they encompass intellectual, behavioral and innovative aspects amplified by the use of electronic devices in work-related tasks (Molin et al., 2020).

2.1 COMPETENCIES

Boyatzis (1982) stated that competencies include knowledge, aptitudes, attitudes and behavior configurations required to perform specific job functions. Parry (1996) indicated that competence is ground in knowledge and skills related to work activities capable of influencing how individuals interact with the work team they belong to within an organization. Both perspectives are seen as seminal to help better understanding competencies as a multiplicity of workers' knowledge and practices (Ballesteros-Sánchez et al., 2019).

Competency has more recently come to be discussed as "expertise" concerning recognition and responsibility. This viewpoint entails the mobilization and integration of diverse knowledge, skills, capabilities, resources and values that altogether enable individuals to generate social value for themselves and economic value for an organization (Fleury & Fleury, 2001; Noronha, 2022; Santos & Santos, 2022; Tartari et al., 2014). It can also be defined as the application of skills to address complex demands based on the efficiency component, which requires mobilizing psychosocial resources, attitudes and skills within specific contexts (Neitzel & Schwengber, 2019; Rosamilha et al., 2022).

Clearly, studies on competencies have already revealed multiple perspectives shaped by different epistemological approaches and lack of consensus about the real meaning of this term (Boyatzis, 2008; Brito et al., 2014). Consequently, competencies are characterized by varying segmentation forms and by multiple nomenclatures and typologies.

The concept of metacognitive competencies encompasses various activity fields and carries more than one possible meaning in the literature (Molin et al., 2020; Rocha & Malheiro, 2019). They can be overall understood as a set of thinking skills aimed at problem-solving (Saini et al., 2022). In other words, it concerns the ability to think about one's own thinking (Estrela et al., 2021).

Gewehr et al. (2020) stated that metacognition can be understood as a reflective process on one's own cognition. Therefore, individuals become aware of their knowledge, learning and limitations through this process. Metacognition is linked to activity management skills and self-awareness within this scenario (Botelho & Vargas, 2021; Pimentel & Sales Júnior, 2021).

By bearing this information in mind, and based on the literature, the competencies were organized into five "categories" with their respective compositions, illustrated in Table 1 and developed in more detail in the subsequent subsections.

Table 1
Competency categories, descriptions and sources

Category	Description	References
Intellectual competencies	Refer to skills linked to cognitive processes, mainly to knowledge production or acquisition. They encompass the ability to seek out and grasp new activities and concepts, whether independently or in a group, as well as analytical, strategic and critical skills (critical thinking).	Alencar et al (2022), Dulewicz & Higgs (2005), Favaretto & Cotella (2020), Patriota & Muzzio (2021), Sholihah & Lastariwati (2020), Skulmoski & Hartman (2010).
Behavioral competencies	It encompasses professionals' attitudes, their conduct toward others and their overall demeanor. It is linked to soft skills and to other social competencies, as it involves abilities related to adaptability and self-awareness.	Dulewicz & Higgs (2005), Gruden & Stare (2018), Muzzio (2017), Muzzio & Paiva Júnior (2015), Skulmoski & Hartman (2010).
Expertise	It encompasses the attributes necessary for professionals to be experts in their field. It includes both technical knowledge and experience in the field's practices. It also regards knowledge across multiple disciplines and the ability to simultaneously operate in various fields, whether dealing with colleagues or handling analytical and technical aspects.	Dos Reis & Zille (2020), Dudziak (2010), Favaretto & Catela (2020), Machado (2014), Skulmoski & Hartman (2010), Valente (2019).
Innovative competencies	Refer to qualities linked to the innovation process. This process entails analytical competencies aligned with creative and imaginative skills. It also explores the process of seeking innovation.	Calasans & Davel (2019, 2020, 2021), Dos Reis & Zille (2020), Dulewicz & Higgs (2005), Favaretto & Catela (2020), Gruden & Stare (2018).
Managerial competencies	Involve administrative skills linked to management and the achievement of organizational goals. They are required in specific contexts encompassing human, technical and conceptual skills. They overlap with socio-emotional competencies, mainly with those regarding skills involving communication, such as human resources management or negotiation.	Dulewicz & Higgs (2005), Gruden & Stare (2018).

2.2 INTELLECTUAL COMPETENCIES

Intellectual competencies refer to skills linked to cognitive processes, mainly to knowledge production or acquisition. They encompass the ability to learn, whether autonomously or otherwise, and to develop and implement projects in line with team goals (Favaretto & Cotella, 2020; Patriota & Muzzio, 2021; Sholihah & Lastariwati, 2020). They can be characterized as presented in Figure 1.

Figure 1
Intellectual competencies

Intellectual competencies	
Code	Description
Self-taught	It regards the professional skills that independently look for learning new knowledge. This professional can learn autonomously, as it aims its labor market, which is constantly changing.
Strategical Perspective	It refers to setting goals and strategies for the professional's right communication and interpretation of its work development improvement matters. The professional focused on the strategic perspective can provide strategic support, formulate technological strategies and implement them in compliance with the organization's profile.
Learning process	It regards the Professional's ability to learn, to acquire knowledge. Professionals are prone to learn within this process, and they do so through their mistakes and over their labor activities
Critical thinking	It addresses critical thinking, the assertive judgement of facts, discernment and the identification of advantages. The professional presenting critical thinking is able to act efficiently at decision-making moments as they understand when they must take an immediate action and observe the disadvantages by bearing in mind the impacts of the decisions made. The analyzed corpus showed two branches: critical analysis and judgement.

Note: Adapted from Alencar et al. (2022), Dulewicz & Higgs (2005), Favaretto & Cotella (2020), Patriota & Muzzio (2021), Sholihah & Lastariwati (2020), Skulmoski & Hartman (2010).

2.3 BEHAVIORAL COMPETENCIES

Behavioral competency encompasses professionals' attitudes, conduct toward others and overall demeanor. It involves both internal or personal skills like self-assurance, which supports decision-making. However, it can become a problem within organizations if it crosses the line between confidence and arrogance (Boyatzis, 2009; Dulewicz & Higgs, 2005; Gruden & Stare, 2018; Muzzio, 2017; Muzzio & Paiva Júnior, 2015; Skulmoski & Hartman, 2010). They can be characterized as presented in Figure 2.

Figure 2
Behavioral competencies

Behavioral competencies	
Code	Discription
Adaptability	It regards the ability of a professional who adjusts itself to different situations. The adjustable professional is the one who can adapt itself to changes, to the new, to the culture of a given organization. This professional also needs a set of different knowledge in order to work in this field.
Autonomy	It means the ability to make things by oneself. The autonomous professional does not need orders from others in order to work, it is free to think on its own, to be proactive to the take initiatives to work alongside it peers within the organization.
Self-actualization	It approaches the professional's intrinsic motivations in elements that brings it actualization. It means professional and personal actualization. Professionals do not seek only remuneration, but something that has meaning and that makes it feel happy with the performed activities.
Professional identity	It regards the professional's sense of itself, of its own values and of how it wishes to be seen by those it interacts with (its peers, the public, the organization, stakeholders). It covers the behavior associated with ideas, values and beliefs, reason, competence and ethical behavior, dynamism and sense of socio-environmental accountability.

Note: Adapted from Dulewicz & Higgs (2005), Gruden & Stare (2018), Muzzio (2017), Muzzio & Paiva Júnior (2015), Skulmoski & Hartman (2010).

2.4 EXPERTISE

Expertise comprises the features required for an expert performance, which means the technical skills, experience and training necessary for a professional to be an expert in its field (Dos Reis & Zille, 2020; Favaretto & Catela, 2020; Skulmoski & Hartman, 2010; Valente, 2019). They can be characterized as presented in Figure 3.

Figure 3
Expertise

Expertise	
Code	Discription
Digital competence	It refers to the digital skills that professionals should possess to use digital technologies effectively, including knowledge of digital platforms, software, and the ability to identify and critically assess relevant information. These skills are necessary for performing activities within organizations.
Multidisciplinary approach	It refers to professionals' ability to demonstrate knowledge across different fields. It involves possessing knowledge in more than one discipline and being able to articulate and integrate such knowledge.
Multitasking	It refers to professionals' ability to perform more than one task simultaneously, beyond the tasks for which they were hired. Multitasking professionals are capable of performing multiple activities at the same time. In organizations, this may be perceived from a broader perspective: professionals who perform multiple activities.
Professional qualifications	It refers to the knowledge and/or information required to perform professional activities. This may include higher education, additional training, technical certifications, and continuing.

Note: Adapted from Dos Reis & Zille (2020), Dudziak (2010), Favaretto & Catela (2020), Machado (2014), Skulmoski & Hartman (2010), Valente (2019).

2.5 INNOVATIVE COMPETENCIES

Innovative competencies refer to skills demanded by the innovation process. They include skills needed for developing organizational processes or individual career paths as they represent the creation and innovation potential (Calasans & Davel, 2019, 2020, 2021; Favaretto & Catela, 2020). They can be characterized as presented in Figure 4.

Figure 4
Innovative competencies

Innovative Competencies	
Code	Discription
Quest for autonomy	It refers to the ability of professionals to act and express themselves independently. It also involves the characteristics of professionals who do not follow rules, norms, or deadlines.
Quest for innovation	It refers to the search for professionals to continue innovating. These professionals are always seeking new opportunities, aiming to develop new skills, enhance their knowledge, and continuously pursue improvement. Most importantly, as they are always seeking new challenges, they constantly set themselves new challenges.
Professional image building	It refers to the professional image that individuals build so that partners, the public, and organizations perceive them. It involves how professionals position themselves and communicate their personality.
Entrepreneurial skills	It refers to the skills required for professionals to undertake entrepreneurial activities. In this regard, it involves the perception that the professional can meet needs and, therefore, use their entrepreneurial skills. It also requires individuals to act as their own bosses.
Vision and imagination	It refers to the strategic vision aligned with the capacity to create. It addresses the capacity to create new ideas that contribute to the process of developing a plan, independently or with the purpose of improving, in the search for productivity and quality, the processes and products of an organization.

Note: Adapted from Calasans & Davel (2019, 2020, 2021), Dos Reis & Zille (2020), Dulewicz & Higgs (2005), Favaretto & Catela (2020), Gruden & Stare (2018).

2.6 MANAGERIAL COMPETENCIES

Managerial competencies involve administrative skills linked to management and the achievement of organizational goals. This competency comprises aspects related to the coordination of material and intellectual resources, as well as to the skills required for manage teams and stakeholders, such as the ability to set agreements and partnerships, to execute plans, take risks, manage problems, persuade, influence and lead (Gruden & Stare, 2018; Roman et al., 2019). They can be characterized as presented in Figure 5.

Figure 5
Managerial Competencies

Managerial competencies	
Code	Description
Ability to execute	It is understood as the ability to implement a planning. It regards persistency in seeking to implement plans, take risks, use its personal, creative and intellectual skills to identify opportunities and explore them to the maximum, and master techniques to achieve the implementation as expected.
Manage resources	It concerns management, matters related to planning and to performing managerial tasks. It regards knowing how to evolve and to get to the best outcomes. It aims at reinforcing employees' competencies, help them improve and enhance themselves.

Note: Adapted from Dulewicz & Higgs (2005), Gruden & Stare (2018).

3 METHODOLOGICAL PROCEDURES

Qualitative study of an inductive nature (Denzin & Lincoln, 2005) conducted through semi-structured interviews. The long interview proposed by McCracken (1988) was the employed data collection method. Professionals working in the ICT and/or CE sectors were selected for the interviews.

Data identified as "new technologies" by the United Nations Conference on Trade and Development (UNCTAD, 2021) were cross-referenced with the CE sectors proposed by the Federation of Industries of the State of Rio de Janeiro (FIRJAN, 2019) to draw the intersection between the ICT and CE. Similarly, material linked to information and communication technology was selected from the creative industry mapping conducted by FIRJAN (2019).

Technology hubs were identified as a means to access these professionals and reach this target audience. Subsequently, the desired profile was sought through the snowball sampling technique to generate a relevant study group within the research context (Parker et al., 2019). In addition, the research adapted the traditional, offline, interview format for the online environment. This adaptation followed the approach proposed by Moura & Souza-Leão (2022) to leverage interviewees' familiarity with the specific software used for the interviews, namely: Google Meet and Microsoft Teams. These software are part of their work routine. This procedure was an opportunity to broaden the pool of interviewees across Brazil.

The number of interviews was determined by representativeness (geographic and by segment) and saturation criteria attainable at the initial stages to transcribe and organize the research *corpus* (Flick, 2007; Hays & McKibben, 2021). This procedure led to nineteen interviews. These interviews lasted one hour and twenty minutes, on average. They were recorded under the consent of all participants, and took place between April and July 2022. The complete interview guide is available in Appendix A.

Figure 6 presents interviewees' profile.

Figure 6
Interviewees' profile

Interviewees' profile					
Code #	Function	Action field	Segment in the company	Company size	Region
E 01	Production manager	Programing	Information technology	Medium	NE
E 02	Business manager	Marketing	Entertainment and communication	Small	NE
E 03	Project manager	Programing	Technology and information	Medium	NE
E 04	Software developer (CEO)	Programing	Technology and information	Small	NE
E 05	Software developer (CEO)	Programing	Technology and information	Small	NE
E 06	Businessman (audiovisual producer)	Audiovisual	Entertainment and communication	Individual micro-entrepreneur	NE
E 07	Software developer	Programing	Technology and information	Small	NE
E 08	Businessman (CEO)	Architecture	Creative economy	Small	NE, S and NE
E 09	Software engineer	Programing	Technology and information	Big	NE
E 10	Designer (game designer)	Design	Creative economy	Individual micro-entrepreneur	NE
E 11	Laboratory coordinator	3D printing	Creative economy	Small	NE
E 12	Audiovisual producer	Audiovisual	Creative economy	Individual micro-entrepreneur	SE
E 13	Designer (Motion and animation)	Design	Creative economy	Individual micro-entrepreneur	CW and SE
E 14	Music producer	Music	Creative economy	Individual micro-entrepreneur	NE
E 15	Music producer	Music	Creative economy	Individual micro-entrepreneur	NE
E 16	Designer (illustration)	Design	Creative economy	Individual micro-entrepreneur	NE
E 17	Businessman (CMO)	Blockchain	Technology and information	Small	NE
E 18	Businessman (CEO)	Blockchain	Technology and information	Small	NE
E 19	Designer (UI/Ux)	Design	Creative economy	Small	S

Interpretative Content Analysis (ICA) supported the data analysis. This method allows reflecting on the meanings observed in the collected data, but without losing ground on what was expressed in the statements themselves (De Sousa & Dos Santos, 2020; Mozzato & Grzybovski, 2011). This approach helps understanding the investigated content and how it relates to the broader context where it was produced and to what it addressed (De Souza-Leão et al., 2020).

Accordingly, the analytical process crossed different levels. The first one regarded coding the meanings directly expressed in interviewees' speeches. Subsequently, these codes were organized by topic and regrouped into categories related to activities and tasks performed by the interviewed professionals. Finally, in a third and concluding round of interpretation, facets simultaneously referring to the investigated context and to interviewees' responses were proposed. It enabled connecting to concepts highlighted by the study's theoretical framework.

The methodological stages are linked to both an ethical process and research validation. The quality criteria necessary for qualitative data validation are available in Figure 7.

Figure 7
Methodological stages

Methodological stages	
Orientation and epistemological position	They are introduced either in theoretical and methodological choices, or in writing.
Reliability	It is set by the consistency of data collected based on adopting a method which takes into account the social context and the time continuity of the analyzed events.
Triangulation	It aims at finding research inconsistencies; triangulation was carried out on a weekly basis among three researchers. Encounters has orientation shapes and they were carried out in a first round among the researchers and, later on, in a final round, which was validated by an expert researcher.
Reflexability	They are highlighted either in scientific writing or in data analysis. Result derive from constant checking on the constancy of interpretations resulting from the data/researcher relationship.
Corpus construction	Expressed in this very section.
Detailed description	Introduced in the next section.

Note: Adapted from Creswell (2021), Paiva Júnior, Leão & Mello (2011).

4 RESULTS DESCRIPTION

Results were organized according to the competencies division presented in the study's theoretical framework subsections. Dimensions highlighted at the analysis stage are presented as metacognitive competencies comprising five categories. Table 2 illustrates the intellectual, behavioral, expertise-related and innovative categories, and their respective codes.

Table2
Categories x Code

Category	Code
Intellectual competencies	Self-taught
	Strategic perspective
	Learning process
	Critical thinking
Behavioral competencies	Adaptability
	Autonomy
	Self-actualization
	Professional identity
Expertise	Digital competency
	Multidisciplinary profile
	Multitasking
	Professional qualification
Innovative competencies	Quest for autonomy
	Quest for innovation
	Building a professional image
	Entrepreneurial skills
Managerial competencies	Vision and imagination
	Execution skills
	Resource management

Categories and their respective codes are presented alongside the interview excerpts, in the next section.

4.1 INTELLECTUAL COMPETENCIES

Intellectual competency manifested beyond the mere knowledge acquisition involves cognitive processes including its application and individuals' stance on such a knowledge (Patriota & Muzzio, 2021; Sholihah & Lastariwati, 2020). Findings in this study have highlighted self-directed learning with emphasis on learning autonomy, which is characterized by professionals' independence in absorbing new information and in critically constructing knowledge. Both aspects are clear in excerpts available in Figure 8.

Figure 8

Example of intellectual competencies drawn from interviews 13 and 5

[Coding Process of learning and Self-teaching]

I have done some things, one here, another there, but most of the things I have learnt was with other people at work, with other people in everyday life. Kind of, how it works here at Adobe, Premier, as it works at After, I started a business and it scavenged it on my own. Of course, I watched many tutorials on Youtube, these things [...] In any case, by doing new things, I guess that... that's how I learned most of the things I know, by doing, I like that you learn fast, very fast, necessity makes you evolve, so I like the challenges, in general. (E 13)

[Coding Process strategic perspective and Critical thinking]

[...] we are not hasty and technology is in the mainstream, but, as it is in the mainstream, everybody is using it, wait, everybody is using it, wait a second, we try to catchup but we end up in a position of wait to analyze what is happening with technology, and that is how we escaped by using technology, which was in the mainstream, and it started to decline after 4 years and it is still dying, and we preserved a little and adopted a technology that was more promising on the long-term than the other one. (E 05)

Self-taught competencies concern mastering technology-related techniques through online tutorials and acquiring business management knowledge through day-to-day practices. On the other hand, the strategic perspective entails an understanding of corporate strategic planning and organizational resources optimized through technology use linked to problem-solving, as outlined by Sholihah & Lastariwati (2020). This understanding goes all the way to data-driven decision-making, which requires professionals to know when to act and to make a decision, as well as to know how to research and analyze users' needs. They must understand customer requirements, the product vision and the presented solution.

The learning process is distinguished by specific elements, namely: (a) eagerness to learn, which is an intense desire to acquire knowledge; (b) aptitude for learning and self-improvement, whether individually or in groups; (c) learning agility; and (d) prototype validation involving the assessment of whether a solution prototype is ready for testing or for market launch. It also included the (e) learning from failure aspect, which is a process shaped by mistakes made and knowledge acquired through workplace experience; as well as (f) continuous exercise of creativity, so professionals hone their creative skills through extensive study and practice (Patriota & Muzzio, 2021). Finally, the (g) critical judgment element elucidated through discernment manifested as an ethical, consistent attitude and professional commitment with decisions, and through analytical thinking, such as weighing advantages and disadvantages while assessing the impacts of one's decision-making.

4.2 BEHAVIORAL COMPETENCIES

Behavioral competencies are substantiated by self-regulation and adaptability in case of market volatility. Autonomy manifests itself through self-management and organization, as (a) being personally and professionally organized, keeping tasks in order and (b) possessing

agility, herein defined as professionals' ability to be quick and dynamic in the work environment. There is also an aspect concerning (c) the self-imposed demands posed by these professionals, themselves, on the execution of their work. Finally, there is the (d) self-management skills, according to which, professionals show their ability to manage their own activities and time. These last two elements are closely connected to the concept of metacognitive self-regulation proposed by Gewehr et al. (2020). It states that individuals become aware of their own limitations and autonomously manage their time.

Adaptability emerges from four fronts: (a) ability to handle ambiguity and change amidst uncertainty and transitions; (b) ability to act in adverse situations and flexibility, herein defined as the skill to quickly adjust to new scenarios; (c) continuous updating featured by efforts to keep pace with market evolution; and (d) one's stance and positioning in different situations to reflect the ability to respond to complex and diverse scenarios falling outside the scope of daily operations. Thus, adaptability requires resilience to cope with ambiguity and commitment to continuous updating to new scenarios (Dulewicz & Higgs, 2005; Gruden & Stare, 2018).

Interviewees' excerpts presented in Figure 9 allowed identifying adaptability as the ability to adjust to new scenarios. Autonomy, in turn, emerged as a self-imposed pressure form.

Figure 9

Examples of behavioral competencies drawn from interviews 19, 10 and 16

[Coding Autonomy]

Oh, I'm kind of, not kind of, I'm quite a nerd, like I'm always poking around, in, in, forums, and, and trying, trying, seeking these solutions on my own, so, you know, we keep on looking for, I guess its that one, this initiative of going forward looking for things and trying to solve them, without keep on asking for help, I guess it is important in this creativity field, right, you gotta have one, I guess the initiative and the sense of self-management is important. (E 19)

[Coding Adaptability and Self-actualization]

If you focus on results of paint art design you will be frustrated [...] focusing on results you create expectations and by doing so if it does not remain the same what you expected you'll be frustrated [...] Its part of it, there will be mistakes, and such, but if you focus on the process [...] focus on the creative process to have fun doing the thing – having fun when working, I can have fun in my work – it means having fun if you appreciate what you are doing, to feel good for doing what you are doing, right? You simply do what you do, and feel happy with that, and feel curious. You have to feel comfortable doing art. (E 10)

[Coding Identity]

[...] we are in this capitalist world, right, of money and money, what we sell, actually, is our time, right, what we end u selling is time [...] one nice thing is that after the time you create an identity, then, you start to be sought by, after you have an identity, people want to produce with you because they know that you will make it your way [...]. (E 16)

Simultaneously, self-fulfillment include (a) self-motivation and (b) workplace well-being. Self-motivation regards satisfaction expressed through (b1) job fulfillment, (b2) financial fulfillment and (b3) working with what one enjoys. Satisfaction in performing the job is perceived by professionals who are either result-oriented or process-oriented. Financial fulfillment addresses motivation linked to financial gain, whereas the final aspect highlights fulfillment deriving from emotional/subjective identification with the job.

On the other hand, the identity code manifests itself through several dimensions: (a) labor monetization - how professionals monetize their workforce, and (b) focus, which means keeping the concentration needed to carry out their activities. There is also (c) engagement with the company, with the instances where professionals show loyalty to their employer. Yet,

there is a (d) professional identity linked to career management, to how individuals steer and develop their professional path. Political positioning towards professionals' stance on political matters is a significant issue, as well. This element is combined with their socio-environmental responsibility - it refers to (e) professionals' sense of socio-structural and environmental accountability. This finding indicated that workers' behavioral and socio-emotional conduct in the CE and ICT sectors is moving toward a hybrid identity that combines professionals and citizens. This identity has been poorly explored in the literature on competencies.

4.3 EXPERTISE

Expertise broadens into an arrangement of interconnected knowledge, practical experience and adaptability within shifting technological contexts, even when it is oriented to the technical aspect. This scenario extends the understanding centered on acquired-experience relevance (Dos Reis & Zille, 2020; Valente, 2019) to expertise hyper-connectivity incorporation. All these possibilities are illustrated in Figure 10.

Figure 10

Examples of expertise drawn from interviews 9, 19, 5, 10 and 6

[Coding Digital competency]

So, JavaScript is a language that I ended up studying a lot, I kind of dominate react well too, JavaScript, GraphQL [...]. (E 19)

[Coding Multidisciplinary elements]

[...] but my qualification is quite, I think that it is quite transdisciplinary, I come from the communication field, but I changed to design, so I deal with a technological part, so I think that I can circulate well in this medium, among the human aspect, project needs, and, hum, I'm not an engineer, but I can see where we can have a problem in the project specs [...]. (E 19)

[Coding Multitask]

I work with software development, I'm a technician leader on web development software, and as a businessman I end up accumulating different functions, so I also work with the commercial of some project clients when I master the topic, I also work with the financial, strategic and HR parts in the company. I accumulate a lot of functions. (E 05)

[Coding Professional qualification]

[...] I did not emphasize how a second language is important, mainly English. I know there's people who do not like English, but we, you know, if we do not speak English, French is OK, or any other, but I guess, I guess English is essential [...]. (E 10)

[...] I have a major degree in Social Sciences, I tended a specialization in Photography and Masters' in Communication, with emphasis on documentaries. I was a teacher in many private institutions and I recently opened an audiovisual producer when I work, I live on it. I currently live on audiovisual production. (E 06)

Digital competency is made clear by (a) professionals' mastery in handling tools, devices and systems integrated with information and communication technology; (b) by technical experience on the use of ICTs gained over the digital context and technical skills linked to it; and (c) the drive to learn how to use information technology tools through self-directed learning (Skulmoski & Hartman, 2010). This last aspect introduces the hyper-connectivity dimension, which is linked to the need for uninterrupted connection to the digital world where individuals can no longer disengage from digital media. At the same time, multidisciplinary actions manifest themselves through knowledge across multiple fields, alongside interdisciplinary actions, which are featured by the integration of insights from different fields. This context fosters versatility, herein understood as the ability to operate across more than one sector. This multiplicity reflects on how activities are carried out as

professionals perform and accumulate multiple roles in the organization and end up acting as multitasker.

Qualification, in turn, is defined by the attainment of credentials required for the role (college education, certifications, specialization), professional experience (e.g., years of experience starting via internship), continuous learning, practical knowledge (e.g., fast methods), self-directed learning (independent knowledge acquisition) and the need for English language proficiency (Alves et al., 2014).

4.4 INNOVATIVE COMPETENCIES

These findings are typical of innovative competencies expressed from a multidimensional perspective that encompasses everything from idea generation to technical proactivity. Such elements are ground in the ability to achieve the continuous reinvention and the creative solution of complex problems, and in technical proactivity. This article highlights the relevance of autonomy and mastery over one's work as creative capital drivers, as well as the strategic use of creativity to underpin the elaboration of original ideas (Muzzio & Paiva Júnior, 2018).

The pursuit of autonomy manifested as self-reliance and desire for autonomy (i.e., managing one's own work) comes along resistance to strict structures and rules. This profile emerged from (a) self-reliance - understood as the technical and decision-making mastery enabling professionals to operate in an independent manner; (b) the pursuit of functional autonomy - featured by micromanagement rejection (the individual holds its sovereignty over work execution); and (c) geographic and operational freedom, which grant professionals discretion regarding where and how to perform their tasks. This professional behavior is in compliance with the research by Calasans and Davel (2019, 2020, 2021), according to which, the creative professional is an agent driven by autonomy and flexibility in job performance and in their career trajectory.

The innovation drive is clear in discussions on competencies' development in innovation-oriented contexts where professionals learn to reinvent themselves and to improve skills suited to these environments. The commitment to constant learning and continuous professional development is observed, as well. These professionals seek out challenges. They are driven by demanding tasks capable of encouraging them. This mindset manifests itself through the search for alternative problem-solving methods and the development of creative solutions. Their capacity to handle daily challenges is expressed by their ability to manage routine workplace issues, much like creative capital management (Muzzio & Paiva Júnior, 2018). Consequently, professionals develop skills for innovation and, consequently, for reinvention-linked transformation. These professionals are interested in new technologies and curious to master updates to existing technologies and to explore emerging trends. Such possibilities are illustrated in Figure 11.

Figure 11

Examples of behavioral competencies drawn from interviews 19, 10 and 16

[Coding Search for autonomy and Innovation]

[...] so we say that startups are quite autonomous teams, they have the power of everybody all the time, everybody has the power to make decisions about their own work, nobody needs to supervise, it is collaborative field [...]. (E 17)

[Coding Search for innovation]

[...] so, you know, a person I have an easy time with, I like to live things, I like to be in contact with what is new, so to be in contact with new things, this is something that excites me within my creative process [...]. (E 12)

[Coding Construction of a professional image]

[...] talk a lot in social networks, show your projects, show your work, because, you know, we have to show yourself, to seem interesting, so the others want to see you and to get in touch for professional possibilities. (E 06)

[Coding Ability to start new businesses]

[...] they see me as an example of a person who created a company and who had nothing, so, we, all the partners, come from poor families, so we had zero, zero relatives in technology, zero parents owning a business and we got to start a company from zero. (E 05)

[Coding Vision and Imagination]

[...] I the sense of also producing music, it means thinking different ways possible, not a single way, not a single way, oh, we set the voice on the front, and so on, there is not music here where the voice is mix on the same landscape of the instruments, you know [...]. (E 15)

At the same time, image building is presented across several fronts. It addresses how individuals wish to be perceived by their peers and how to effectively communicate such an image by accurately conveying their personality, so it can be understood by their peers and the public. Strategic career management is another aspect, which is observed when professionals define career goals and strategies often accompanied by a stage name.

Entrepreneurial skills manifest themselves in professionals' ability to identify opportunities and transform ideas into economically viable activities, even with limited resources. Beyond entrepreneurship, which means developing a venture, this process concerns (a) investing in oneself - it is marked by financial outlays whether for courses or for boosting the business; (b) transforming a hobby into work; (c) having an entrepreneurial profile suited to the creative economy; and (d) having an "ownership mindset", in other words, a sense of being part of something significant featured by a high commitment level.

In addition, vision and imagination are typical of storytelling proficiency, which is herein understood as the ability to craft creative narratives, as well as a profit-oriented creativity aimed at generating economic benefits. Therefore, it opens room for both innovation ideas focused on process improvement and creative solutions for everyday problems. However, a contradiction arises between creative potential and limitations to monetize the work itself. Based on this duality, developing skills to generate innovative ideas does not keep pace with business acumen (Dos Reis & Zille, 2020; Gruden & Stare, 2018).

4.5 MANAGERIAL COMPETENCIES

Managerial competencies encompass coordination and planning conventional functions. They take on an expanded scope by integrating decision-making, resource management and organizational strategies (Gruden & Stare, 2018; Roman et al., 2019) (Figure 12).

Figure 12

Example of managerial competencies drawn from interviews 4, 1 and 8.

[Coding Self-actualization ability]

[...] So I see myself as an optimistic person and straight forward, if I have a problem, I will do my best to fulfil the gap the best way possible, it makes no sense on playing the Macgyver because later on it will fall on my back, again, I will have to solve it, and the last bad move will even make the problem worse, I guess I'm a pretty determined person. (E_04)

[Coding Managing resources]

[...] I got here acting too much as a manager, like that guy who is the project manager, we didn't even talk about fast management, about getting here and organizing the house, about making people work on an organize way, making everybody perform well, on hiring whoever was necessary, firing whoever was necessary, lowering costs and so on [...]. (E 04)

The execution capacity is defined by several key aspects, namely: mastery of techniques enabling professionals to achieve quality and excellence in their work; and identifying problems and opportunities by mostly evaluating solutions and growth prospects in their fields. Persistence is another component disclosed by professionals' determination to reach challenging goals. Finally, these professionals engage in strategic decision-making featured by making complex choices, accepting the accountability for associated risks and resulting impacts.

This last feature requires a preliminary data analysis stage regarding suppliers or the minimum viable product linked to data management. The collected data suggested the extension of the existing literature to show that current management involves analytical and digital competencies linked to both managerial activities digitalization and the assessment of a product or service market readiness (Roman et al., 2019). The managerial dimension expands within this context to include the definition of resource management strategies and the identification of the technologies best suited to each solution. The ability to organize priorities and keep a systemic view of the process becomes essential to ensure a clear oversight of every stage.

This process leads to resource optimization and ensures results within the limits offset for available resources. It would allow professionals to achieve accurate outcomes, despite the constraints. Simultaneously, it encompasses inventory management focused on internal logistics, as well as time management, which involves efficient planning and distribution of activities, and management focused on structuring ceremonies. In addition, human resources management enhance team members' creativity. These activities blend strictly technical features (e.g., data analysis) with social skills linked to creative management, although they fall within the management realm (Muzzio & Paiva Júnior, 2018). This finding highlights the multifaceted nature of contemporary management, which has evolved from a mere function into an intersection of different competencies.

5 FINAL CONSIDERATIONS

According to this study, metacognitive competencies are clear in ICT and CE professional practices, which are characterized by a set of behaviors, skills and capabilities relevant to their work activity. Consequently, the results disclosed technical, behavioral and cognitive skills essential for professional development in the information age. This is so, because the data set comprised competencies divided into five categories that, altogether, reflect the knowledge demanded by these professionals' work. The definitions of each competency linked to the described categories and contextualized through empirical data

reflect how interviewees perceived and interpreted the skills required for professional ICT and CE work practitioners.

Competencies identified in the study *corpus* were relevant to interpret the introduced terms as they were primarily represented by intellectual, managerial, innovative and behavioral competencies. These competencies also encompassed the ability to acquire new knowledge, remain flexible and adapt to changes required in the field; and to make decisions within organizations. Features such as creativity and professional conduct-related attitudes are integral to the innovation process.

There are also categories linked to the knowledge acquired through professional practice or formal education, similar to expertise and managerial competencies. They often present a more technical nature. Finally, intellectual competency relates to the analytical process of absorbing and processing information. A professional having these competencies represents the ideal candidate for the labor market.

Facets identified based on the codes in each metacognitive competency category represent the understanding of the knowledge acquired by these professionals throughout their lives. Soft skills were relevant to interpret the interviewees' statements, which were primarily represented by innovative and behavioral competencies.

Categories linked to the knowledge acquired through professional practice or formal education, mainly the more technical ones, such as expertise and managerial competencies, are in another realm. Consequently, intellectual competency concerns the analytical process of absorbing and processing information. A professional holding all the outlined competencies represents the ideal candidate for the labor market.

From this perspective, this article adds to the literature by clarifying the interrelation among competencies, skills and behaviors required by ICT and CE professionals to perform their work activities. It established that although these sectors are often viewed as non-uniform, they appear to share practices with similar sectors. This feature makes it feasible to investigate them in order to propose a standardized approach to manage their workforce.

The literature on metacognitive competencies is linked to specific roles in IT or to creative economy (project managers, cultural entrepreneurs, among others) they drew upon to frame the research problem and guide the analysis (e.g., project managers, cultural entrepreneurs). Consequently, it does not assess the relevant competencies for the professional practice, as a whole, as the research focuses on professionals in specific roles, rather than on a sector defined by innovation, technology and creativity. The literature revealed a gap as it failed to address the competencies of the entire productive class in this field.

One can point to limitations concerning the choices made in CE and ICT professionals' operational segments; however, this limitation also represents the study's unique aspect given the field vastness and its different activity field. It was necessary defining the segments to be addressed and those to be excluded from the research. Focus on ICT and CE professionals working in Brazil was another study limitation. Consequently, at least two categories of professionals often found in these sectors were not taken into consideration, those who have migrated to other countries (brain drain) and the ones who choose not to set bonds with specific regions (digital nomads). Brazil stands out as a major global economy, in addition to its vast geographic and cultural scale, which proved that the study scope was defined within a valid context.

This limitation also allowed the proposal of a future research agenda aimed at other competencies classified as socio-emotional, in other words, at a set of skills involving

individuals' relationship with themselves and with others. It is recommended to broaden investigations into these competencies, with emphasis on professionals working in technological and creative environments, such as digital influencers, content creators, celebrities, digital entrepreneurs, among others. Finally, studies conducted with professionals in the same sector, but not limited to the Brazilian context (digital nomads or professionals from emerging economies) could further expand this study's contributions.

Acknowledgement

This research was funded by the National Council for Scientific and Technological Development (CNPq) and the Foundation for Science and Technology Support of Pernambuco (Facepe).

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Appendix A

Interview script

Topics	Specific questions
Featuring professional activity	What is your day-to-day work like?
	What are the main activities of your job?
	Would you say your work requires creativity?
	Would you say your activity is innovative?
	How does your activity relate to technology?
	You mentioned [...]. Could you explain in more details how that relates to your activity?
Professional features	How do you organize or manage your work, including when it involves others?
	How do you handle the challenges of your profession?
	How do you assess the way you handle challenges at work?
	How do you evaluate your attitude or conduct at work?
	How do you rate the way the challenges of your profession are handled?
	How do you rate your ability to handle new developments or changes related to your work or profession?
	How do you rate your relationship with colleagues or project team members?
	How do you handle pressure at work?
	Technically speaking, what are your main professional qualities?
	In your viewpoint, what are the characteristics companies look for or value most in a professional in your field?
Influence of using technologies and digital media on career choice	You mentioned [...]. Could you further explain how does it relate to your professional activity?
	Have you always been interested in technologies related to your professional activity?
	Do you usually participate in online discussion forums?
	Are you usually very active on social media?
	How do you think your life would be without digital technologies?
	You mentioned [...]. Could you explain the importance of it to you in more details?
	How was your first contact with your profession?
	What was your professional training like?
	How do you view your profession in today's world?
	You mentioned [...]. Could you elaborate on the relevance of it for your profession?