The digital humanism era triggered by individual creativity

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Authors’ biography

**Veronica Scuotto** (PhD, FHEA, MBA, BA-Honour) is currently an associate professor in the Department of Economics, Management, Institutions at the University of Naples Federico II (Italy) after working at the University of Turin, at the University of the West of Scotland (UK), and at the Pôle Universitaire Léonard de Vinci in Paris (France). She obtained the Italian National Qualification as full professor in 2020. She has been invited as a guest speaker to several conferences. Her research is focused on small to medium enterprises, knowledge management and digital technologies, which has resulted in the publication of articles featured in top-tier peer-reviewed journals such as *Journal of Product Innovation Management (4*)*, *Journal of World Business (4*)*, *Journal of Organizational Behaviour (4*)*, *Journal of Business Research (3*)*, *Production Planning & Control (3*)*, *Technological Forecasting and Social Change (3*)*, *International Marketing Review (3*)*, *IEEE Transactions on Engineering Management (3*)*, among others. She has authored four books. Veronica is editorial assistant for the Journal of Intellectual Capital and an editorial board member of the Journal of Knowledge Management. Veronica is also a member of the International Council for Small Business and is a mentor for the Techstars Smart Mobility Accelerator in Turin, Italy.

Furthermore, in 2021 Veronica has received the “Gold Award Best Paper” at the IEEE ICTMOD 2021. In 2020 on JOB has been awarded as the tenth most cited article. She also received two awards as the best Paper of the EuroMedSIMA track “New Challenges in Open Innovation” in 2016 and the “best-commended paper” in 2017 at the annual EuroMed Academy of Business (EMAB) conference. In 2018 she was recognized by International Council for Small Business (ICSB) as a global partner of excellence.

**Theo Tzanidis** is an Associate Professor at University of the West of Scotland. Theo is also a Guest Professor and external examiner at Birmingham city University. He is a Senior Member of Digital Marketing Institutes Global Industry Advisory Council, and also a UWS Digital Media and Communications Lead. Previously, Theo was heavily involved in digital transformation consulting and Research Projects that focus on digital marketing automation, digital communications, digital business & corporate transformation via the use of Digital Social and Transformational Technologies. Previously, as Head of Marketing for a large construction firm, he led and implemented digital transformation in 2011. Theo had launched and successfully directed UWS M.Sc. Digital Marketing programme, now a leading postgraduate programme in UK in its discipline. Theo is the Principal Investigator (PI)/Lead Academic on numerous Innovate UK funded Digital Transformation Projects, Theo Tzanidis pioneered a digital revolution of higher education via the use of creative new technology. He co-created, with Matthew Frew, the accelerated and Immersive Education method that was nominated for the 2018 Guardian, Herald, and Pioneer Awards for the creative use of VR/AR/Digital to integrate technology and redefine how students are taught at UWS.

**Antonio Usai** is senior researcher in business management and he teach Strategic marketing for tourism and Digital marketing and revenue management at the Department of Economics and Business of the University of Sassari. He is member of the Academic Board of the XXXVI PhD program in Economics, management, and quantitative methods of the University of Sassari and his major research interests include innovation management, strategic management, and consumer
behavior. He is the founder of Tourism Plus (spin-off of the University of Sassari) which is specialized in innovation, research and development in the tourism sector.

Roberto Quaglia is Professor of Strategy and Management at ESCP Europe and a visiting Professor at the Lorange Institute/CEIBS (Switzerland/Ghana), ESA (Lebanon). He has earned his PhD at University Paris 2 Assas in Paris, he is an alumni of CPCL at Harvard Business School (USA), EDP at MIT - Massachusetts Institute of Technology (USA), MiM at Escp Europe (France), University of Torino (Italy). He started his professional career as a strategic consultant at McKinsey & Co. and he then moved to Academia over 15 years ago. A true passion for teaching and consulting, with a bias to corporate clients and family business; he serves as a keynote speaker, a workshop facilitator, a consultant or a board member. Roberto specialises in Strategy, Leadership, Decision Making, Communication, Influence, Change Management and Family Business.
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Responding letter

Dear Guest editors and Reviewers, we’d like to kindly thank you for your insights. They have helped us to improve our article and so we really hope that the research can meet your expectations. As recommended by reviewer 1 and 2, we have revamped the empirical research that offers some different results. For instance, in this new analysis the entrepreneurial spirit is not significant. In turn, discussion, theoretical and managerial implications are amended accordingly.

We have also asked for a professional proofreader to check the narrative of the article. We retain that the article is more readable and we hope that you’ll enjoy it.
The digital humanism era triggered by individual creativity

Abstract

Shifting from Industry 4.0 to Industry 5.0, the digital transformation (DT) has encouraged new debates on human skills as opposed to technologies. It has delivered positive and negative perspectives, focusing on the dilemma of how human skills can influence the DT. The present research explores human skills in the entrepreneurial world, considering its three main forms of creativity, innovation and entrepreneurial spirit in relation to the DT. This has mostly occurred in the knowledge-intensive business service (KIBS) industry in which humans have a predominant role. Under the lens of social cognitive theory, this study has examined a range of 370 KIBS companies across different sectors in Europe and the resulting individual creativity and innovation represent a (motivator) or a catalyst, which drives and nurtures DT. Theoretically, a new concept emerges, namely digital humanism, which involves emphasizing the relevance of human skills. Moreover, the study suggests that governments and policymakers encourage creative working activities by exploiting technologies to develop innovations. In this sense, technologies assume a positive connotation, leveraged by entrepreneurship.

knowledge-intensive business service; digital humanism; Creativity; Digital transformation; entrepreneurial spirit

Introduction

As we are on the verge of the fourth Industrial Revolution, and we are edging closer to Industry 5.0, there are certain challenges that industry must respond to as the transition is getting closer (Marr, 2018; Konno & Schillaci, 2021), which will disrupt the way in which we live and work and, consequently, learn. Betti et al. (2020) called this the great industrial reset. Within this context, we envision digital platforms and the quick involvement of synthetic hyperintelligence, changing the way in which we commercialize, interact, consume, communicate and ultimately socialize (Del Giudice et al., 2021a; Bostrom, 2015; Mulgan, 2016). In turn, this has provoked a debate on the positive and negative outcomes derived from the use of new technologies (e.g., artificial intelligences, the Internet of Things, robots, etc.). One of the big questions concerns whether technologies empower or disempower workers. The management literature offers two perspectives – one is opposite of the other- which celebrate the incredible enforcement of human skills (Stiegler, 2008; Del Giudice, 2021a;b; Acemoglu & Restrepo; 2017a, 2017b), whereas others have demonized the use of such technologies over time, as these tend to diminish human strengths and replace them (Cubric, 2020; Pan, Froese, Liu, Hu & Ye, 2021; Carleton, 2016; Hoetler, 1979; Sombart, 1913; Schumpeter, 1942). In turn, there is still a great deal of confusion regarding the potential synergy between humans and humanoids, and how to empower humans by using these emerging technologies. Moreover, this confusion has led to a new phenomenon, namely digital humanism, which has induced a debate in relation to the positive and negative views of digital humanism in the management literature. As Lyall et al. (2018) stated, people have a fear of being replaced by machines and ultimately losing their jobs, whereas other scholars argue that automation in the form of robots (for now) cannot replace the critical and strategic thinking of individuals. Stiegler (2008; 2011) stresses the relevance of these machines in terms of augmenting human skills. Recently Del Giudice et al. (2021a; b) have explored some of the positive outcomes emerging from digital humanism, such as improving the working balance and triggering new ‘entrepreneurial ventures’. They have also emphasized the positive relationship between explorative and exploitative routines with human-humanoid interactions in ambidextrous environments. These positive outcomes emphasize human competences in the form of creativity, innovation and entrepreneurship. Edwards-
Schachter et al. (2015) employed social cognitive theory (SCT) to investigate these competences, so as to explore how individuals interact with their environment. In this scenario, knowledge driven innovation has resulted in the emergence of KIBS companies. They have assumed a crucial role in the new digital era (Albizu et al., 2022) and have induced a ‘rethinking’ of the DT process by considering a technology space (van Meeteren et al., 2022). Taking into consideration the fact that SCT constitutes a theoretical concept that explains human behaviour via environmental, psychological and behavioural effects (Bandura, 1991; 1998; 2001), the aim of this study is to assess self-efficacy through the aspects of employee creativity, innovation and entrepreneurial spirit, which represent a (motivator) or a catalyst, driving and nurturing the DT in the KIBS. The research examines how individual creativity, innovation and entrepreneurial spirit can be empowered by digital technologies and whether the intertwining of those individual abilities can foster DT in the organizational environment. The study examines the role of creativity along with innovation (Montani et al., 2017) and employees’ entrepreneurial spirit (Newman et al., 2018) under the lens of SCT, and addresses the belief that “human characteristics and capabilities nurture digital transformation”. In particular, it examines a range of 370 KIBS companies across different sectors in Europe; KIBS are more innovative than other companies and are fundamental for the current, knowledge-based economy. These companies have attracted the interest of the Europe Union, which promotes the growth of these companies and the academic community (Growe, 2019; Tuominen & Martinsuo, 2019; Heikka & Nätti, 2018; Kohtamäki & Partanen, 2016; Domenech et al., 2016) even in the context of manufacturing industries (Khanra et al., 2021). Despite this, the research enhances the scenario of knowledge-intensive firms (Fisher et al., 2021; Marjanovic, 2021; Papa et al., 2021; Ahmed et al., 2021; Ferreira et al., 2018; Tsai, 2018; Boucknen & Kraus, 2013) offering a quantitative analysis on business services. The results emphasize the inextricable link between creativity and innovation with DT (Galindo-Martín et al., 2019; Park et al., 2022; Del Giudice et al., 2021a).

In addition, other opportunities will emerge in the domain of entrepreneurship and job placement, thanks to an understanding of the way in which entrepreneurs, managers and even policymakers consider digital humanism and how they learn, decide, strategize and implement such phenomena. The study recommends that government and policymakers intervene in relation to insecure and low-paid jobs and encourage creative working activities by exploiting technologies to develop innovations. In this sense, technologies can assume a positive role, as a means of improving job quality, preserving human rights and fostering entrepreneurship.

Theoretical background

Many businesses are still working hard to achieve the competitive advantages of Industry 4.0, such as scalability, process automation and thus, improved productivity, efficiency, support for flexibility and agility, so as to generate a better customer experience, higher revenues and increased profitability (Moran, 2018; Bresciani et al., 2021a, Bresciani et al., 2021b). Despite their considerable efforts to transform and evolve in order to meet the demands of a new era in terms of doing business, there are still certain opposing forces and factors that impede development and transformation and, sometimes, this is linked to opposing attitudes towards change and technology within the human resources department of an organization (Del Giudice et al., 2021). For instance, such fear started with the increased use of social media (Tandon et al., 2021). Furthermore, organizations are now fully feeling the transformative effects of digitization, digitalization and, as a result, that of DT, with the ever-accelerating process creating more channels for customer and business interaction, as well as opening new avenues for data, using products and services (Ahmad & Bachene, 2017; Bresciani et al., 2021b; Bresciani et al., 2021c). According to Gong and Ribiere
DT, digitalization and digitization have no explicit or commonly accepted definition, and according to certain authors, this intensifies the confusion among both the academic and practitioner communities, which, in turn, has an effect on the way in which the phenomenon is studied or implemented by the industry. Gong and Ribiere (2021) define DT as:

“A fundamental change process enabled by digital technologies that aims to bring radical improvement and innovation to an entity [e.g., an organization, a business network, an industry, or society to create value for its stakeholders by strategically leveraging its key resources and capabilities”.

Moreover, Scuotto et al. (2022) highlight digitalization as an evolutionary process for the organization in relation to Industry 4.0 and 5.0 frameworks, the journey from analogue to digital. The authors describe DT more as an organizational evolutionary spectrum, with possibilities for digital technology adoption and implementation, varying complexity and the growth of both hardware and human resources, moving towards cyclical revolutions throughout time. This implies that the primary steps within the DT spectrum (Verhoef et al., 2019) are an analogue state of being, followed by digitization and then digitalization.

Autio (2017, p. 1) defines digitization as:

“the technological transfer of analogue information into digital form”. A nice example is scribbling on paper (analogue) and progressing to writing on a word document using a stylus pen. Digitisation is associated with a decreasing number of digital technologies used in an organisation.

Furthermore, Tilson, Lyytinen and Srensen (2010) (p.2) define digitalization as:

“The socio-technical processes that accompany the use of most digital technologies, having an influence on social and institutional environments that need and increasingly depend on digital technology”.

Digitization, as defined by Scuotto et al. (22), constitutes the first stage in the DT spectrum, linked to advances in computer processing and use in industry. Digitalization, on the other hand, is the step that comes after digitization and encompasses the use of digital technology in corporate processes, economic activities and society (Auto, 2017). Web 2.0, which debuted in 2004, heralded the arrival of smartphones, as well as cloud computing, algorithms, performance analytics, digital communications and big data technologies (Verhoef et al., 2019), all of which had a direct impact on the evolution of marketing communication as an internal business process, as well as engagement with prospective customers or clients. These establish digitilization as the conceptual framework that develops company processes in response to technical sector changes and, as a result, relates technological sector changes to business industry changes.

Many entrepreneurs envision the future and do not perceive business processes and organizations as they are or as they may become with the future industry (Industry 5.0). Furthermore, technical advancements are occurring at such a rapid pace that Industry 5.0 is already becoming a part of the commercial environment (Atwell, 2017). DT, digitization, delocalization, agilization, automation, virtualization, customer centricity, brain to computer interfacing, cybernetics and robotics are only some of the areas that are emerging at the forefront of our daily lives. Companies are now faced with a one-way route: evolution (Bresciani et al., 2021c; Bresciani et al., 2021d). The KIBS emerges within knowledge driven innovation companies; Van Materen et al. (2022) have analysed the technology space for the KIBS, offering a detailed map of its DT. For Albizu et al. (2021), vocational education
and training are significant in the KIBS and are immersed in the digital era. Moreover, to continue to innovate, adapt and change, it is critical that the organization invests in the human factor and drives the adoption of new technologies and techniques. The KIBS is now able to use data to foresee future trends and the necessary modifications that are regarded as innovative, and it is this approach that will take the industry collectively to the next stage of the Industrial Revolution. The above notion, however, can be seen as both a positive and negative development. Where there is a big shock and considerable change, there is usually space for the formation of positive and negative attitudes and perceptions, and consequently, both dystopic and utopic expectations of the future.

**Theoretical framework: SCT in a digital transformation context**

SCT was introduced by Bandura in 1991 and was elaborated on in some of his other works (1998; 2001). He takes into consideration environmental, psychological and behavioural effects to explain human behaviour. As an SCT (sub)set, self-efficacy is a self-regulatory instrument that not only suggests the skill or competence of performing, but also the self-belief in one's ability to be effective and thus improve motivation and problem-solving efforts (Bandura, 1998). Other components of SCT relate to anticipation and self-efficacy beliefs, according to Zhao and Zhou (2021), which are essential components. People are motivated to conduct a certain activity if they feel driven, but self-efficacy deals with assessments relating to one's learning and execution of actions when dealing with a projected issue (Schunk & Pajares, 2009; Young et al., 2005). SCT explains psychosocial processes using a triadic reciprocal causation behaviour model, cognition and other personal traits, and the environmental events are the causes of mutual influence within the social cognition model, which impact upon one other bi-directionally (Bandura, 1988). Individual attitudes and desires powerfully regulate and direct individual actions, and individuals may stimulate environmental responses. In turn, actions influence and, ultimately, determine the content and form of cognition, as well as individual emotional responses. The environment influences both individual motives and behaviour and consequently, people become both environmental products and environmental producers, due to the triadic reciprocal causal relationship. According to Edwards-Schachter et al. (2015), creativity, innovation and entrepreneurship (together forming: entrepreneurial competences), when investigated under the lens of SCT, allow us to understand how individuals (and consequently entrepreneurs) interact with their environment. They see this as a complicated and social interactive process that allows the individuals (or entrepreneurs) to develop new competences that have been socially constructed. This happens frequently within KIBS companies, which are highly dependent on human behaviour and so cognitive perspectives may differ (Mol & Brandl, 2018).

**Hypotheses development**

According to de Vasconcellos (2021), firms that invest in cultivating creativity among their workforce have a greater organizational performance, which is heightened when this creativity acts as a precursor to digital skills. Furthermore, according to the same authors, more creative organizations that build digital skills may minimize the negative impacts of time since the firm's inception, as well as any employee-number constraint, making them more dynamic, agile and adaptive to the DT environment. Foerster-Metz et al. (2018) assert that the workforce of the future will need to think and behave in a linked manner, as well as concentrate on innovation and creativity, so as to deal with the structural changes brought about by technological advancement cloud computing, advanced algorithms and artificial intelligence, which are all interconnected and have a significant impact on how people behave within and outside of organizations. DT has shown that it has significantly changed the workforce population, the skill set required and the
means to connect, cooperate and communicate within a company, not only from the employees’ perspective but also from a leadership perspective. This is a core catalyst of DT especially in a KIBS environment, given that DT is closely linked to knowledge development, dissemination and learning. Particularly as regards the latter, creativity is a crucial factor in the implementation and success of any DT process. DT is concerned with both technology and people (Frankiewicz & Chamorro-Premuzic, 2020). Indeed, a technological revolution should be observed by a KIBS organization and should have an impact on all dimensions of the organization as a bundle of relationships and implications, including organizational capital, human resources, managerial practices, product development, operations, process engineering and management decisions. DT is the process of acquiring technology and absorbing digital knowledge, in order to enrich and improve the organizational capabilities for the value generation. As a result, analysing successful DT programs is critical, in order to evaluate the skills of people and organizations. The top management qualities that influence the organizational and individual behaviour of KIBS are, thus, very important.

The transformation process is considerably more likely to be driven from the top, which does not imply an authoritarian or hierarchical leadership style, but rather an understanding that senior managers’ leadership encourages long-term change (Sathe, 2007; Imran et al., 2020). As a result, the role of leadership in DT is vital in terms of carrying and supporting an organization on its path to digital maturity. In particular, the leadership style is critical when making decisions within a complicated setting, as well as fostering and spreading a revolutionary innovative approach, promoting creativity, digital culture and entrepreneurial spirit across the organization.

When it is obvious that creativity stimulates innovation and, therefore, entrepreneurship (Galindo-Martín et al., 2019; Wyckoff & Pilat, 2017; Srinivasan & Venkatraman, 2018; von Briel et al., 2018; Park et al., 2022; Packmohr & Brink, 2021; Soldatova et al., 2021), it is less evident whether those nurture organizational DT. HPs -1, 2 and 3- suggest that this type of transformation is now directly linked to technology and digital innovation in the digital era. It is a comprehensive method of moving organizations towards the integration of new technologies and digital solutions, in order to improve organizational performance by increasing organizational capabilities and competitiveness. Creativity should be understood as having numerous contextual levels, including several levels of aggregation (personal, team and organizational), as well as diverse mechanisms that drive ( Guilford, 1950; Torrance, 1965). Despite the many interpretations of the word “creativity”, the general view is that it is a multidimensional variable consisting of four characteristics (Ivancovsky et al., 2021): (1) fluency – the ability to generate a considerable number of ideas and directions of thought for a specific problem; (2) flexibility – the ability to consider as many uses and classifications for a particular item or subject as possible; (3) originality – the ability to consider ideas that are unusual and even refuted, rather than those that are self-evident, banal or statistically ordinary and (4) elaboration – the ability to expand on an existing idea and develop it (Ivancovsky et al., 2021). There has been extensive evidence from research into the industries of fashion (Lee et al., 2021), education (Schiavo et al., 2021; Crawford et al., 2021), tourism (Gretzel & Koo, 2021), engineering and operational management (Vrontis et al., 2021) that the use of advance technologies enhances individual creativity.

Therefore, we deem that:

**Hpi.1 Individual creativity is positively correlated to DT**

By failing to adapt successfully to newly released items, Christensen (1997a) claims that incumbent organizations collapse. Consequently, low-end markets adopt disruptive innovation first, while performance improvements allow connected goods to enter mainstream markets. However, relative advantage is one of the innovative traits that contributes to market acceptability. Most research on
innovation diffusion promotes adoption intention by boosting remarkable performance or high-end innovation (Pham & Ho, 2015). Technology advancement and disruption is likely to be affected by market demand and competitive dynamics between innovators and incumbents (Adner, 2002). In other words, innovation disruption occurs when a new product outperforms older products. Moreover, Nambisan et al. (2019) state that several studies have demonstrated how digital technologies fuel new forms of innovation that cross traditional industry/sector boundaries, embrace networks, ecosystems and communities, integrate digital and non-digital assets, and accelerate the inception, scaling and evolution of new ventures (e.g., Fischer & Reuber, 2011; Huang et al., 2017; Lyttinen et al., 2016; Srinivasan & Venkatraman, 2018; von Briél et al., 2018). Nambisan et al. (2017) have observed that the introduction of new digital technology alters the nature of uncertainty inherent in innovation and entrepreneurship (in terms of both processes and results), promoting a radical rethinking of the way in which individuals, companies and collectives might pursue creative undertakings.

Consequently, we consider that:

*Hp.2* Individual innovation is positively correlated to DT

According to Stevenson and Jarillo (2007), there are three fundamental characteristics of entrepreneurship: autonomy, creativity and opportunity. Autonomy often refers to the entrepreneur's independence in reaching stated goals and taking advantage of possibilities. Autio et al. (2014) add to previous research (HP2), namely that innovation, as we define it in a DT context, includes not only the introduction of new technology, but also the employment and consequences that result from its use. Galindo-Martín (2019) insists that the multifaceted interdependence of digital technologies, competencies and firm-level innovation that coincides with DTs allow entrepreneurs to access new markets and find new ways of interacting with their consumers. According to the author, this is a core characteristic of the KIBS, an organization that is dependent on knowledge induced innovation and change, whereby digital technology facilitates communication or recruitment information, which in turn enables companies to hire the best trained individuals for specific tasks (Beckman et al., 2021). Wyckoff and Pilat (2017) add that augmented skills lead to increased worker productivity and that the economies of scale and scope that are generated favour innovation, thus bolstering and enhancing the benefits of a reinforced digital economy and entrepreneurial output.

Against this background, we maintain that:

*Hp.3* Individual entrepreneurial spirit is positively correlated to DT

**Empirical research**

**Research context**

KIBS companies are distinctive in that they are more innovative and generate a competitive advantage for countries. This has increased the interest in those companies, and they have adopted specific country strategies from the European Commission, related to the knowledge-based economy (European Commission, 2021). Their key value is knowledge that circulates inbound and outbound, an organizational environment combining leadership and people (Millar et al., 2016) and preserving it (Bolisani et al., 2013). According to Giacinto et al. (2018) the KIBS is placed in urban areas which allows it to be close to customers (customers’ proximity) and to the human capital. These companies frequently interact with their customers through a “collaborative learning process” (Grandinetti, 2018; Aslesen & Isaksen, 2010; Strambach, 2001), offering new solutions, and in so doing, developing new knowledge (den Hertog, 2002) in line with the principles of creativity, innovation and entrepreneurial spirit. Moreover, other criteria used to identify the KIBS rely on the university’s
proximity as a fundamental space for collective learning (de Bok & van Oort, 2011; Jacobs, Koster & van Oort, 2013; Shi, Wu & Zhao, 2013; van Dijk & Pellenbarg, 2000) and the employment of highly skilled workers. KIBS industries are essentially based on the explorative routine side of an organizational environment, employing their cognitive abilities to bring new, innovative ideas into the market. Moreover, they are included in the following sectors: computer programming, consultancy and related activities; 63 (information service activities), 69 (legal and accounting activities), 70 (activities of head offices; management consultancy activities), 71 (architectural and engineering activities; technical testing and analysis), 72 (scientific research and development) and 73 (advertising and market research) (in line with NACE Rev.2 classification).

In summary, we used the following criteria to select our sample:

- Located in urban areas in Europe
- Collaborative learning process with customers
- Collective learning with employers
- Proximity to universities
- Proximity to customers
- Development of innovative solutions

Sample and data collection

The initial sample was composed of over 1954 employees employed within the KIBS but only 370 KIBS companies were fully engaged with the present research. They were able to send us the full completed questionnaire, composed of 20 closed questions, structured according to the seven-point Likert scale. The questionnaire was based on ancillary questions concerning the demographic aspect of the respondents (e.g., age, job role, company, sector, etc.) and then specific questions on individual creativity, innovation and entrepreneurial spirit, and DT.

Dependent variables

DT
Recent times have been characterized by the exponential use of digital, advanced technologies, such as the Internet of Things, blockchain, artificial intelligence, humanoids and so on, within business environments. Companies, thus, have been encouraged to adopt those technologies that fully embrace the technological change created by the DT. As previously mentioned in the theoretical section, DT is achieved by employing digital technologies to interact with clients, introducing new digital skills within the company and shifting individual work online.

<table>
<thead>
<tr>
<th>DT</th>
<th>Digitalization</th>
<th>D1</th>
<th>Employing digital technologies</th>
<th>Westerman et al., 2014;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>D2</td>
<td>Introducing digital skills</td>
<td>Legner et al., 2017;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>D3</td>
<td>Ensuring that individuals work digitally</td>
<td>Vial, 2019</td>
</tr>
</tbody>
</table>

Independent variables

Entrepeneurship - creativity, innovation and entrepreneurial spirit.
Entrepreneurship is consistently associated with three key elements, namely, creativity, innovation and entrepreneurial spirit.

Considering previous research into the domain of creativity, we took into consideration the following items: (1) fluency; (2) flexibility; (3) originality and (4) elaboration (Lee et al., 2021; Schiavo et al., 2021; Crawford et al., 2021; Gretzel & Koo., 2021; Vrontis et al., 2021). This is summarized as follows:

<table>
<thead>
<tr>
<th>Creativity (CR)</th>
<th>C1</th>
<th>Fluency</th>
<th>Lee et al., 2021; Schiavo et al., 2021; Crawford et al., 2021; Gretzel &amp; Koo, 2021; Vrontis et al., 2021</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>C2</td>
<td>Flexibility</td>
<td></td>
</tr>
<tr>
<td></td>
<td>C3</td>
<td>Originality</td>
<td></td>
</tr>
<tr>
<td></td>
<td>C3</td>
<td>Elaboration</td>
<td></td>
</tr>
</tbody>
</table>

Referring to OECD (2021), variable “innovation” is formed from the following items: practical intelligence for innovation; problem solving skills; flexibility skills and high-tech skills. In summary:

<table>
<thead>
<tr>
<th>Innovation (INN)</th>
<th>I1</th>
<th>Practical intelligence for innovation</th>
<th>OECD 2021</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>I2</td>
<td>Innovation</td>
<td></td>
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<tr>
<td></td>
<td>I3</td>
<td>Problem solving skills</td>
<td></td>
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<td></td>
<td></td>
<td>Flexibility skills</td>
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<td></td>
<td></td>
<td>High-tech skills</td>
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</tbody>
</table>

Conversely, entrepreneurial spirit is linked to the capacity to start a new business, being autonomous and exploiting new opportunities

<table>
<thead>
<tr>
<th>Entrepreneurial spirit (ES)</th>
<th>ES1</th>
<th>Capacity to start a new business</th>
<th>Stevenson &amp; Jarillo, 2007</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ES2</td>
<td>Being autonomous</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ES3</td>
<td>Exploiting new opportunities</td>
<td></td>
</tr>
</tbody>
</table>

Accordingly, the research design evaluates the relationship by means of independent variables, namely, creativity, innovation and entrepreneurial spirit, which are embraced in the general meaning of entrepreneurship and the dependent variable, that is DT, via a SPSS analysis. These interactions are shown in Figure 1.

**Figure 1. Research design**
Findings

As previously mentioned, the three hypotheses are tested by SPSS analysis. The scope is to evaluate whether human skills, based on creativity, innovation and entrepreneurial spirit, “nurture” DT within KIBS industries. The present research offers a micro perspective by looking into a business scenario in Europe. Such methodology has been already used in DT (Yu et al, 2021; Melović et al., 2020), entrepreneurship (Nasiri, F., & Bageriy, 2020) and KIBS (Dansai et al., 2021) research domains. Table 1 offers a correlation analysis of the internal consistency between measures and items which are positive and are consistent and reliable with the research design.

Table 1. Correlation analysis

<table>
<thead>
<tr>
<th></th>
<th>CR</th>
<th>INN</th>
<th>ES</th>
<th>DT</th>
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<tbody>
<tr>
<td>CR</td>
<td>1.000</td>
<td></td>
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<tr>
<td>INN</td>
<td>0.41970949</td>
<td>1.000</td>
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</tr>
<tr>
<td>ES</td>
<td>-0.0101473</td>
<td>-0.0126883</td>
<td>1.000</td>
<td></td>
</tr>
<tr>
<td>DT</td>
<td>0.39319311</td>
<td>0.4649231</td>
<td>-0.0384534</td>
<td>1.000</td>
</tr>
</tbody>
</table>

To avoid any bias in the outcomes, we created a control model that has shown significant results (Table 2).

Table 2. Control model

<table>
<thead>
<tr>
<th>Variables</th>
<th>CR</th>
<th>INN</th>
<th>ES</th>
</tr>
</thead>
<tbody>
<tr>
<td>DT</td>
<td>0.623***</td>
<td>0.511***</td>
<td>0.615***</td>
</tr>
<tr>
<td>Annual turnover</td>
<td>0.589***</td>
<td>0.339***</td>
<td>0.007***</td>
</tr>
</tbody>
</table>
A SPSS analysis was conducted, associating a binary code with the dependent variable. As a result, the internal validity was verified and it is resulted that hp1 and hp2 are significant; while hp3 is not significant (as shown in Table 3).

**Table 3. Results**

Hp1.

CR (independent variable ) → DT (dependent variable)

<table>
<thead>
<tr>
<th>Regression statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>R –multiple</td>
</tr>
<tr>
<td>R –squared</td>
</tr>
<tr>
<td>Correct R squared</td>
</tr>
<tr>
<td>Standard error</td>
</tr>
<tr>
<td>Observations</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Analysis of Variance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gdl</td>
</tr>
<tr>
<td>Regression</td>
</tr>
<tr>
<td>Residual</td>
</tr>
<tr>
<td>TOT</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Coefficients</th>
<th>Standard error</th>
<th>Stat t</th>
<th>Significant value</th>
<th>95% inferior</th>
<th>95% superior</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>16,59</td>
<td>3,69</td>
<td>4,4</td>
<td>5,57</td>
<td>9,13</td>
</tr>
<tr>
<td>CR</td>
<td>0,20</td>
<td>0,07</td>
<td>2,7</td>
<td>0,009</td>
<td>0,05</td>
</tr>
</tbody>
</table>

CR is significant and positive. Hp1 is supported.

Hp2.

INN (Independent variable ) → DT (dependent variable)

<table>
<thead>
<tr>
<th>Regression statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>R –multiple</td>
</tr>
<tr>
<td>R –squared</td>
</tr>
<tr>
<td>Correct R squared</td>
</tr>
<tr>
<td>Standard error</td>
</tr>
<tr>
<td>Observations</td>
</tr>
</tbody>
</table>
**Analysis of Variance**

<table>
<thead>
<tr>
<th></th>
<th>Gdl</th>
<th>SQ</th>
<th>MQ</th>
<th>F</th>
<th>Significant F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>1</td>
<td>1901,263927</td>
<td>1901,264</td>
<td>11,3</td>
<td>0,001682995</td>
</tr>
<tr>
<td>Residual</td>
<td>41</td>
<td>7436,044406</td>
<td>181,3669</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOT</td>
<td>42</td>
<td>8795,897393</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Coefficients</th>
<th>Standard error</th>
<th>Stat t</th>
<th>Significant value</th>
<th>95% inferior</th>
<th>95% superior</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>3,90</td>
<td>6,57</td>
<td>0,5</td>
<td>0,556</td>
<td>-9,37</td>
<td>17,1</td>
</tr>
<tr>
<td>CR</td>
<td>-0,004</td>
<td>0,01</td>
<td>-0,24</td>
<td>0,806</td>
<td>-0,041</td>
<td>0,003</td>
</tr>
</tbody>
</table>

INN is significant and positive. Hp2 is supported.

**Hp3.**

ES (independent variable) → DT (dependent variable)

**Regression statistic**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>R–multiple</th>
<th>R–squared</th>
<th>Correct R squared</th>
<th>Standard error</th>
<th>Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>R–multiple</td>
<td>0,038453392</td>
<td></td>
<td></td>
<td>-0,02287552</td>
<td>14,63614905</td>
<td></td>
</tr>
<tr>
<td>R–squared</td>
<td>0,001478663</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Correct R squared</td>
<td>-0,02287552</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Standard error</td>
<td>14,63614905</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Observations</td>
<td>43</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Analysis of Variance**

<table>
<thead>
<tr>
<th></th>
<th>Gdl</th>
<th>SQ</th>
<th>MQ</th>
<th>F</th>
<th>Significant F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>1</td>
<td>13,00617138</td>
<td>13,00617</td>
<td>0,060</td>
<td>0,806598954</td>
</tr>
<tr>
<td>Residual</td>
<td>41</td>
<td>8782,891222</td>
<td>214,2169</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOT</td>
<td>42</td>
<td>8795,897393</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Coefficients</th>
<th>Standard error</th>
<th>Stat t</th>
<th>Significant value</th>
<th>95% inferior</th>
<th>95% superior</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>25,3</td>
<td>2,63</td>
<td>9,62</td>
<td>4,516</td>
<td>20,01</td>
<td>30,64</td>
</tr>
<tr>
<td>CR</td>
<td>-0,004</td>
<td>0,01</td>
<td>-0,24</td>
<td>0,806</td>
<td>-0,041</td>
<td>0,003</td>
</tr>
</tbody>
</table>

ES is not significant. Hp3 is not supported.

In line with the above results, we present that the hp1 and hp2 are supported; whereas hp3 is not supported. To sum up, Hp.1 The use of advanced technologies to enhance individual creativity is supported; Hp.2 The use of advanced technologies to enhance individual innovation is supported; whilst Hp.3 The use of advanced technologies to enhance individual entrepreneurial spirit is not supported.

**Discussion**

The belief that creativity and innovation spur DT innovation is supported by adopting an individual lens. In this sense, the study enforces the relevance of individual skills and capabilities, which are also expressed in the form of digital humanism (Del Giudice, 2021a;b). This drives the digital revolution and, consequently, the entrepreneurial revolution.
Furthermore, this is consistent with Scuotto et al.'s (2022) image of DT as a spectrum of organizational growth. The outcomes of this research support the concept that creativity and innovation are catalysts that push an organization's evolutionary transformation within the DT spectrum (Bresciani et al., 2021c; Bresciani et al., 2021d). More research is needed in this area to emphasize the relevance of the catalytic factors and their link to the acceleration of the digitization and digitalization phases throughout the DT evolutionary cycle. This research also emphasizes the relevance of human resources in organizational growth and change, as well as the importance of creativity and innovation in dealing with unanticipated occurrences and fostering change in a corporate context.

This unpredictability makes top-down digital change more difficult to envision (Kane, 2017). As a result, the success of new technology initiatives has long been attributed to employees' acceptance and adoption of new technology (Venkatesh & Davis, 2000) and the success of DT initiatives is attributed to employees' voluntary and active participation in a much larger and complex change process. Organizations that understand how to involve employees in the DT process will fare better than those that do not. People, not just technology, are critical to the success of these projects, according to scholars and practitioners interested in DT. However, much previous research (Kane, 2015) has been centred on top-down models that highlight employees' technology adoption based on their judgements regarding technical characteristics (e.g., ease of use, usefulness). Less research has been conducted as to why and how individuals willingly and actively engage in the DT process, which is ambiguous and difficult to analyse. It is our goal to bridge this gap by researching employees' broad beliefs and hypothesizing how they are used as sense-making aids for understanding digital change (van Dijk & van Dick, 2009).

According to Soldberg et al. (2020), a growing body of research implies that people rely on simplifying methods when faced with increasing complexity and ambiguity, and that generic beliefs are a more effective cognitive processing strategy in these situations. People's perceptions regarding the nature of internal or situational resources will influence how they comprehend and engage in (or withdraw from) DT projects. The “digital mentality” of an employee is the sum of these beliefs and managing DT means using the digital mindsets of employees.

**Theoretical implications**

This study contributes to the literature in the management, entrepreneurial and digital domain, emphasizing the significance of individual skills. Creativity and innovation are skills central to the evolution of any organization, and they are catalysts that promote DT (Galindo-Martín et al., 2019; Wyckoff & Pilat, 2017; Srinivasan & Venkatraman, 2018; von Briel et al., 2018; Park et al., 2022; Packmohr & Brink, 2021; Soldatova et al., 2021). According to Hp1 and Hp2 creativity and innovation are connected with DT. The implication of this finding is important, as it highlights how significant human resources are in terms of promoting digital transformation within; although the individual entrepreneurial spirit is not relevant in this context. A technological revolution in an organization has an influence on all elements of the business, including organizational capital, human resources, managerial practices, product development, operations, process engineering and management choices (Adner, 2002; Fischer & Reuber, 2011; Pham & Ho, 2015 Lyytinen et al., 2016; Huang et al., 2017; Srinivasan & Venkatraman, 2018; von Briel et al., 2018). The process of acquiring technology and absorbing digital knowledge to enhance and strengthen organizational capabilities for value creation defines and determines the success of technological change. Consequently, examining successful DT initiatives is crucial when evaluating the talents of individuals and organizations. It is crucial to take into account the protagonist “revolutionaries” whether these come from the top-level management or simply through the operational floor, and
thus enhance the nurturing and spreading of a revolutionary new approach, supporting creativity and innovation across the company. In turn, the positive or negative perceptions or attitudes of both employees and management, especially those of potential “revolutionaries”, underpin DT success but also divide the organization into “technophobes” and “technophiles” which may be the reason for lack of significance of entrepreneurial spirit.

However, we assume the position of confuting the negative opinions on DT, emphasizing the individual skills of creativity and innovation: technophobia is an unreasonable fear and/or anxiety that people develop in reaction to a new stimulus that arrives in the form of a technology and changes the individual's regular or prior routine when completing a certain job/task (Khasawneh, 2018). This is an unusual way in which to begin our research, yet we have observed that fear and technology often meet, whether this is associated with new food technologies and production techniques or new technologies. Yet, where there is fear, there is also the opposite, and where there are technophobes, there are also technophiles. We support the positive attitude towards DT that can be termed technophilia, defined by Martínez-Córcoles et al. (2017) as “a strong attraction and enthusiasm for new technologies” (pp. 184). Technophilia (from the Greek – Τέχνη, “art, skill, craft” and φίλος - philos, “beloved, dear, friend”) has historically been characterized as a strong attraction in relation to technology, particularly emerging technologies, such as personal computers, the Internet, cell phones and/or other gadgets (Osiceanu, 2015). However, there are grounds to believe that technophilia is more than just a desire or a positive attitude towards the use of technology (enthusiasm); it also encompasses behaviours and feelings. Therefore, we can assume that technophilia is embraced in the entrepreneurial attitude of people and provokes creativity, innovation and entrepreneurial spirit, which nurture the DT.

Managerial implications

Management often confuses DT projects with smaller-scale initiatives, aimed at improving efficiency and effectiveness. This omission may also impede DT. Moving from physical to digital retail sales is a far larger, more complex change effort than replacing internal communication service providers. DT is a more abstract kind of change with an undetermined future that is often described in metaphors, rather than providing an exact definition. Scuotto et al. (2022) present DT as a spectrum of various stages, one of which is digitalization and another digitization. The same authors note that today many businesses are forced to revise their business models and attempt to creatively integrate digital technology into their businesses, that creative, technologically driven change being known as DT. For some businesses this may relate to adopting innovative technologies (e.g., the Internet of Things or Industrial Internet of Things) (Warner & Wäger, 2019; Hess et al., 2016); for other businesses this may involve harnessing social media to engage with clients and to prospect sales or leads (Kaplan & Haenlein, 2010) or intelligently automating company processes and decision making. In a nutshell, businesses need to foster creativity and innovation within their organizational environment to come up with new solutions, for instance, rewarding people that are prone to be enterprising, having an optimistic mindset and positive mental outlook and exploiting opportunities. We maintain that the DT can be empowered by creativity and innovation, thereby transforming technophobia into technophilia.

Final remarks

The present study explores the relationship between individual entrepreneurial attitudes and the impact of DT on businesses. Through a micro and positive lens, we support the linkage between creativity and innovation with DT and the lack of significance entrepreneurial spirit can stimulate
new research to understand “why”, “how”, “when” this happens. At the moment, we have explored the industry scenario of KIBS. These companies have been established to become the new focus of scholars and academics, and this research explores the European context; even if the study can offer a broad overview of the phenomenon, it is still territorially limited and could be extended to include other countries, such as emerging economies. Moreover, the analysis of these variables can be extended to other sectors. We have explored individual, entrepreneurial characteristics independently of the micro and macro factors, therefore, the way in which those factors can nurture or influence DT development within businesses can be the focus of future study. In this sense, the DT is considered as a partially ‘response’ to entrepreneurship, however, other scholars, conversely, examine the effect of DT on business models or even on individual attitudes. In conclusion, highlighting the human element of the new economy, allowed us to consider the relevance of being empowered by technologies, so as to be more efficient and create a better working life.

References
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Moran, K. (2018, 1 August). Benefits Of Industry 4.0; Retrieved from: https://scontrols.com/benefits-of-industry-4-0/


