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# The Hidden Potential: Explaining How and Why Late-Entry IT Professionals Move Into The IT Profession

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# The Hidden Potential: Explaining How and Why Late-Entry IT Professionals Move Into The IT Profession

*Completed Research Paper*

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## Abstract

To sustain the rapid technological evolution, more than our internal market of young IT talent will be required to satisfy the need for IT staff. Integrating skilled non-IT professionals in the IT sector may help combat the IT skills shortage. However, we still lack an understanding of how and why non-IT professionals enter the IT sector late in their careers. We address this research gap by drawing on the careers of 53 successful late-entry IT professionals. By combining the theories of boundaryless and protean careers with the signaling theory, we discuss how we see shifts in the signals of knowledge, skills, and abilities that lower the barriers of the IT profession and explain how signals of behavior and practices act as door openers into IT. Lastly, we introduce four career patterns of late-entry IT professionals and thus shape our understanding of contemporary career development in but also outside of IT.

**Keywords:** career transition, boundaryless, protean, signaling theory, skills shortage

## Introduction

The IT sector has one of the highest talent shortages in the labor market (Bureau of Labor Statistics, 2023), which gets exacerbated as IT professionals increasingly choose to turn away from the IT profession (Zaza et al., 2022). In order to continue the rapid advancement of technology, our internal market of young talent will not be sufficient (Kulik et al., 2014; Malik et al., 2019). While we are already experiencing a high demand for IT professionals that exceeds the supply, this gap is expected to increase in the coming years (Bureau of Labor Statistics, 2023). Companies must therefore find ways to meet the demand for IT experts not only by relying on the next generation of IT professionals but also by integrating skilled professionals from outside the IT more effectively into IT.

In recent years, we have developed a clearer understanding of career transitions that lead individuals out of IT (see for example: Brooks et al., 2015; Joia & Sily de Assis, 2019; Young et al., 2023; Zaza et al., 2022). Yet, we have neglected research on career transitions that lead individuals into IT. Joseph et al. (2012) referred to these individuals as late-entry IT professionals, meaning individuals without IT background who enter the IT profession after several years in another non-IT occupation<sup>1</sup>. Despite their great potential for

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<sup>1</sup> The term "late-entry IT professionals" does not connote an advanced age, but rather indicates entry into the IT field subsequent to training and work experience in a different domain.

combating the IT skills shortage, late-entry IT professionals remain almost unexplored and we still do not know much about why they enter IT late in their careers and the mechanisms that enable or hinder their entry.

A good understanding of the careers and motives of late-entry IT professionals is essential for the future of IT work. To make use of late-entry IT professionals and to successfully integrate them into IT, their motives, career paths, and entry barriers must be thoroughly studied. Research on careers in IT has drawn on the concepts of boundaryless and protean careers, as they help us explain the high job mobility level in IT (Joseph et al., 2012). The theories of boundaryless and protean careers (DeFillippi & Arthur, 1994; Hall, 1996) have revolutionized our understanding of contemporary occupational development. At a time when jobs and careers have become more blurred and less separable (Li et al., 2022), boundaryless and protean concepts allow us to understand better modern careers that are not bound to a single organization or occupation, and their consequences for job markets, organizations, and individuals (Guan et al., 2019).

Boundaryless and protean career development both represent contemporary and flexible careers (Briscoe & Hall, 2006). However, both concepts differ in their drivers. On the one hand, boundaryless careers are institutional enablers in the movement of people across occupational boundaries, representing sociological career movements. This concept refers to individuals who choose career paths beyond traditional boundaries, such as those of a single organization, industry, and occupation (DeFillippi & Arthur, 1994). On the other hand, protean careers are shaped by the individual's values, interests, and personal goals, catering to their self-actualization (Hall, 2002). Individuals following protean careers aspire to be self-directed in their career choices and are guided by intrinsic values (Hall 2002), representing psychological career movements. Both concepts reflect the changing nature of work in the 21st century and are therefore expected to grow significantly in importance (Li et al., 2022).

The concepts of boundaryless and protean careers can help us explain career transitions of late-entry IT professionals. With this paper, we want to take a first step toward addressing the research gap on late-entry IT professionals and thus examine the following research questions:

*RQ1: How do late-entry IT professionals enter the IT sector?*

*RQ2: Why do late-entry IT professionals enter the IT sector?*

To answer these research questions, we studied 53 careers of successful late-entry IT professionals. Based on in-depth interviews with these IT professionals, and a detailed analysis of their backgrounds and career paths, we present new findings on the career transitions and motives of late-entry IT professionals. By combining the theories of boundaryless and protean careers with signaling theory, we discuss how we see shifts in the signals of knowledge, skills, and abilities (KSAs) in the IT profession and explain how signals of behavior and practices act as door openers into IT. Furthermore, we introduce four different career patterns of successful late-entry IT professionals and explain how these patterns differ in their preparations for the career transition, the transition process, and the individuals' motives. As far as we are aware, our paper is the first to detail career transitions *into* IT and to help companies better integrate late-entry IT professionals into the IT sector.

## **Theoretical background**

In the following, we describe theoretical concepts that form the basis of our paper. First, we explain the current state of research on boundaryless and protean careers. In this paper, we define boundaryless career development as focusing on sociological career movements and protean career development as focusing on psychological career movements. Afterward, we introduce signaling theory and describe signals that make the IT profession distinctive. We do so as we believe that both boundaryless and protean career development, as well as signals of the IT profession shape current career transitions in the IT sector.

### ***Boundaryless career development***

Boundaryless careers refer to a career model different from the traditional organizational career model, which assumes that employees will have long-term employment relationships with one organization, including career advancement opportunities within this single organization (see, for example: Super, 1957). In contrast, boundaryless careers represent a more fluid and flexible approach to career development,

where individuals are not limited by organizational boundaries but rather move across organizations, industries, and professions (Arthur, 1994). In summary, a boundaryless career reconceptualizes a career as a set of jobs spanning organizational and occupational boundaries, focusing on sociological career movements.

The most commonly understood characteristic of boundaryless careers is that individuals detach themselves from hierarchical and advancement structures within organizations (Arthur, 1994). Consequently, due to a lack of validation inside the organization, individuals start to draw validation from outside their employers (Li et al., 2022). To enable frequent cross-organizational movements, individuals with boundaryless careers build strong professional networks and relationships and seek validation through them (Arthur & Rousseau, 2001, p. 6; Briscoe & Finkelstein, 2009). Due to their non-linear progression, individuals with boundaryless careers thus often define their career success based on continuous learning, skill development, and experience instead of climbing a traditional corporate ladder (Guan et al., 2019).

The IT profession shows characteristics of a boundaryless profession. Joseph et al. (2012) identified three distinct career paths to which IT professionals tend to subscribe: the IT career path, the secondary labor market (SLM) career, and the professional labor market (PLM) career. Whereas they describe the IT career path to be mainly boundaryless across organizations, they describe the SLM and PLM career paths to be mainly boundaryless across occupations. Within the IT career path, Joseph et al. (2012) identified three sub-career paths: technical IT, managerial IT, and late-entry IT. The authors thus extended the traditional dual career path model by uncovering the late-entry career path in IT. To date, IT research has not yet expanded on this research. Due to their great potential for combating the IT skills shortage, we need to develop a better understanding of this subgroup of IT professionals, especially where they come from and what causes their transition to the IT profession.

To our knowledge, there are no studies on late-entry IT professionals, however, the IT workforce literature does address career transitions in the IT labor market, especially investigating the phenomenon of turnaway, i.e. IT professionals leaving the IT profession. IT workforce research has focused heavily on IT turnaway in recent years (see for example: Brooks et al., 2015; Joia & Sily de Assis, 2019; Young et al., 2023; Zaza et al., 2022) as more and more IT professionals leave the IT profession. The results of these studies point to several recurring themes that contribute to such transitions away from IT. First, the demanding nature of IT jobs, with their long hours and high stress, has led some IT professionals to seek work-life balance in other professions (Young et al., 2023). In this context, research has also highlighted burnout and exhaustion as driving forces for a move away from IT (Armstrong et al., 2015; Zaza et al., 2022). Finally, the allure of positions in non-technical fields has often accompanied these switches as professionals seek to apply their IT skills in a broader context and seek for personal growth and new experiences (Joia & Mangia, 2017; Joia & Sily de Assis, 2019). Overall, while the IT sector offers many opportunities, understanding the factors that lead to turnaway is essential to understand the challenges late-entry IT professionals will face when entering the IT profession.

### ***Protean career development***

The protean career model is driven by personal agency (Hall & Mirvis, 1995) and thus focuses on psychological movement. In this career model, the individual is seen as the primary driver of their career, with work challenges and relationships becoming more important than upward mobility. Individuals following protean careers define their career progression through a sequence of short learning cycles with phases including exploration, trial, establishment, mastery, and disengagement (Hall, 1996). The individual moves on to the next exploration phase for learning and self-fulfillment after mastering a stage for a short period of years. Since these careers do not follow traditional career ladders, they are difficult to compare and measure according to classic career success factors (Spurk et al., 2019). Consequently, individuals with protean careers often define their career goals with psychological success, a happy (family) life, and personal pride replacing traditional career goals (Cortellazzo et al., 2020).

The protean career model has yet to find much resonance in IT workforce research. Only one study has identified an actual protean career path in the IT workforce (Joseph et al., 2005). Within the protean career path, individuals were found to switch occupations multiple times, spending an average of 22% percent of their career in an IT job and 69% in neither managerial nor IT jobs. Joseph et al. (2005) argue that the existence of said career path is enhanced by the low entry and exit barriers in the IT sector.

### ***Distinctiveness of the IT profession based on the signaling theory***

Next, we will draw on the signaling theory to describe signals which provide information on the distinctiveness of the IT profession and consequently influence career transitions to the IT industry.

Signaling theory describes how individuals use signals to provide information about their abilities, qualities, or characteristics to others (Spence, 1978). In our context, we use signaling theory to explain how IT professionals establish an image of themselves as a distinctive profession. In order to be successful in the IT profession, we suggest that career changers will need to obtain these signals before or while entering the IT profession. In the following, we will draw on three types of signals of IT professionals: signals of knowledge, skills and abilities; signals of behavior and practices; and signals of values and interests.

Due to knowledge being their principal capital, one of the most vital signals for knowledge workers to establish professional distinctiveness is the signal of KSAs (Spence, 1978). One primary signal of the IT profession is the high value of education and degrees (Ang et al., 2002). Education in the form of an IT degree signals to others that the IT professional has a certain level of expertise in the IT field. Like other knowledge professions, such as doctors or lawyers, IT professionals rely highly on their education to prove their KSAs to employers (Mithas & Krishnan, 2008) and external observers.

Compared to other knowledge workers such as doctors and lawyers, however, we see two significant differences for IT professionals in the use of degrees of signals. First, IT professionals do not need to be registered to practice, which lowers the entry barrier for the IT profession. Thus, entry into the profession depends on the ability to perform a job, and the verification of qualifications is solely up to the potential future employer. Second, due to constant technological change, IT professionals cannot rely on their degrees alone. Constant technological change causes an ongoing transformation of the IT profession, and the basic features and working tools used (Niederman et al., 2016). This constant technological change forces IT professionals to keep up with the latest technological developments to remain competitive and effective (Riemenschneider & Armstrong, 2021). Continuous learning is consequently a prerequisite for success in the IT profession.

Next, we describe the signals of behavior and practices that form the distinctiveness of IT professionals. IT work follows certain work structures and procedures, which have been manifested as IT-specific (Jacks et al., 2018). IT work nowadays usually takes place in teams (Faraj & Sproull, 2000). With the rise of agile methods and the progression of digitalization, IT work has developed into a work with various boundary-spanning activities. Due to the different facets of software development, IT teams usually have representatives from different areas working together either in one team (as in agile teams - Hoda and Murugesan (2016)) or through interfaces in the process (as in teams following the waterfall model - Faraj and Sproull (2000)). A special feature of this collaboration is that IT teams are often spread geographically, making the collaboration highly reliant on digital support (Sarker et al., 2018). Despite this interdisciplinary and global collaboration, IT professionals define themselves through a common sense of belonging, which is expressed to observers through common cultural forms, such as technical jargon or a lack of formal work rules (Guzman et al., 2008).

Lastly, we find strong signals within the IT profession addressing common values and interests (VIs) (Ghosh et al., 2022; Jacks et al., 2018). IT professionals share a common interest in technology and technological evolution. This passion acts as common ground for the IT profession as technology builds its foundation. As this technological foundation constantly changes, IT professionals accept change as a necessary part of the profession (Riemenschneider & Armstrong, 2021). Furthermore, IT professionals perceive themselves as working in a mentally demanding work environment, making them hard-knowledge workers with high work ethics (Guzman et al., 2008; Riemenschneider & Armstrong, 2021). This might also be one of the reasons why IT professionals have a favorable self-image and take pride in their belonging to their professional group (Guzman et al., 2008). Consequently, they show signs of professional ethnocentrism and intercultural dysfunction (Guzman et al., 2008; Rao & Ramachandran, 2011). This common set of VIs of IT professionals results in opportunities for collaboration and knowledge sharing and helps IT professionals to develop a sense of belonging.

## Research method

To answer our research questions, we collected primary and secondary data on late-entry IT professionals, including 53 interviews and information on the interviewees' careers with the help of LinkedIn profiles, blogs, and news articles. In the following, we describe our research approach.

### Data collection

We followed the approach by Glaser (1978), using theoretical sampling, rigorous coding, memo writing, and constant comparison when collecting and analyzing data (Glaser, 1978). We identified suitable interview partners over personal contacts in IT organizations, LinkedIn profiles, and news articles. After identifying potential interview partners (n=~200), we contacted them via email, explained our research, and guaranteed anonymity (Myers & Newman, 2007). As we did not want to limit ourselves to individual country specifics, we decided to conduct the interviews globally. We contacted interview partners in the US, Europe (Germany, Austria, Switzerland, UK, Ukraine, Bulgaria, Turkey) and Asia (India, Vietnam and South Korea). 53 interview partners (26.5%) agreed to do an interview.

Suitable interviewees had to meet the following criteria: 1) not have a degree or other educational background in Information Systems, Information Technology, Computer Science, or similar, 2) have professional experience in an industry other than IT, 3) have successfully entered the IT profession at some point in their career, 4) still be working in IT up to the interview. As a minimum age, we set 25 years to ensure that the interviewee had professional and labor market experience. After conducting an interview, we asked for recommendations for further potential candidates, following the “snowballing” method.

We used an interview guideline, which structure we built based on Reich and Kaarst-Brown (1999), who investigated career transitions from IT to non-IT. The interview guide covered topics such as education and job history, the experience of moving out of non-IT, and the preparation and transition into the IT job.

Our semi-structured interviews lasted 43 min on average (ranging between 30 min – 90 min). Every interview was recorded and transcribed with the written permission of the interviewee. Furthermore, after every interview, we wrote a memo that included a summary of the critical insights and follow-up questions for the following interview (Urquhart et al., 2010). Table 1 provides an overview of the interview partners.

39.62% of the sample were women, which indicates a higher proportion of women among boundaryless IT professionals, as shown in other studies (Prommegger et al., 2021). The sample contained a balance of people with work experience from STEM backgrounds (e.g. architecture, mechanical engineering, marine, physics) and non-STEM backgrounds (e.g. teachers, sales staff, psychologists, translators, marketing staff). The length of previous work experience before the career change ranged from 3-20 years.

### Data analysis

We collected the interviews in five waves between December 2020 and June 2021, which enabled us to discuss the findings and adapt the guideline if needed. During these discussions, we compared the interviews with previous results and extended our findings until we had reached theoretical saturation.

Characteristics	Option	Total	%
<b>Gender</b>	Male	32	60.38%
	Female	21	39.62%
<b>Prior Work Experience</b>	STEM	25	47.17%
	Non-STEM	28	52.83%
<b>Current Job Title</b>	Systems Administrator + Software Developer	34	64.1%
	IT Consultant	8	15.1%
	Chief Information Officer	3	5.7%
	IT Project Manager	3	5.7%
	Business Analyst / System Analyst	3	5.7%
	Data Scientist / Engineer	2	3.8%

**Table 1. Overview of interview partners**

We coded all interviews using the coding software AtlasTI. All in all, we analyzed more than 500 pages of interview transcripts. The codes and findings from the interviews were regularly discussed and elaborated on within the team of authors. Furthermore, we strengthened our approach by triangulating our interview data with the memos, including our impressions during the interviews, publicly available data such as LinkedIn profiles, blog entries, and news articles on the interview partners.

We used an iterative coding approach in line with interpretive research guidelines (Walsham, 2006). Relying on coding procedures used in the grounded theory methodology (Glaser, 1978), our coding became progressively more abstract while we reflected on our findings based on our theoretical understanding. Our coding procedure included several steps. Step 1: We went through the interviews to identify signals that late-entry IT professionals acquired before or during their career transition. We first open-coded these signals to generate a complete picture. Next, we looked for similarities in the signals and consequently assigned them to categories using axial coding. Finally, based on our knowledge of signaling theory, we assigned these categories to types of signals. For example, we assigned the signal *certificate* to the category *formal education* and assigned it to the type of *signals of KSAs*. As a result, we obtained a list of signals and categories, which provided us with information on how late-entry IT professionals entered the IT profession (answering RQ1). Step 2: We followed the same steps as above to generate codes for motives of late-entry (answering RQ2). We, again, went through the interviews to identify motives for individuals to enter the IT sector and categorized them accordingly. Based on the derived codes for RQ1 and RQ2, we could understand different signals and motives of late-entry IT professionals' careers that enabled and urged them to enter the IT sector. Step 3: We looked for similarities and differences in the identified signals in the interviews to identify patterns in the individual career paths. We noticed variations in motivation among late-entry IT professionals, leading to diverse preparation and career trajectories based on these motivations. We observed two main entry types: planned and unplanned career transitions, each influenced by pull and push factors. Organizing the careers accordingly, we established four late-entry IT professional groups, which we introduce in the results section.

To ensure accuracy in the findings, we decided to do double coding of a set of interviews. First, two researchers coded both twenty interviews (37.8%) and then compared the derived codes. We achieved a satisfactory inter-coder reliability of over 90%. Based on these high values, the first author of the study independently coded the remaining 33 interviews. The codes and findings from the interviews were regularly discussed and elaborated within the team of authors.

## Results

In the following, we present our results. With Table 2 we answer RQ1 and explain how late-entry IT professionals enter the IT profession, by introducing signals of KSAs and signals of VIs that lower the barrier to IT. With Table 3, we answer RQ2 and explain why late-entry IT professionals move into IT, based on four distinct patterns in late-entry IT professionals' decisions why to enter the IT.

### ***RQ1: How do late-entry IT professionals enter the IT sector?***

#### **Following boundaryless career development by acquiring signals of KSAs**

We found that late entrants to IT collect signals of KSAs with formal education, informal education, and prior work experience before or while entering IT. In the following, we describe these categories.

For a planned entry, acquiring **formal education signals** for KSAs are paramount. If career changers wanted to prepare for career transitions to the IT sector consciously, they acquired signals such as boot camp degrees, certificates or by participating in open education courses. Boot camps enabled late-entry IT professionals to gain knowledge and skills that are in high demand by providing them with intensive training on specific, current technological skills. Along with this technical training, boot camps also arranged for their participants to connect with potential employers. In addition, late-entry IT professionals earned certificates in relevant technologies to demonstrate their suitability for IT positions with the required skills in high-demand technologies. All our interview partners also affirmed that open education courses, i.e. courses that are freely available on the Internet through various platforms, were very helpful in building their initial IT skills.

<b>Codes for signals of knowledge, skills and abilities</b>	<b>Example quotes</b>
<b>Formal education</b>	
<b>Boot camps</b>	<i>"I attended a boot camp for three months, which was my first contact with programming. At first, I wanted to do a distance learning course. But that would have taken a lot of time and money, which I didn't have. So, I decided for the boot camp."</i> [ATJ4]
<b>Certificates</b>	<i>"I was very interested in learning Python, so my company offered me an instructor-led training. The company registered me for Global Knowledge and gave me an unlimited account for Udemy. I got several certifications there, because [my employer] encouraged me to do so. Those things were fun for me."</i> [ALL3]
<b>Open education</b>	<i>"Something that's great, is YouTube. On YouTube, there are thousands of tutorials and they really help. You can get help for every problem and there is tutorial for almost everything."</i> [ATJ11]
<b>Informal education</b>	
<b>Side projects</b>	<i>"I started an e-commerce site project with three friends after college, to actually get some hands-on experience. I started to work on websites, and then I worked on them as a side job, it wasn't my main source of income though."</i> [ATW6]
<b>Open source projects</b>	<i>"Before entering IT, I tried to really ramp up my tech skills. [...] I started working on Network x. This is an open source package in Python for largely academic purposes and essentially translating network models. This work on this open source project was the closest I came to professional experience, and I think this is what eventually helped me get the job."</i> [ALL2]
<b>GitHub profiles</b>	<i>"I started documenting all my work for about 19 months on GitHub, which now shows my progress over time."</i> [ATW8]
<b>Conference attendance</b>	<i>"I also attended a tech conference out of curiosity which was about programming as an art, inspiring stories of visionaries like Steve Jobs, hands-on experience with programming microcontrollers, etc. and I decided that I really want to learn how to code."</i> [ATW2]
<b>Prior work experience</b>	
<b>Business knowledge</b>	<i>"[My employer] was looking for young people which are familiar with the operation of the vessels, and [the processes in] the company. I had a lot of expertise in this area, so I agreed to join this project."</i> [APP1]
<b>Boundary-spanning activities</b>	<i>"For in-house processes, we have an analytics tool built in-house where salespeople can view goods and so on. I used this tool a lot. [...] It happened that I started to support the product manager of this analytical tool because he was alone and couldn't manage his workload anymore. After one year, the product manager left and I was the only person who knew how to manage this tool."</i> [ALL1]
<b>Codes for signals of values and interests</b>	<b>Example quotes</b>
<b>Technical affinity</b>	<i>"Actually, I am a very technical-oriented and I usually spend a lot of my free time doing technical stuff."</i> [ATW6]
<b>Problem solving / Logical thinking</b>	<i>"When dealing with computer, logical thinking is essential. When you find a problem, you need to start with defining it, breaking it down, understanding it. During my Math's studies, I was trained for this unconsciously which helped me a lot in the end."</i> [ATW8]
<b>Perceived fit with IT work</b>	<i>"This kind of work [in IT] is very dynamic, but not burdening or tiring. The tasks change every 2-3 days and you get to work on something different very often. You communicate with lots of people and work in interdisciplinary teams. That's great!"</i> [ALL10]
<b>Table 2. Overview of identified codes for acquired signals of late-entry IT professionals before entering the IT sector</b>	



One of our interview partners, now working as a software developer, described this preparation as follows:

*“At my old job, I was bored and I realized I wanted to be less generalist, but more specific. And that’s when I thought “Hey, how about learning some technical stuff, whatever you have missed in the last years?” [...] If I want to be more specific, I need more technical knowledge. That’s when I started to get into YouTube videos, I attended Coursera and Udemey courses. First, I was just practicing on my own. And finally, I found the boot camp, where I was being trained to be a DevOps engineer for three months. And after all of that, I was employed at [censored] to work there as a software engineer.” [ATW9]*

Next to formal education signals, we found **informal education signals** to lower the entry barrier to IT. Some interview partners told us that they gained practical experience by engaging in open-source projects or starting side projects, for example by developing a website. These steps often happened without an actual plan to enter the IT sector. Documenting these hands-on experiences on, e.g., GitHub profiles, subsequently served as strong signals of KSAs and conveyed their passion for IT to potential employers, as described by this software developer: *“I started documenting all my work for about 19 months on GitHub, which now shows my progress over time. Even after I was employed at my current company, that individual daily training was a lot of help. I made the habit of continuous studying and progressing.” [ATW8]*

A Lead Data Engineer with a Psychology Major, described the need to acquire these signals as follows:

*“If you want to get into IT, you’ll need to provide references of your knowledge. That’s tricky if you have no actual work experience and network in your new profession. However, what works very well in the tech world is to work out these references yourself. For example, if you want to get into the data science area, you can train machine learning models yourself and publish your work. You can write articles about it, there are thousands of blogs or forums. And you can share your code on GitHub. This way you build up a portfolio proofing your expertise.” [ALL14]*

For late-entry IT professionals who made their lateral entry within a company, conversely, education was often not the decisive signal to lower the barrier of the IT profession. These late-entry IT professionals prepared for their career transitions, consciously or unconsciously, by acquiring more implicit signals during their **prior work experience** that provided information on their suitability for an IT job.

We found two categories of prior work experience to be particularly crucial for late entry: business knowledge and boundary-spanning activities. Late-entry IT professionals that performed their career transition within a company, often gained extensive business knowledge, making them valuable company assets. This business knowledge subsequently acted as a signal that made it easier for late-entry IT professionals to move into the company’s IT department later on. Furthermore, we found non-IT job roles interfacing with the IT department a solid signal to lower the barriers to IT. Individuals who performed well at boundary-spanning activities, i.e., working across departments, possibly interacting with the IT department, accumulated valuable signals that significantly lowered the barrier to entry into IT. These positions provided the late-entry IT professionals with valuable knowledge of the interoperability of business and IT and helped them to become a valuable resource for the IT department.

### **Following protean career development by acquiring signals of VIs**

Since our focus was on late-entry IT professionals, our study naturally only involved boundaryless professionals. However, in the interviews we additionally found signs of career growth driven by self-actualization, suggesting a leaning towards a protean career development. In particular, we found signals of VIs that late-entry IT professionals emitted before entering the IT sector. First, we found late-entry IT professionals strongly interested in technology-related topics. Late-entry IT professionals were often curious about how technology works and how IT can be used to improve real-life problems. Our interview partners often told us they were early adopters of new technologies and liked to keep up with the latest trends and developments in the IT field. Furthermore, we found late-entry IT professionals often have a penchant for logical thinking and a natural problem-solving ability. A software developer described his passion for problem-solving as follows: *“I really like the happiness when solving a problem. And I also like symbolic thinking. I was and am still able to abstract a lot. In Mathematics and Physics, you abstract ideas and with programming it’s all about abstraction. Once you abstract the problem, you need to code what has to be abstracted. It’s really layers of abstraction. That fascinates me about IT.” [ATJ1]*

In addition, we found signals of VIs addressing the perceived fit with work practices of the IT profession. We found late-entry IT professionals that were particularly interested in the principles of flexibility and autonomy in agile methods because they aligned with their personal values. Furthermore, the creative and innovative work environment as well as the occupational culture in IT acted as positive triggers for the wish to enter the IT sector. These positive characteristics of the IT profession led individuals to enter the IT sector, as a former electric engineer described: “Work [in IT] is very dynamic, but not burdening or tiring. The tasks change every 2-3 days, and you get to work on something different very often. You communicate with lots of people and work in interdisciplinary teams. That's great!” [ATW10]

### **RQ1: Why do late-entry IT professionals enter the IT sector?**

Next, we identified four distinct patterns that late-entry IT professionals follow when entering the IT sector. These patterns are characterized by variations in their reasons for career transition between planned and unplanned transitions, as well as the interplay of push and pull factors driving careers into the IT domain. We call these patterns *Attracted-to-the-IT-Job* and *Attracted-to-the-IT-Work* (both planned career transitions) and *Appointed* and *Allured* (both unplanned career transitions). Table 3 gives an overview of the four patterns and answers RQ2 on the reasons for late-entry into IT.

Category	Planned Career Transition		Unplanned Career Transition	
	Attracted to the IT job	Attracted to the IT work	Appointed	Allured
<b>n</b>	n=15 (28.3%)	n=15 (28.3%)	n=7 (13.2%)	n=16 (30.2%)
<b>Reasons for career transition (push vs. pull)</b>	Push: Pushed into IT because of lack of job opportunities or interest in current job	Pull: Pulled into IT because of a strong passion for technology and/or the IT field	Push: Pushed into IT because of an appointment to an IT job, due to relevant business knowledge	Pull: Pulled into IT because of several career moves closer to IT until finally ending up in IT
<b>Gender</b>	balanced	balanced	Dominantly male	balanced
<b>Background</b>	Predominantly Non-STEM	Predominantly STEM	Predominantly STEM	Predominantly Non-STEM
<b>Typical career patterns</b>	Non-STEM education ↓ Lack of opportunities/interest in job ↓ Boot camp ↓ Transition to IT	STEM education ↓ Self-learning (e.g. open source projects) ↓ Small IT projects ↓ Transition to IT	STEM education ↓ Extensive work experience ↓ Appointment to IT job ↓ Transition to IT	Non-STEM education ↓ Work experience ↓ Career move(s) closer to IT ↓ Transition to IT
<b>Signals of knowledge, skills and abilities</b>	Boot camps, certificates, open education	Open education, open source projects, side projects,, GitHub profiles	Business knowledge, boundary-spanning activities	Business knowledge, boundary-spanning activities
<b>Signals of values and interests</b>	-	Technical affinity, problem solving, logical thinking	-	Perceived fit with IT work
<b>Career advancement focus</b>	Boundaryless	Protean	Boundaryless	Boundaryless -> Protean

**Table 3. Career patterns of late-entry IT professionals when entering the IT sector**

We want to highlight that these patterns serve as prototypical representations. It's important to recognize that every career path is unique, and complete consistency within the clusters cannot be ensured. Nevertheless, we have confidence that these patterns offer a comprehensive overview of various prototypical career progressions of late-entry IT professionals.

### **Career pattern 1: Attracted to the IT job**

The first pattern we identified is the *Attracted-to-the-IT-job-late-entry-IT-professional*. 15 IT professionals (28.3%) belonged to this group, following a planned career transition into IT. These late-entry IT professionals get pushed into IT due to a lack of career advancement opportunities or a lack of interest in their former job or occupation. Consequently, these individuals consider alternatives to their current job and decide to enter IT. The background of this occupational group is predominantly outside of STEM. Since this group usually does not possess experience with IT or a similar field, they need first to acquire signals of KSAs to lower the barrier of the IT sector. Most individuals opt for extensive training before entering IT, for example, through boot camps, certificates or open education courses. These degrees and certificates subsequently act as signals for KSAs, lowering entry barriers, and enabling professionals with various backgrounds to transition to the IT sector. This group lacks a focus on protean career development and rather simply tend toward a boundaryless career progression, as their career transitions are usually triggered by external events rather than interest. An *Attracted-to-the-IT-job-late-entry-IT-professional* described her career change as follows:

*“I had been quite dissatisfied with my last job for a long time. There were just not a lot of opportunities for advancement; the employment contracts and the work relationships were very precarious. I wished for more stability and more financial security. I spent quite a long time trying to figure out what I liked and what would be a good next step. I ended up in programming based on recommendations from friends who were developers and who said, give it a try, it's easy to get into. There's a lot of demand, especially for women. First, I tried it with online courses. After that, I decided to do a boot camp and that worked.”* [ATJ3]

### **Career pattern 2: Attracted to the IT work**

The second pattern we identified is the *Attracted-to-the-IT-work-late-entry-IT-professional*. 15 IT professionals (28.3%) belonged to this group. These late-entry IT professionals also complete a planned career transition. However, different to the group before, they get pulled into IT because of great passion for technology. In line with this passion, these individuals often have a background in the STEM field, which usually provides them with the advantage of having acquired basic IT skills in the course of their higher education. *Attracted-to-the-IT-work-late-entry-IT-professional* usually possess high technical affinity, problem-solving, and logical thinking skills, often supported by their STEM background. Precisely this strong technical affinity leads them to complete smaller IT projects in their free time and participate in open-source projects. We found this group to often maintain detailed GitHub profiles that give insight into their experience with various technologies. After gaining extensive experience through side projects or smaller paid projects, *Attracted-to-the-IT-work-late-entry-IT-professional* eventually decide to enter the IT sector, mainly because they want to capitalize on their IT skills. Their IT affinity and experience with IT usually allow them to enter the IT sector without any further preparation. In contrast to the group *Attracted-to-the-IT-Job*, these individuals are inclined towards protean career development, as we found statements that show how these individuals clearly pursue their own VIs by following their passion for technology. A Business Management Graduate described his career transition like this:

*“Initially, I did not plan to change my occupation but then it happened very naturally because I was always fascinated by technology. Even back when I was a student, me and my friends did some web development for fun. I started to do my own projects. The COVID-19 pandemic was just starting so it was a good way to fill my time doing something useful. The projects were so interesting and I loved programming. It was getting more and more clear to me that I wanted to do this for a living.”* [ATW8]

### **Career pattern 3: Appointed**

The third pattern we identified is the *Appointed-late-entry-IT-professional*. Seven IT professionals (13.2%) belonged to this group. Appointed late-entry IT professionals belong to the group of unplanned career

transitions and get pushed into IT because of an appointment to an IT job. These employees are usually known for their extensive business knowledge and their successful history with their current employer. Because of this strong signal of knowledge, and the need in the company to fill a position in IT, these individuals are recommended and selected for an IT job within the organization. As this group possesses considerable professional experience and is often eager to take on challenges, the professionals accept the offers and their transitions into IT. We could not find any statements in this group indicating a protean career change, representing mobility due to self-actualization and interest. Rather, the motives behind these job changes correspond to sociological career advancement, which hints at boundaryless career development. A current CIO describes his career transition as an *Appointed-late-entry-IT-professional* as follows:

*“My specialties were navigation of navy vessels. [...] I started my career as a cadet, and after that as a deck officer. You know, these shipping companies, they are employing the crew seamen actually on a contract basis. And in year 2000, the company wanted to implement a ship management solution [...] for the office use and the vessels. They were looking for young people which are familiar with the operation of the vessels, and [the processes in] the company. I had a lot of expertise in this area, so I agreed to join this project. Initially, this was a temporary project. They sent us to the headquarters in London to get us trained and we started implementing the system. And my idea was not to proceed in this direction. But how it turned out this was the beginning of my IT career. I expected that when my contract with this project finishes, I will go back to ships. But after we deployed the system on board the vessel, the company said that they need people to start looking after the system from office side. So, I stayed.” [APP1]*

*Appointed-late-entry-IT-professional* found their way into IT primarily at the beginning of the IT era. While this seemed to be a successful path for late-entry IT professionals back then, we found that this entry into IT is drying up. We found only one representative of late-entry IT professionals who followed this type of entry into IT after 2010, all other *Appointed-late-entry-IT-professional* joined the IT sector between 1990 and 2000. We interpret this to mean that while the appointed entry may have worked in the past, it may no longer be possible. Instead, *Attracted and Allured Late-Entry-IT-Professionals* (see next session) are rising. We suggest that the increase in complexity in the IT sector and more IT specialists in the job market make the appointment of individuals obsolete.

#### **Career pattern 4: Allured**

The fourth pattern we identified is the *Allured-late-entry-IT-professional*. 16 IT professionals (30.2%) belonged to this group. *Allured-late-entry-IT-professionals* unconsciously enter the IT sector and thus belong to the group of unplanned career transitions. We found that this group often could not clearly identify the exact time of their entry into IT. Allured late-entry IT professionals usually do not have a STEM background. In fact, we found this group to have various backgrounds, ranging from singers to marketing professionals. Allured late-entry IT professionals reported that they had never had much experience with technology before entering IT. During their careers, however, they reached a point where they came into contact with the IT profession. This contact happens, for example, because they were nominated as a power user in the company or they started to make change requests for inhouse software and were invited to meetings of the software development team. At this point in their careers, these individuals recognized an interest in technology and in work approaches of the IT profession that they did not know they had before. Consequently, they wanted to keep working with and in IT.

Collaboration in agile IT teams is particularly suitable for this career transition, as the principles of interdisciplinary work make them open to the participation of people from outside the IT field (Hoda & Murugesan, 2016). We found *Allured-late-entry-IT-professionals* often start as business-side contact for IT teams and subsequently move closer and closer to IT until they either actively decide to get into IT or end up in IT without actually planning to do so. A distinctive feature of this group is that they initially simply focus on a boundaryless career development, as evidenced by typically taking multiple career steps that bring them closer to IT. However, as they approach IT and become more interested in IT, this group switches to a focus on protean career development, which allows them to pursue their interest in IT work and the IT sector. A cyber security expert described his allured career transition as follows:

*“My first job was in sales. Actually, working for my first company in sales was fun, but I pursued certain other goals, so I went back to university. There, in fact, I was completely cut off from my career. But the campus IT team was looking for help, so I started working there as a staff member. I had no idea about*

*IT work. The first time I went to the server room, I was fascinated. I felt the need to learn more about the network and realized that I was lacking the very fundamental parts. Then I desired to study the professional aspects of the IT more in depth. At that time, the people around me advised me to get a network certificate. So, I started to prepare for the Cisco CCNA certificate.” [ALL3]*

## **Discussion**

Given current changes in labor markets, such as globalization, technological change, and demographic shifts, boundaryless and protean careers are expected to become the new normal (Li et al., 2022), which is why we now need to develop a better understanding of individuals pursuing boundaryless and protean careers in IT. Therefore, this paper was driven by examining how and why late-entry IT professionals enter the IT sector. In the following, we discuss our findings drawing on a combination of boundaryless and protean career development with signaling theory. We discuss how we see shifts in the signals of KSAs in the IT profession and explain how signals of behavior and practices act as door openers into IT. Furthermore, we clarify our theoretical and practical contribution, provide insights into the limitations of this study and suggest future research that builds on this initial investigation of late-entry IT professionals.

### ***Shifts in signals of KSAs in the IT profession***

Previous research on IT professionals highlights degrees as essential signals for KSAs (Ang et al., 2002; Mithas & Krishnan, 2008). With our study, we extend this research by showing KSAs signals of 53 late-entry IT professionals working in IT, without ever having gained an IT degree. While some late-entry IT professionals may have a STEM degree, i.e., a degree with a similar background to IT, we also found late-entry IT professionals with educational backgrounds that are entirely unrelated to IT and have successfully obtained full-time IT jobs. This leads us to conclude that signaling in the IT job market shifts and happens not only through degrees but also through many other signals such as boot camps, certificates, open education courses, side projects, GitHub profiles or prior work experience. As this signal shift differs from other knowledge professions - e.g., law-, we would like to shed more light on this finding.

While the constant change in technological fundamentals means that existing personnel must be constantly trained, it also means that newcomers can access the IT sector comparably easily. Constant changes in requirement profiles entail that existing knowledge quickly becomes obsolete, and new knowledge must be constantly built up (Niederman et al., 2016). This distinct feature of the IT profession lowers barriers to entry into the IT sector. Our results illustrate, how professionals who want to enter the IT sector can learn current, in-demand technologies to enter the IT sector quickly. As a result, they bring skills in high demand technologies that are rare in the IT labor market without needing to receive a formal degree in IT first.

The acquired knowledge through boot camps, training or similar acts as strong signal for potential employers and compensates for the otherwise needed IT degree. The high demand for IT professionals is driving companies and managers to accept these shifts in knowledge signals. Once successful late-entry IT professionals get a foothold in IT, they can stay in IT and move up the career ladder because, from that point on, their work experience is often enough proof for their KSAs to potential employers. We thus conclude that the constant change in technological fundamentals lowers the barrier to IT and leads to shifts in signals of KSAs in the IT profession.

### ***Signals of behavior and practices as door openers into IT***

As expected, late-entry IT professionals were exposed to IT at some point in their careers. This interaction with an IT artifact sparked their interest in technology, and IT work, giving the signals of behavior and practices of the IT profession a new role for career transitions.

We credit the increase of late-entry IT professionals to a greater visibility of IT through an increase in digitalization in companies and in society in general. With the rise of agile methodologies and boundary-spanning activities in the IT sector, a wide variety of employees became involved with the IT sector and built up IT knowledge accordingly. Whereas agile principles are rooted in manufacturing (Sarker & Sarker, 2009) and thus might not be a unique concept to IS, they have gained popularity in the IS industry since the 70's and are now strongly associated with modern software development (Abrahamsson et al., 2017). We found agile teams to form a perfect environment for these first contacts as they allow an

interdisciplinary perspective to IT work (Hoda & Murugesan, 2016). As agile IT teams are often formed with representatives from software development and user departments (Rigby et al., 2018), user representatives to agile IT projects can serve as an entry into IT. Nominating user representatives for interdisciplinary team may open the world of IT to them and subsequently arouses curiosity for IT work.

Based on this first contact with IT, we suggest that exposure to IT shows potential late-entry IT professionals how IT work fits with their environmental values (Andela & van der Doef, 2019). The innovative work environment in IT teams, such as flat hierarchies and self-organization, aligns with notions of new work norms. Late-entry IT professionals may, thus, positively respond to these behavior and practices signals of the IT profession. The internalization and routine exhibition of expected professional signals open the door to entry into the IT workforce. We thus suggest that the behavior and practice signals of practicing modern software development, such as agile methods, go beyond simple work practices and have become a career development mechanism.

The main new finding related to signals of behavior and practices as door openers is, that these signals can nudge late-entry IT professionals to change their career orientation from a boundaryless to a protean mindset. In the case of *Allured-late-entry-IT-professionals*, the lowering of boundaries afforded the environment for a protean transformation. The narrative is that exposure to IT may increase one's self-efficacy by providing opportunities to learn and master new skills. While workers without an IT background may initially lack confidence in their ability to work in the IT sector, they gain experience, confidence, and self-efficacy as they become more involved with IT activities. This increased self-efficacy can help individuals identify and pursue career opportunities that match their VIs, thus following the principles of protean career development (Li et al., 2019).

### **Theoretical contribution**

Our study makes several contributions to theory. First, we highlight our theoretical contribution to career research in a management and IS context. By drawing a detailed picture of career changers entering a new profession without obtaining a formal degree before, we contribute to research on contemporary career attitudes, particularly on protean and boundaryless careers (Guan et al., 2019; Li et al., 2022). Most notably, we extend theories of boundaryless and protean careers with signal theory to show how signals facilitate boundary crossing. We found signals of KSAs and signals of VIs that individuals conducting a career transition intentionally or unintentionally collect to lower entry barriers and successfully secure employment in a new professional domain. Combining these signals with boundaryless and protean career theories offers valuable insights into the favored strategies for career development among individuals.

Furthermore, we have found a change in the pursuit of career development in the group of *Allured-late-entry-IT-professionals* due to their exposure to IT work. While the group of allured individuals mainly followed boundaryless career designs in the beginning of their careers, they changed to protean mindsets when they positively evaluated the behavioral and practical signals of the IT profession. As a result, *Allured-late-entry-IT-professionals* choose to follow a career path in a new profession that was unknown to them before, guided by self-actualization, values and interests. We thus extend the research of boundaryless and protean careers by illustrating a specific switch from a boundaryless career design to a protean. This finding is new for both management and IS career research.

Second, we extend the literature on the signals of KSAs in the IT profession. While the classical IT degree remains a strong knowledge signal in the IT profession, we found that the IT profession is inclusive enough to accept other signals of KSAs that differ from IT degrees. Late entry IT professionals can very well enter the IT profession acquiring signals of formal and informal education, such as boot camps, certificates or side projects. Our findings lead us to the conclusion that possessing an IT degree is not a prerequisite for entering the IT profession. This notion holds particular relevance considering that an IT degree could potentially become obsolete relatively quickly, given the rapid pace of technological advancement, highlighting the increasing importance of continuous education as opposed to relying solely on a one-time degree. One of our interview partners (*Attracted-to-the-IT-work-*) illustrated this finding:

*“At the moment, you really don’t need an IT degree. Currently nobody cares if you have a degree or not. You show that you have experience and they will give you a coding challenge and you will get a job. [...] There is a huge shortage of IT professionals and if you know how to write a few lines of code, you will get the chance to prove yourself.[...] You don’t need to spend three years at university.” [ATW1]*

Lastly, our research shows that behavioral and practical signals of boundary-spanning activities and agile methods for the IT profession do not only function as signals to show professional distinctiveness but also to increase the visibility of IT in companies and society in general. These behavioral and practical signals act as door openers to the IT sector, conveying a positive image of IT work that might have been previously unknown. While agile methods were primarily intended to improve the organization of IT work (Beck et al., 2001), they have led - possibly even unconsciously - to an increase in the number of individuals getting into contact with the IT profession. We thus conclude that the behavioral and practical signals of boundary-spanning activities and agile methods lead to attracting external individuals into IT and opening up a new career path into IT that would not have been possible otherwise.

### ***Practical contribution***

Urgent practical needs drove our research: Investigating contemporary career development in the IT sector and investigating and subsequently facilitating the entry of late-entry IT professionals. Accordingly, our findings provide many practical implications for companies and individuals.

Our study provides insights for companies on where and how they should target late-entry IT professionals. Specifically, we identify four types of late-entry IT professionals and explain differences in their motives and their paths into IT. Our results indicate that in order to attract late-entry IT professionals, different motives need to be addressed depending on the type of career changer. Companies looking to recruit *Attracted-to-the-IT-job-late-entry-IT-professionals* shall explore bootcamps and specialized training programs as these platforms attract individuals who are actively seeking a transition into the IT field and are committed to upskilling. Collaborating with bootcamps or offering internships during their training can be effective ways to identify and engage with this group. These late-entry IT professionals are suited for junior positions; however, it's important to note that they might require intensive organizational training to familiarize themselves with the IT landscape. Next, *Attracted-to-the-IT-work-late-entry-IT-professional*, drawn to the nature of IT work, can often be found contributing to open source projects and online side projects. Companies can tap into platforms like GitHub to identify suitable job candidates. Due to their experience with technology, this group, is suited for more advanced positions within the IT department. Pairing them with a knowledgeable mentor can aid their integration into the team. To locate potential *Appointed-late-entry-IT-professionals*, companies should focus on in-house departments that closely align with IT. This group often comprises professionals who have been directed to handle IT-related tasks and comply to a transition into IT because of their prior work experience, making them suitable for management positions. Similarly, *Allured-late-entry-IT-professionals*, comprised of individuals who are enticed by IT through roles such as power users, can be readily identified within the organization. Companies should consider hiring them for positions within interdisciplinary settings like agile teams, where their familiarity with diverse roles and functions can contribute to collaborative and dynamic environments. In summary, we want to encourage organizations to hire late-entry IT professionals and integrate them well into IT through proper onboarding.

Finally, for individuals, our findings highlight implications for regular and long-term IT professionals. 1) For regular IT professionals, we recommend to keep their signals of KSAs up to date to stay competitive. Because IT staff must constantly deal with new technological changes, long-term IT professionals benefit less from their degrees and work experience than other occupational groups. Existing IT staff need to constantly update their technical knowledge, suggesting that acquiring regular training and certificates complements the importance of formal IT degrees. 2) For late-entry IT professionals, we recommend to make use of the constant technological change. Our results show how technological change enables outsiders to enter the IT industry because they can take advantage of changes in skill requirements to jump on a high-demanded, new technology. We therefore recommend using the increasing importance of knowledge of in-demand technologies as a signal for KSAs leading to a lower barrier to entry into IT.

### ***Limitations***

As with every other research, our study is subject to limitations. One main limitation of the interview study with late-entry IT professionals is that it only includes successful late-entry IT professionals still working in the IT sector at the time of the interviews. Limiting the dataset to late-entry IT professionals still working in IT was done intentionally, as the primary goal of this study was to draw a detailed picture of successful entries into IT. However, limiting interview partners to late-entry IT professionals still working in IT means

that the experiences and perspectives of those who have entered the IT profession and subsequently decided not to stay in the IT sector are excluded from the study. We strongly believe that the experiences of late-entry IT professionals who have left the IT sector again will also provide valuable insights for the study of career transitions in IT, as indicated by Prommegger et al. (2020). Thus, to address this limitation, researchers should consider including a broader range of IT professionals in their research, including those who have decided not to stay into the IT industry in the long-term.

Furthermore, we acknowledge that the qualitative study type may limit our findings' generalizability. Interviews are a subjective data collection method that relies on the interviewees' and researchers' perspectives and experiences in analyzing the data. One limitation of our qualitative work is that the findings may not represent the experiences of all late-entry IT professionals. To address this limitation, future research on late-entry IT professionals should consider further data collection with a larger sample size, including quantitative methods, such as surveys or career sequence analyses, to provide a more comprehensive understanding of the experiences and career paths of late-entry IT professionals.

### **Future research**

The opportunities for future research based on our results are manifold. First, we call for further research on late-entry IT professionals' career paths and motives. Despite its practical relevance for the IT job market, this subgroup of IT professionals remains almost unexplored. However, to successfully integrate late-entry IT professionals into IT, their motives, career paths, attitudes, and entry barriers must be thoroughly studied. Only then can companies benefit from the hidden potential of late-entry IT professionals and retain them in the company in the long term.

In order to investigate the barriers faced by late-entry IT professionals and their entry experiences, we recommend conducting interviews with late-entry IT professionals who have subsequently left IT. Prommegger et al. (2020) show in their study that only 30% of all late-entry IT professionals remain in the IT sector long term. Most lateral entrants return to their original or another discipline after only a few years. In order to understand the challenges of late-entry IT professionals, it is therefore essential to also examine late-entry IT professionals who have left IT after their entry.

Finally, we call for quantitative data to back up our qualitative study. For example, IT career sequence analyses of late-entry IT professionals, as already conducted by Joseph et al. (2012), help to provide a better understanding of the different backgrounds and career paths leading into IT and will enrich the qualitative findings on late-entry IT professionals we provide in this study. Furthermore, large-scale surveys or other analysis methods, such as qualitative comparative analysis, can help to identify crucial factors for a successful long-term entry into IT, based on a bigger sample size.

### **Conclusion**

Our study highlights the need for late-entry IT professionals to acquire signals that substantiate their KSAs and IVs before entering the IT sector. These signals prove their suitability for work in IT and lower the barriers to entry. We observe a shift in KSAs signals that show how in-demand technologies become accepted for entry into the IT profession. Furthermore, we uncover how modern work practices in IT, such as agile methods, open doors into the IT sector and convey a positive image of IT work. Lastly, this study presents four different types of late-entry IT professionals, illustrating the diverse ways organizations can target and recruit these professionals. Overall, this research offers valuable insights for organizations seeking to diversify their IT workforce by attracting professionals from outside the field and for research by providing a better understanding of career transitions in the IT sector.

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