

RESEARCH ARTICLE

Significant career change to software development. A life-course perspective

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Abstract

The present study, based on qualitative data, investigates the significant career change through the life-course lens. Biographical interviews were conducted with people who changed their profession and the findings were characteristically reflective and subjective, foregrounding the participants' interpretations of their layers of reality. Different type of resources: individual (Agency), community (Networking), and society (Labour market) were taken into account and the endeavour enabled to capture the triggers involved in career change process. The distinction between voluntary and involuntary career change decision helps to understand the reasons for which the change is chosen. There are major differences between those who leave involuntary their desired profession and those who discover that they have a calling for the software development. Moreover, the results advocate for the importance of early vocational counselling. On the other hand, evidence of discrimination encountered by new programmers could be addressed by HR departments in the IT organizations

Keywords

Career change; software development; life course; life trajectories

Nowadays, we discuss the labour market using concepts like *fluid*, *flexible* or *limitless* (Rodrigues & Guest, 2010). The traditional career model, as defined by standardised professions or occupational trajectories, assumes one or two career changes throughout a lifetime. Usually, this model is about laterally changing jobs, not significant career changes (from an initial profession to others). In the last 25 years, scholars have considered a *boundaryless* (Arthur, 1994; Cortini, Tanucci, & Morin, 2010; Sullivan & Arthur, 2006) or *protean* career as self-directed and having a values-driven orientation (Briscoe & Hall, 2006). As Tomlinson et al. (2018) stated, flexibility in the labour market occurs at the intersection of individual agency, organisations, institutions and policies. The first theoretical model of the cyclical nature of

a career was designed in 1980 by Super and demonstrates how careers are fragmented in cycles. Later, other studies described a cycle as lasting from between two to five years (Hall & Chandler, 2005). These cycles have been explained by the fact that during their lifetime, individuals are faced with very rapid changes in technology, products and the labour market, and even with various personal circumstances that lead to professional change (2005). One recent work (Tomlinson, Baird, Berg, & Cooper, 2018) added to the agentic vision of the boundaryless and protean career concepts a wider range of actors that exert an impact on individual career decisions (institutions, organizational settings, policy).

A significant career change represents a crucial turning point in the life course of the individual, potentially generating substantial

effects on various aspects of an individual's life: romance, family, finances, and physical or emotional health. The voluntary/involuntary distinction has offered the possibility to capture opportunity structures and how these act as triggers for the decision to change a career.

The initial career choice made by individuals in their early lives (as teenagers or young adults) could be an important predictor for their future career path. An incorrect or inappropriate career orientation could culminate in an unsatisfactory working life and ultimately prompt the decision to seek a significant career change. Previous research studies have identified a strong link between the formation of occupational aspirations during adolescence (as an essential developmental task) and occupational attainment in adulthood (Basler & Kriesi, 2019). In 1909, Frank Parsons offered a model about how career decisions are made by matching persons with occupations. His theory is based on the fact that specific skills and abilities make an individual suitable for a certain profession. Even though Parsons' approach remains valid and is as such used in vocational counselling, more recent studies have emphasised the importance of context and its essential role in choosing a career (Lent & Brown, 2020).

Whenever individuals choose to pursue one life trajectory or another, be it the decision to, say, relocate to another country, enter into or dissolve a relationship, or have children or remain childless, no single factor can be solely attributed to that decision. In this sense, the analysis of the factors involved in the career change should take into account different aspects of personal life (the stage of life, significant life events), professional life (working conditions, job satisfaction) or the labour market offers. The changes in the labour market have accelerated the demand for programmers and other associated professions (business analysts, testers, information project managers, etc.). The labour market is imbalanced such that even for individuals with the same level of education, labour conditions between professions, industrial sectors or locations often differ. The software development field is very desirable.

This article thus explores significant career changes in the labour market by considering both individual drivers and opportunity structures. Given that complex life circumstances can sometimes compel one to make decisions that ignore or conflict with personal abilities or interests, the current work examined how software developers' narratives both construct and re-construct important life events and shape their change experiences. The research was conducted from a life-course perspective (Elder Jr. & Giele, 2009) and therefore took into account individual-level factors in addition to meso (organisation, community) and macro (labour market and policy) factors (Tomlinson et al., 2018). The life-course approach has been shown to produce remarkable outcomes in studies of dynamic career change (Howes & Goodman-Delahunty, 2014). Accordingly, previous studies have evaluated turning points in life that can be regarded as facilitators of personal change (Zittoun, 2009) but also career change, which, of course, strongly influences most aspects of life (family, education and/or residence). On the other hand, previous research has identified the individual drivers of career change as self-determination, control theory or career satisfaction (McGinley, 2018). Career choices are typically made based not just on one's own abilities but also on one's capacity for acquiring new abilities, perception of potential future opportunities, and consideration for the wishes of significant others. As such, this article seeks to contribute to the growing body of literature on career change by conceptualizing the career transition to the IT domain as the product of ongoing interactions between individuals and their physical and social environments, *i.e.* community, family, and peer networks, and the structural opportunities these interactions and contexts entail. The data generated for the present study were qualitative insofar as the findings were characteristically reflective and subjective, foregrounding the participants' interpretations of their reality. That said, the qualitative research methodology also permitted the determination of the main triggers of career change and associated decisions. Ultimately, the primary objective of the study was **to identify the meanings attached to career change and the main**

triggers for career change. Related research objectives were as follows:

- To explore initial career options and how career decisions are made.
- To differentiate between voluntary and involuntary career change. Employing this dichotomy can enhance understanding of both the main triggers of and decisions relating to career change.
- To identify the resources and challenges involved in the process of career change.

Career change – a work and life event

A career change is an important event in both the working life and personal or family life of individuals, and it has become increasingly frequent in recent years. Career change is defined as the transition from one job to another, which is typically in a different field from the one for which an individual originally developed skills and responsibilities (Carless & Arnup, 2011), or as the “*entry into a new occupation which requires fundamentally different skills, daily routines, and work environments from the present one*” (Feldman, 2002, p. 76).

Previous studies have sought to delineate the main predictors for career change, with the research outcomes demonstrating that youths are more mobile than older individuals: “*increased mobility is a prominent feature of the modern career and the trend appears to be amplified with successive generations*” (Lyons, Schweitzer, & Ng, 2015, p. 16). In the cited research, career mobility was measured using the rates of job and organisational change per year of career employment. Based on these measurements, the authors concluded that the differences in these rates between generational cohorts were very large, as Millennials (born between 1981 and 1996) made almost twice as many job and organisational moves per year as Generation Xers (1965–1980), almost three times as many as Boomers (1946–1964), and 4.5 times as many as Matures, *i.e.* those born before 1946. Furthermore, Generation Xers had almost twice as many job changes per year as

Boomers and 2.5 times as many as Matures. Although these generational classifications pertain mainly to Western culture, they share many similarities with Eastern and ex-communist countries. As such, generational differences with regard to occupational mobility can be considered relatively universal.

Concerning gender, men are more flexible and appear to be more willing to change careers than women (Carless & Arnup, 2011). That said, the decision to make a career change, although often voluntary and independent from work-related circumstances or conditions, can also be involuntary, particularly when job conditions or labour market forces become unfavourable or outright adverse.

To elaborate, a *voluntary* career change is often positive in that it occurs not as the result of adverse work circumstances or discontent but instead as a calling, as a choice made by individuals to improve their lives by shifting from one career to another (Dik, Sargent, & Steger, 2008; Steger, Pickering, Shin, & Dik, 2010). Taken together, identifying a new career and initiating the change process have been shown to significantly increase one’s life satisfaction (Smart & Peterson, 1997).

According to studies in the field of career change, the main reasons for *involuntarily* changing careers are low job satisfaction, burnout (Barrick & Mount, 1996) or deficient job security (Schein, 1978). Yet, structural changes in the labour market (*e.g.* high unemployment rate, low demand for certain jobs, changing demand for others professions) can also result in involuntary career change. The contemporaneous transition to a global market economy has contributed significant transformations and disruptions, with entire industries or their subsidiaries vanishing and, consequently, also the professions tied to them (especially specialised professions). More recently, a very similar effect has occurred due to digitalisation, with certain professions being either outright replaced by machines or diminishing in importance over time, according to forecasts.

Regarding the phenomenon of *voluntary* career change, the extant literature on the subject includes relatively few studies. This is

because up until the labour market became flexible, voluntary career changes rarely occurred due to the low willingness on the part of employers to hire older persons for entry-level jobs that did not require experience. Therefore, the current proliferation of voluntary career change could be explained by 'the sense of a calling' as a predictor for the intrinsic motivation of work, the efficacy of career decisions and the career level (Dik, Sargent, & Steger, 2008; Duffy, Bott, Allan, Torrey, & Dik, 2012; Steger, Pickering, Shin, & Dik, 2010; Wrzesniewski, McCauley, Rozin, & Schwartz, 1997). Further, voluntary career change may be stimulated by new work challenges, more competent leaders or better training opportunities (Rouse, 2001).

The structural opportunities – transformation of the labour market

During communist period, occupational trajectories were standardised in clear stages and consisted of two transitions: from school to the labour market, and from the labour market to retirement (Vlase & Preoteasa, 2017). The transition to a market economy introduced significant changes to the labour market and consequently to different life domains. The transformation of the economy, as in many other ex-communist countries, resulted in mass redundancies and increased demand for labour in various new fields (services, information technology and communication). At the individual level, such developments in the Romanian labour market prompted the development of new coping strategies: early retirement, migration or professional changes. At the same time, the global development of the IT field led to the emergence of new professional demands and a higher need for IT professionals.

The IT domain accelerated considerably due to both international economic conditions and national policies geared towards stimulating this field. Between 1995 and 2018, the number of employees in this domain in the European Union increased 2.87 times; in the US, the number of employees increased 2.32 times; and in Romania, the number of employees increased 3.24 times (Mas et al.,

2019). In 2003, a tax exemption for software developers was included in the Romanian Fiscal Code, with some restrictions. For example, employers had to position software development as the main business activity, and employees had to be graduates of universities with an established IT profile. Since February 2018, these restrictions have become more relaxed (e.g. programmers who are not university graduates are now permitted), while the number of employees benefiting from tax exemption has increased.

In 2017, the IT sector constituted 5.5% of Romanian GDP, which is about double that of 2012. At the same time, the number of employees in the field has increased yearly. One study (Aries Transilvania, 2017) showed that in 2016, the number of employees in the IT field in Romania was 100,000, an increase of 75% since 2011. One forecast for 2021 predicts that the number of employees in the Romanian IT industry will increase to about 125,000. Concerning the distribution of income, about 77% of IT sector revenue originates from exports (ANIS, 2018). Therefore, many Romanian companies are working as service centres for international clients. As such, Romania is competitive at the international level, particularly in attracting customers for whom projects in services or outsourcing are the primary interest.

In such a context, one in which the demand for experts in the IT field is inexorably increasing, but also one in which labour market conditions are prone to severe inequalities between professions despite similar educational and experience levels (from the viewpoint of both wages and working conditions), the emergence of the career change phenomenon in the IT area is increasingly evident. Specialised companies have been created with the express purpose of offering training and professional reorientation services to software developers, testers and business analysts, among other professionals. Training courses are typically either short or medium in duration (between one month and one year), and often the companies that deliver these courses may recommend the trainees to potential employers. So far, the number of companies in Romania providing professional reorientation services is increasing at a constant rate. Even

though this phenomenon has not been statistically well documented, the high demand for software development professionals in the IT sector and the consequent and associated increase in the number of individuals changing careers in response to this demand are readily apparent.

By the beginning of the 1990s, many claims were being made about computer science, which was described as a field of the future, while competition for computer science specialization was high. In Romania, automation and computer science universities admitted youths who excelled in mathematics and physics. Also, simultaneously, in the computer science industry, only those who had tertiary education in the field (i.e. graduates of computer science or cybernetics) had access to employment opportunities. A number of changes have occurred in the past 14 years in the field of software development after multiple state measures were launched to support the domain (e.g. tax exemptions) concurrent with the outsourcing of IT services from Western to Eastern countries. All these factors generated considerable changes in the labour market. The demand for programmers and other associated professionals (business analysts, testers and information project managers) has exponentially increased. In the absence of an adequate response from the education field, and due to out-migration of the highly skilled labour force, professional reorientation in the software development field was easily and eagerly accepted by both employees and employers. Likewise, at the international level, either by direct application or through digital employment platforms, professional reorientation has become a reputable and competitive arena for attracting talented employees, especially in the IT area.

Methods

Participants and sampling

Eleven in-depth interviews were conducted with individuals who had undergone a significant career change – namely, transitioning to an IT career. To ensure comparative value, but also to guarantee unaltered recollection on the part of participants, individuals who were in the

process of undertaking a career change or who had recently changed careers (within three years of the study) were selected for interviewing. Purposive sampling (Patton, 2002) was employed, and the main selection criteria were as follows: (1) the participant had to either be undergoing a significant career change or have undergone such a change within the prior three years; (2) the participant had to be employed as a software developer at the time of the interview. The overarching intention was to ensure a common destination profession, regardless of whether the actual trajectories towards this destination were different. The selection procedure was developed according to the snowball method, with each interviewee being asked to recommend other potential interviewees who met the above criteria. The software developers included in the sample all worked in Bucharest, Romania's capital city. Six of these developers graduated from departments in the social sciences and humanities (law, sociology, political science, marketing, psychology and education sciences), whereas the remaining five graduated from technical fields (construction, transportation, engineering and materials science). The participants ranged in age from between 24 to 40 years, and comprised two women and nine men. This gender imbalance is unsurprising, as the majority of software developers are typically male.

Instruments

Generally speaking, the study considered the ways in which participants narrated their career change process and the meanings they attached to their experiences. Towards this end, biographical in-depth interviews were conducted. The interview guide included topics such as childhood, education, family of origin, initial career orientation, decision to make a career change, the process of career change, adaptation to the new career, residence type, health status, leisure activities, family characteristics and romantic relationships. These topics were addressed within the framework of the life-course approach, which was aimed at capturing key concepts, such as linked lives, turning points, trajectories or transitions (Elder Jr. & Giele, 2009).

Data collection

The interviews, which lasted from between 40 to 120 minutes, were conducted face to face and were recorded. Various locations (e.g. coffee shops, malls, researcher's office and park) served as interview settings. A total of nine interviews were conducted by the author of the article, while the remaining two interviews were conducted by two other doctoral students. All respondents were fully informed about data protection regulations, and all signed an informed consent form before being interviewed.

Analysis

The nature of the analysis was at once thematic, inductive and deductive (Green & Thorogood, 2004; Saldana, 2011). MAXQDA12 was employed to code the interviews. The thematic analysis served to organise all the collected information (Braun & Clarke, 2006) and to identify key life-course concepts, such as life events and transitions, as well as to outline the multidimensional life trajectory for each participant. Next, meanings were extracted from the participants' narratives. In order to preserve anonymity, any information that might have exposed the participants' identities was excluded, and each participant was assigned a pseudonym.

Concerning trustworthiness in qualitative research, the article is an interpretative research and the study met the criteria of authenticity (Morrow, 2005) and *verstehen* (i.e. deep understanding) (Patton, 2002). The author of the article, who also served as the main interviewer, shared the same context and culture as those of the participants.

Findings

Four main themes were theoretically established (i.e. deducted from the life-course approach): individual resources, opportunity structures, policies and decision-making processes. Other subthemes were inductively identified. The main themes derived from the analysis of career change processes are presented below.

Table 1. *Thematic Analysis: Themes and Sub-themes*

1. Individual resources
Recruiting
Marriage/romantic relationships
Introvert/extravert
Personal development
Health problems
Ethics/values
Inspiration
Desire to learn
Agency
Job satisfaction
Abilities
Personal life/leisure
Live events (in the past)
Standard of living
Future plans
2. Opportunity structure
2.1. External support
Family of origin
Linked lives
Networking
Advice
2.2. Training system
University
Second faculty
Certifications
Training/self-learning
Foreign languages
Quality of education system
Career counselling
First career choice/high school
2.3. Organisation
Employment
Perceived discrimination
Co-workers
Challenges
Work programme
Work contract
Work from home
Work-life balance
Internship
Job search/selection
Previous experience
Social status of developer
Adaptation to new career/job
3.State support/policy
Tax facilities
Labour market policies

4. Decision to change career
Software training
Self-confidence/validation
Self-determination
The calling
Change agent
Triggers
Obstacles/difficulties in career change
Disadvantages
Regrets/negative feelings

Each individual case presented a distinct life story and occupational narrative. The life-course approach that guided the entire research process viewed each trajectory as unique and accounted for the influence of individual, family and/or structural factors. Moreover, the examination of each life story generated rich information that in turn provided a comprehensive picture of the career change processes as experienced by each participant. Graphics of life trajectories were designed to better comprehend aspects unique to each of the participants' lives. Two of these graphics are included in the analysis section.

Table 2 includes the full range of information collected about each participant.

Initial career choice

The participants spoke comprehensively about their experiences with the career change process. The process typically began in high school, where the participants received career guidance but were not provided with clear counselling nor with assistance in choosing a profession. All interviewees attended high schools with a theoretical science programme (mathematics – computer science; mathematics – physical sciences; or technological). Admission to such high schools is difficult, requiring students to demonstrate above average performance irrespective of their skills or the field in which they intend to pursue later study.

The interview data showed that the choice of university major was usually made in direct consultation with **persons vested with authority**, namely parents, peers, teachers or classmates, or as a consequence of mass-media influence. Only one participant reported

completing a vocational test online, the results of which were inconclusive and therefore did not help him make a decision. High school teachers, who are typically viewed by students as possessing authority, play a very important role in the choice of career. Viorel (24 years of age) revealed the information he had received from his high school mathematics teacher:

R: I had a math teacher who was highly rated, who told me on each occasion that we will never work anywhere, that there are no more jobs, that he doesn't know what we are going to do, that woe is on our heads.

I: That is, I mean this was the discussion about your career guidance...

R: Precisely.

I: And did you believe him?

R: I tried not to, but I think it had a rather strong impact because he was our most regarded teacher ... he had authority, being the math teacher... (Viorel).

Initial decisions concerning career choice were justified rationally, with those charged with advising high school students referring to wages or employment opportunities after graduation. In all cases included in the sample, the choice of college was made by accounting for prevailing labour market conditions (as perceived by either the students themselves or by significant persons in their life), considering the likelihood of being admitted, and, to a lesser extent, self-assessing skills and aptitudes. Additionally, self-confidence – or the lack thereof – was also considered as an important factor in choice of faculty.

One participant, Mariana, who was raised in a small town in southern Oltenia, recalled advice she had received in high school that had influenced her choice of one of two, although only after much vacillation. The source of this advice (although not clearly stated by the participant) seems to have been a teaching staff member. In Mariana's narrative, the theme of a lack of courage emerged; retrospectively, she believed that she did not have the courage to pursue admission to Cybernetics (a department within the Academy of Economic Studies [AES] Bucharest). Even after 20 years, she still regrets not opting for a technical university.

Table 2. Description of the sample

	Year of birth	High school	Education (first option)	Professional experience	Relevant factor for the career change decision	Strategies for entering the IT field	Current occupation	Current employer
Ionut	1983	Maths-CompSc	Political Science, Master's in Marketing	Journalist, editor, sales agent, call centre operator	Fell out with his girlfriend (she worked in IT)	Informal education, self-taught. No graduation certificate	Application administrator	IT and Marketing company (100 employees)
Mihai	1987	Maths-CompSc	Sociology (and Master's degree in Security Studies)	Receptionist, call centre operator, entrepreneur, sales agent in health tourism	Began learning programming for maintaining his company's website and databank	Informal education, self-taught. No graduation certificate	Software developer	Software company (100 employees)
Costin	1985	Maths-CompSc	Faculty of Construction	Sales agent for metallic roofs, quality assurance inspector for construction sites	Began managing the website of the company and he discovered he enjoys programming	Participated in a programming training course of 6 months	Software developer	IT Service Centre for an international organisation (3,000 employees)
Viorel	1994	Maths-CompSc	Faculty of Engineering and Materials' Science	Internship programme/practice in a metallurgic enterprise	His cousin recommended he should learn programming	Began a Master's Programme at the Faculty for Computer Science. He participated in a training course for programmers	Software engineer	Romanian software medium company
Alex	1993	Maths-CompSc	Faculty of Transportation	Practice/internship in the field	A faculty colleague recommended he learn programming and loaned him materials and books	Free online courses and a scholarship for a training with Google	Software developer	IT Service Centre (800 employees)
Sorin	1989	Maths-CompSc	Faculty of Law	Lawyer and notary assistant	After he failed the notary examination	The Faculty of Cybernetics	Software developer	IT Service Centre (800 employees)

Table 2. Description of the sample (continued)

	Year of birth	High school	Education (first option)	Professional experience	Relevant factor for the career change decision	Strategies for entering the IT field	Current occupation	Current employer
Cosmin	1992	Maths-CompSc	Faculty of Transport	Internship	Determination, calling to the computer field	Three months' training for learning JAVA	Software engineer	IT Service Centre (800 employees)
Mariana	1977	Maths Physics science	Faculty of Marketing, AES	Call centre operator, technical support	Opportunity at the former job	Informal training and Certification	Developer	Small Romanian software company
Vlad	1989	Maths-CompSc	Faculty of Law	Assistant at the office of a bailiff	Technologically passionate, a friend recommended he turn to IT	Online courses, JAVA certification	Software developer	IT Service Centre (2,000 employees)
Ioana	1990	Technological High school	Psychology and education sciences	Kindergarten teacher	Attempted unsuccessfully to find a job in HR. A friend recommended she turn to programming	JAVA 2 months training course	Software engineer	IT Service Centre (800 employees)
Andrei	1992	Maths-CompSc	Faculty of Transportation	Car engineer with a big company	A friend guided him to the field of programming and even taught him the main JAVA concepts	JAVA 3 months training course	Software developer	IT Service Centre (2,000 employees)

In cases where labour market conditions were considered when deciding on future university education, social and economic changes prevalent over the last few years have led to disappointment and adjustment difficulties in the chosen profession. In the 2000s, fields like Law and Construction seemed to be sectors that would ensure material welfare. However, economic crisis, digitalisation and the rapid development and prominence of the IT field have catalysed major changes in the labour market in a very short amount of time.

Thereafter, as regards faculty, I was somewhat undecided; I didn't know whether to continue on this computer science path. My mother kept nagging me that I must continue with computer science, and somehow there were some material restrictions, as well. I failed in attending the Polytechnic, and I thought, maybe pass the exam for something that was demanded then in 2003-2004, respectively, Construction. There was an enormous boom of companies, so... (Costin).

Career pathways were also linked to the preference to remain in close contact with **friends**. Living far from home frequently involves significant stress, and as such it is not uncommon for friends to attend the same university and/or department, a logical decision for young students at the time. Cosmin, for instance, gave up his initial plan to attend computer science college in order to remain in close proximity to his colleagues and hometown friends. This strategy is especially common for young people from rural or small towns who relocate to larger towns or big cities alongside their friends or colleagues. Remaining together, living together, and sharing transportation with friends can be a powerful emotional, but also instrumental, aid, as can correspondence and gifts sent from the students' families.

We were a group of friends planning to go – the three of us – to the same university, and, so to speak, I was advocating for Automation, while the others were for Road Vehicles, they said that it is much

harder [Automation college, author's note], that ... So, I didn't go there.

I.: Thus, they gained ...

R.: Yes, and so I went to (Department of) Road Vehicles, as I also had this passion for cars. I dreamed about a programming system for road vehicles – that is, for electronic systems installed in cars. More or less this was the target, so to speak. Then I began with programming, but without studying comprehensively in earnest during the college years and having an advanced level. Only after I finished the college did I start earnestly with it, and at the same time I learned I also had the master admission test, and I learned for admission... (Cosmin).

Here, it is evident that Cosmin continues to have a calling for programming, such that even though he made a different decision because of his friends, he still plans to pursue a programming career. Via the snowball selection procedure, the opportunity was presented to include in the sample two high school classmates who could speak about their common life history (Cosmin and Andrei). Cosmin was the first to decide to learn Java, which, after this had been successfully achieved, influenced Andrei, who enrolled in the same three-month training programme for Java.

The mass media plays an extremely important role in the modern world. Digitalisation helps youths to obtain information faster and more efficiently than ever before and, if applied appropriately, such information can be used to identify valuable resources critical to pursuing a future career. Vlad had already dreamt of becoming a lawyer in his childhood, when he had become fascinated with movies about lawyers, even though he never tested his abilities. Mariana spoke about how, during high school, she always followed the written press and created a shortlist of schools in which 'girls on page 5' were enrolled (in her local newspaper, an artistic picture of a beautiful girl was presented every day). Clearly, then, at least for these respondents, media information played an essential role in career decisions. In Mariana's case, during the 1990s (the period in which she

had prepared for university admission), access to information related to professions or specialties, universities and departments, and even labour market conditions was much more limited. After 2000, alongside widespread access to the Internet, the availability of information of all types increased dramatically, enabling youths to make much more informed decisions.

The involuntary path to programming

The discourse of non-technical faculty graduates is permeated by expressions of **disappointment about the profession** initially chosen. For Sorin and Vlad, both law school graduates, having failed their examination for a notary's licence was the decisive factor in guiding them towards IT. In their comments, they spoke not necessarily in terms of failure, but instead about incorrect examinations and uneven chances.

Exactly, and in that year, when I was employed for the second time at the Notary's Office, they opened this thing [the Notary's Licence examination, author's remark], and they said that absolutely anyone may enrol for it. Well, I thought, let's try my luck, but then I remained... There were six such openings at the level of Bucharest, seven openings for the entire municipality, and the candidates were all from the 'movers and shakers circle', that is, they were... Right. We were about 300 candidates for six to seven openings. I trained for the exam while I was working at the same time, and the experience was super disappointing, because instead of... I mean, there was also the written examination, but the first test was the oral examination. There were five notaries in the commission; you drew two cards and they told you the grade. It was one of the saddest experiences ever. They didn't even look at me while I talked on topic. They were talking to each other; nobody listened to me. As I

finished speaking, they were like, 'Well, thanks, have a nice day' (Sorin).

There is clearly an (over)abundance of law school graduates, making access to this particular labour market exceedingly difficult in terms of pursuing a career as a lawyer, a magistrate or a notary. Both Sorin and Vlad considered the admission examinations and selection procedures to be cumbersome and often unfair.

The narratives of those who switched from humanities to IT consistently emphasised the different statuses between the two professions, with a higher status afforded to programmers, as well as better economic and working conditions. Likewise, in terms of gaining employment, the process involved in becoming a programmer was considered to be quite reasonable. Although participants noted that significant efforts had to be made to learn and prepare for this new career, they also regarded the selection procedure to be straightforward. At the same time, their successful experiences pursuing this career offered some hope that they could also inspire others to benefit from these experiences.

I have a better quality of life, and the fact that I shifted from humanities, where I spent a lot of time, to the IT area shows that it is possible, and it should be... I mean, what I did should also inspire others to take this step, and no longer waste time in humanities, where there's no future, actually.

No, I wouldn't advise anyone to pass the political science examination for several reasons. 1. No people studying political science are employed in management positions. 2. You cannot apply what is taught in political science. Actually, political science pertains to philosophy, the combination of philosophy with history, so it's in fact a specialty like philosophy, a faculty... (Ionuț).

In some cases, while working in their first job (not an IT area), the interviewees were assigned additional tasks in the field of programming (they were asked to maintain some apps or web pages). This was the first

step for them in understanding that they possessed obvious skills in the field and that they could realistically pursue a career in IT. Doing so was further described as a smooth transition to the IT profession and also an opportunity to acquire additional skills or develop latent talents.

Yes, there was a programme for tourists, where they were asked to write about their needs, and depending on that, to find out about prices. As there was nobody that could do this, I thought, let me try to write a script, that super easy stuff in Java script, and rather simple. I mean easy, but it was super easy, but at the time for me ... I mean, see, here I was just learning this thing and I realised I liked it a lot, I mean to do this, so that for a couple of days I paid attention to no one, I was caught in that thing (Mihai).

Such practical experience permitted the participants to discover their skills and to make the decision to transition to programming. To better understand the career paths of the participants, life trajectory schemes were devised along four dimensions: education, employment (with details on occupation, employer, type of contract and months of employment), residence, family (couples) and health. Here, the life trajectory of Ionuț, a political science graduate, is introduced. As the life trajectory scheme is by nature very visual, a clear image of life events and transitions emerges, as do links with significant others in personal and professional life. For Ionuț, the occupational trajectory comprises a long line of career changes, with unsafe, skilled or unskilled jobs of short duration (from a few weeks to a few months).

Ionuț's life trajectory (Table 3) illustrates the intersection of multiple life domains, as well as how his very uncertain career path has interfered with family, romantic relationships and educational pursuits.

While Ionuț was employed as a journalist, he was hospitalised, realising only after his discharge that he did not have the health insurance to pay for it. His difficult health condition made him acutely aware of his urgent need for health insurance, and so he decided to switch to a more decent job, one

that offered stability and security. In his case, the transition to a new career felt natural due to his innate programming skills. He had always been interested in computers and phone applications.

Ionuț's career decision was ultimately made after breaking up with his long-time girlfriend, who had also transitioned to the same type of career. In his discourse, Ionuț attributed wage differences to ending his relationship. This, combined with his chronic **health issue** and lack of medical insurance were reason enough to commit to changing his career.

Precisely, and it was purely about insecurity, instability, and this permanent fear. As of the moment I got sick, I mean at the time when the symptoms showed and I was hospitalised, and I was compelled to pay for each hospitalisation day... (Ionuț).

The humanities and social sciences graduates decided to switch to the IT area in order to have a better life, especially as they all already possessed skills in the programming area. They did not consider the transition process to be difficult, crediting the openness of the IT companies to absorbing and training talented resources in the required skills for their easy career shift. The primary challenge they currently face is sufficiently advancing their careers and obtaining the requisite formal certifications needed to be fully integrated into the industry.

The voluntary path to programming

In this category, participants who made a voluntary decision to change careers to IT without having faced any negative circumstances at their previous jobs were included. These participants made the decision to switch professions early on, either during their studies, as they came to understand that IT was their preferred path, or immediately after obtaining their first job. Although they had no negative experiences in their first profession, they knew that working conditions for programmers and the increasing demand for programmers in the labour market were more appealing than the benefits of remaining in their original profession.

Andrei's trajectory contained two work transitions, with two jobs. Although he was very young at the time of the interview (24 years old), he had already declared that he had found his chosen career path. His personal history led him to be a responsible person at a young age. As the oldest of three siblings, and after losing his mother (in his last year of high school), Andrei assumed responsibility for educating his younger brother (16 years old) and sister (8 years old). Andrei also helped his father on the family farm and at local markets, where they sold agricultural produce.

From his educational and employment paths, it is clear that Andrei demonstrated a high level of agency and self-confidence, and that he chose a career very soon after graduating from university (Table 4).

Andrei's computer skills had been developing since high school, when he had participated in computer science school contests. He talked about his new career in terms of having a 'fascination' for IT, but he also mentioned the risk of change.

Being in contact with software development, I don't know how, I got fascinated completely and knowing which were the opportunities in the field, of course, the material side might play the role of promoter, but no matter, as at the time I had no idea about wages in the field. It was all of them together that made me make this risky decision to resign (Andrei).

Andrei was assisted in his career decision by a university peer who had already begun his own change process, learning Java and participating in formal training. As a result of his successful decision, Andrei became an important change agent, one who helped many of his peers and also his relatives to enter the same career:

One is my brother, who is one year younger than me. He has also worked for some time now. Nine months. I also helped my cousin, a friend, and my girlfriend, who has finished psychology and trains a lot, as well (Andrei).

Having mathematical skills and an engineering background made their transition to a different career easier and conferred them

with the characteristic of higher employability. After completing an internship programme, they all received good offers at top companies, especially international service centres.

For many of them, their previous experiences with their peers or friends helped them make a smooth transition with instrumental means, in the form of information exchange (about training, various handbooks, internships and job openings) and recommendations or emotional support. It is evident from the discourses that even those whose career could be considered very successful asked for advice, thereby highlighting the differences among vocations, skills and resources offered in the IT industry.

If the respective someone decides to make this career change, he or she must like it because if it's only based on the material aspect, or because he or she disliked what they did before, they might come to hate the decision and, even worse, become demoralised. I, for instance, would like to change what I'm doing and try programming, but I don't like programming... (Cosmin).

This type of change illustrates, to a significant degree, situations in which young people initially choose inappropriate career orientations. Even though they possessed strong computer skills during high school, they nonetheless chose different careers, for various reasons.

The career change process – Resources and adaptation challenges

In this study, the decision to change careers emerged as a result of evaluating one's skills in the sphere of programming but also due to the recognition of opportunities in the labour market. For those who voluntarily changed careers, the narrative was thematically collective, as they practised solidarity and helped each other as a group to improve their chances for success (not only the participants in the present study but also others in the same situation).

Table 4. Respondent A's life trajectory

	1992	1999–2006	2007–2011	2011	2012	2013	2014	2015	2016	2017	2018
Andrei											
Education	Birth	Elementary school and gymnasium	High school	Polytechnic University - Automotive				Engineering University - Faculty of Electronics Master's degree	Software development training (4 months)		Formal software development trainings and certifications
Occupation			Household production (family farm)								
Employer								Engineer	Software developer intern		Software developer
Employer								Automotive company		International IT company	
Type of contract								Contract	Temporary		Permanent
Month worked								8	4		Ongoing contract (20 months)
Residence		Countryside			Bucharest						Dwelling bought
Family		Two siblings, lives in family multigenerational house		Mother's death	Provided support to the younger siblings			Romantic relationship			Marriage

When the steps taken to become programmers are considered, different elements arise. As can be seen from Table 1, most had learned programming on their own, either from books or online by attending informal courses.

Two of the participants decided to attend a formal programme. Sorin, a law school graduate, enrolled in the Faculty of Cybernetics, Statistics and Informatics, and graduated. During his studies, he found employment as a software tester, and he subsequently changed his career to software development. Viorel, a recent metallurgical engineering graduate, was admitted to the masters' programme at the Faculty for Computer Science but, during his first year, he dropped out. He was already employed as a software developer, and it was very difficult to balance school and a full-time job, so Viorel interrupted his courses for an unspecified period of time. Therefore, all of the respondents were first employed as software developers or engineers (job title) in the absence of any formal certification. In their discourses, some of them talked about perceived discrimination from their co-workers (computer science graduates). To mitigate or circumvent the effects of an 'inferiority complex', the participants employed a coping strategy with the intention of completing formal training. Mihai, a sociology graduate, discussed how he felt that he lacked the fundamentals of computer science, and accordingly started to learn and better understand basic computer concepts:

How does the actual computer work, what the hell is memory, what does it do... I don't know, what are the bytes, what is the binary system and so on, nah, these are things that I am still working on, I still build the foundation' (Mihai).

On the other hand, another participant, a political sciences graduate, described his experiences and relations with his co-workers in terms of 'contempt' and a lack of empathy:

They look with contempt, and the fact that they have access to greater financial resources, they never faced serious social

problems, they did not have to fight, they do not know what a man coming from a humanistic area is going through, they do not. He (a man from a humanistic area) does not find a job, he has a low salary, he does not have a contract. That makes them happier, makes them more superficial, makes them more detached, not all but... (Ionut).

Ionut's perception of his co-workers as different, as having a lower level of tolerance and understanding, placed him in an unequal relationship, one that could potentially produce tension and conflict in his professional relationships.

Among the engineers included in the sample, only Viorel talked about these uncomfortable feelings in relation to his more qualified co-workers. He experienced this situation during his first internship programme, where all of his colleagues were graduates of computer science. He felt that he did not know as much as his colleagues did, and he preferred not to ask for help in order not to disturb them or waste their time. After a few months, he decided to resign; and after a period of learning, he applied for, and found, another job.

The perceived discrimination and sense of an inferiority complex could be harmful to job satisfaction and consequently pose obstacles not only to career development but also to performance in the workplace (Wallace, Pichler, & Bernadette, 2007).

Discussions

Making a career change towards software development professions is an intricate and complex process, and it is therefore futile to attempt to discuss such a transition in terms of homogenous career paths. Those who chose this new career were all very different in their own ways, e.g. previous profession, gender and age. More precisely, the participants in this study made the decision to change careers at different ages and at different life stages. As such, the current paper highlighted the importance of the career change process in light and from the perspective of individual and societal points of view.

The first research objective was to explore participants' initial career options. The results of the analysis in this regard demonstrated the conspicuous absence of professional guidance or counselling for high school youths at a time when such guidance would be most crucial (*i.e.* prior to university enrolment or vocational training). The participants' initial choices were made mainly without awareness of their own skills. During high school, they were guided by either the teaching staff or their parents. The lack of information regarding university domains and the labour market, in addition to deficient self-knowledge, culminated in inappropriate career choices, at least initially. Such choices were often made based on ultimately self-defeating or irrelevant factors, such as the difficulty of admission examinations or the desire to remain close to friends. In the Romanian educational system, vocational and career counselling or facilitation are virtually absent. 'The *calling*' towards the software engineer profession was clear in the case of those who already showed a passion for computer science in high school but who ultimately abandoned computer science, for various reasons. The narratives of these participants were replete with feelings of regret over initially opting for different professions and, already during their university studies, the commitment to learn programming and apply for a career in this sector.

For the second research objective, the voluntary/involuntary distinction was instrumentally used to differentiate between these two seemingly similar paths. The results showed that differences existed between the career patterns of technical graduates and those who graduated in non-IT technical fields. Graduates in the humanities, although correctly choosing their field in accordance with their abilities and skills, were disappointed by subsequent job offers in the labour market. Although the work content was not unsatisfactory, their working conditions were inadequate (salary, type of contract, job security, number of hours worked). In the case of technical graduates, the situation was decidedly different. These graduates entered a profession surrounded by and overflowing with others with similar technical skills, and as

such they were confronted by fierce competition on the one hand, and by obsolescence on the other. Consequently, they re-assessed their technical skills and made the decision to join industries in which these skills would be more appreciated. Some of these individuals were fortunate enough to make this decision early on during their undergraduate studies or immediately after graduation.

The life-course approach permitted a comprehensive depiction of the career change process at the individual level and from the perspective of community or society. From a theoretical and methodological point of view, the article contributes to the career change literature by showing how individuals, regardless of their abilities, are influenced by networks or structural opportunities.

Individual resources involved in this type of change are agency, the capacity to identify and acquire proper learning resources, and substantive programming and self-learning efforts. Additionally, networking is an important resource, especially for people in technical areas who support each other instrumentally in order to locate learning resources or job offers or internships.

Community and society are another strong point in decision making. The labour market is open to cultivating talent in software development via internships or training programmes (short duration programmes or special reorientation programmes).

Implications

The findings of the present study can be applied both theoretically and practically, and can additionally serve as the foundation for making educational policy recommendations. From a theoretical point of view, the main contribution of the current study are the significant insights it generated into the career change process via the methodological lens of the life-course approach. The results of this study are in line with those obtained by prior research, which emphasised the role of context in career flexibility (Tomlinson et al., 2018). Specifically, both labour market opportunities and fiscal capabilities offered by the state weighed heavily in the decision by

interviewees to make a significant career change to IT.

Career guidance is a relatively new field in Romania, and it has as such received relatively little scholarly scrutiny. The analysis of the interviews demonstrated, first, the absence of professional guidance or counselling for youths in high school. It is therefore recommended that such guidance, especially geared towards preparing for a future career, be included as part of educational policy, with dedicated services and faculty members in schools and universities.

Also, the discrimination experienced by new programmers from co-workers with computer science background constitutes a stressor that could in turn result in counterproductive psychological and physical distress. Consequently, HR specialists should work to eliminate workplace discrimination by enacting a more tolerant and welcoming work environment.

On the other hand, digitalisation has created new, precarious jobs (such as platform workers) with very low requirements and direct effects on workers' personal lives. This new workforce demands special attention in regard to their work contracts, working conditions and wages.

The continuous and rapidly accelerating transformation of the labour market due primarily to digitalisation is an essential research issue. Employees working in skilled jobs as programmers or in other associated occupations have a high standard of living, with high wages and good working conditions. However, when major changes occur in the field of software development, questions frequently arise about whether such careers are stable in the long term, especially for those who transition to the field with incomplete qualifications. Currently, the Romanian IT industry is dominated by cross-border services (such as outsourcing) to the detriment of original, innovative software production. For the foreseeable future, there is the risk that, if the costs of such outsourced services in Romania increase, they will be relocated elsewhere to exploit cheaper labour forces, such as in Asia.

Limitations and future research

The sampling method used in the present research had some limitations via the network effect (the potential interconnections among participants). That said, the life-course approach benefited from this type of selection by enhancing the opportunity to depict and thereby understand how the lives of participants were linked personally or professionally. On the other hand, purposive sampling allowed for the selection of participants who had common characteristics but also exhibited differential attributes conducive to the identification of patterns. Generally speaking, this method is appropriate for studies in which the unit of analysis are concepts as defined by participants. In the present research, this translated into the capacity to effectively design the life trajectories of individuals. Additionally, the interview methodology employed was effective insofar as unstructured interviews generated in-depth information, while the number of interviewees (11) was appropriate to the research objective and type of analysis (Morse, 2000).

As all respondents were from Bucharest, career change processes as they play out in the IT industry in other important cities elsewhere in Romania as well as abroad were not considered. Future research should thus attempt to address this limitation. In addition, the long-term effects of a significant career change could be assessed in further research by employing a quantitative and qualitative longitudinal design, one that could evaluate the effects of multiple factors on career decisions and/or skills development.

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