Managing Software Development Risk

Risks of introducing the role of Agile Coach: A Multivocal Literature Review

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1   Introduction

Agile software development is considered as one of the main avenues of research in current software engineering studies (Calefato and Ebert 2019). In fact, agile methods have gradually gained popularity among both researchers and software practitioners until reaching complete dominance in the past 25 years of software engineering (Hoda, Salleh, and Grundy 2018). Agile methods emerged as a response to the "bureaucracy" of the traditional complex methods and the increasing change in the business environment revealed by the need of faster changing requirements and growing demand for efficient software development (Pavlič and Heričko 2018). Traditional approaches could not deal with that change due to the fact that they assume that it is possible to anticipate a complete set of the requirements in an early phase of the project lifecycle (Abbas, Gravell, and Wills 2008). Agile approaches are nowadays embraced widely as an answer to the failure of traditional plan-driven waterfall-based approach as well (Gupta, George, and Xia 2019).

In contrast, agile methods offered lightweight processes with a central focus on people and interactions, while they retain the rigor of engineering processes and best practices throughout the software development lifecycle process (Hoda et al. 2018). As a consequence of its popularity and effectiveness, agile methods are widely accepted in deployment of methods such as SCRUM, extreme programming (XP) and lean software development (Alahyari, Gorschek, and Berntsson Svensson 2019). Moreover, the success of agile methods for small, co-located teams has inspired companies to increasingly apply agile practices to large-scale efforts (Uludag et al. 2018). However, adopting agile practices, related to knowledge and experience is complex and requires lots of effort from the companies and teams along with cultural adaptation: it deals with egos and resistance to change and demands upper management sponsorship (Campanelli and Parreiras 2015; Pavlič and Heričko 2018). In sum, agile approaches are, like any other software method, intensive in human capital and need to be tackled taking into account the interests of all stakeholders (Colomo-Palacios et al. 2012). What is more important, given that software engineering and agile approaches are becoming more and more social (Mens, Cataldo, and Damian 2019), it is crucial to focus on social aspects of such teams.

In order to help companies to adopt agile methods smoothly, a new role, Agile Coach is gaining popularity among software practitioners (O'Connor and Duchonova 2014). In fact, the vast

majority (83%) of 1319 respondents of the survey (VersionOne 2019) said their organization were below a high level of competency with agile practices —agile maturity—, further revealing opportunities for improvement through supporting training and coaching. Although the professionalization of that role seems well-known and consolidated by the conferences and certification programs to standardize the qualification process, the companies decide whether to use an Agile Coach for agile adoption or not and if so, what type of Agile Coach to use. Furthermore, in practice, different coaches have different styles and different focuses depending on the team needs and their own preferences (Bäcklander 2019).

Authors are aware of the importance of the role of Agile Coach and aim to carry out a multivocal literature review (MLR) devoted to identify the risks of introducing such a role by investigating both research and professional literature including not only the negative consequences but also the positive aspects that could lead to potential beneficial opportunities. Therefore, this chapter aims to benefit the readers (both researchers and practitioners) by providing the most comprehensive and balanced view of the topic.

2   Understanding the relationship between risk and agile coach role

Risk is an uncertain event or condition that, if it occurs, has a positive or a negative effect on plans and goals of any software project (Project Management Institute 2013). However, regardless of the outcome, risk management is a process that involves identifying risk, assessing and prioritizing risk, as well as monitoring and controlling risk. Therefore, risk is a necessary evil in the software processes, even those that are claimed to inherently reduce risk, such as in agile approaches (Cockburn and Highsmith 2001). In fact, recent failures of projects that adopted agile software development and the reported challenges associated with it have drawn attention to its possible risks and the importance of identifying, assessing, and mitigating them (Elbanna and Sarker 2016; Gold and Vassell 2015). Moreover, due to the fact that agile approaches depend a lot on people involved in the projects and their motivation in applying agile practices, most issues encountered are related to the people and the practices involved (Parizi, Gandomani, and Nafchi 2014). This echoes one of the values in (Anon 2001), i.e. "individuals and interactions over processes and tools". It implies that not having the right people doing the right process will be a source of risk. According to (Gold and Vassell 2015), previous works stated that risk management is important but it is frequently overlooked in many projects, in particular, risks inherent in Scrum projects are categorized as people, organization and process.

One way on how organizations can reduce the risk when adopting agile methods is to use an Agile Coach (O'Connor and Duchonova 2014). However, Agile Coach is an overloaded term. According to Lyssa Adkins (2010), an agile coach is an experienced user and teacher of agile methodologies, who can take on many roles, such as teacher, facilitator, coach-mentor, conflict navigator, collaboration conductor, problem solver, and so on, to help teams adopt and improve their use of agile methodologies. In this sense, Agile Coaches are meant to guide people on their path towards better expertise through emphasizing best software engineering practices (Rodríguez, Soria, and

Campo 2016). Agile Coaches perform as agents of change and rely upon teamwork related skills as well as other social skills (Vikberg et al. 2013). It has been applied to advanced scrum masters, trainers, and leaders who are not sure where they fit in an agile organization (Gene Gendel and Erin Perry 2015). However, Agile Coach is not a role mentioned in Scrum, Kanban, XP or any other agile framework or practice. The role and its importance have grown organically as organizations have realized the benefits of agility and appetite for long-lasting change has increased (VersionOne 2018, 2019).

Agile coaching can be a role and career that requires a lot of skills, and may not be a natural role for everyone (White 2018; Wick 2018). With learning, practice, and awareness of oneself and others, many can learn and grow careers in coaching. This role has evolved naturally to provide coaching and mentoring to agile teams, but it is relatively new and little researched (O'Connor and Duchonova 2014). However, such a role introduces risks which may not be fully understood and hence will not be properly mitigated. It raises the question: *Which are the risks related to the introduction of the role of Agile Coach?*

3 Research method

An MLR was conducted in order to identify all accessible literature on the Agile Coach role. An MLR is a systematic study of academic literature and grey literature which are constantly produced by SE practitioners outside of academic forums (Garousi and Mäntylä 2016). The last one includes but is not limited to: blogs, post, white papers and articles. As far as the authors know, this is the first MLR on this combined topic although it is not the first secondary study for other roles, e.g. a systematic literature review about the Scrum Master's Role (Noll et al. 2017).
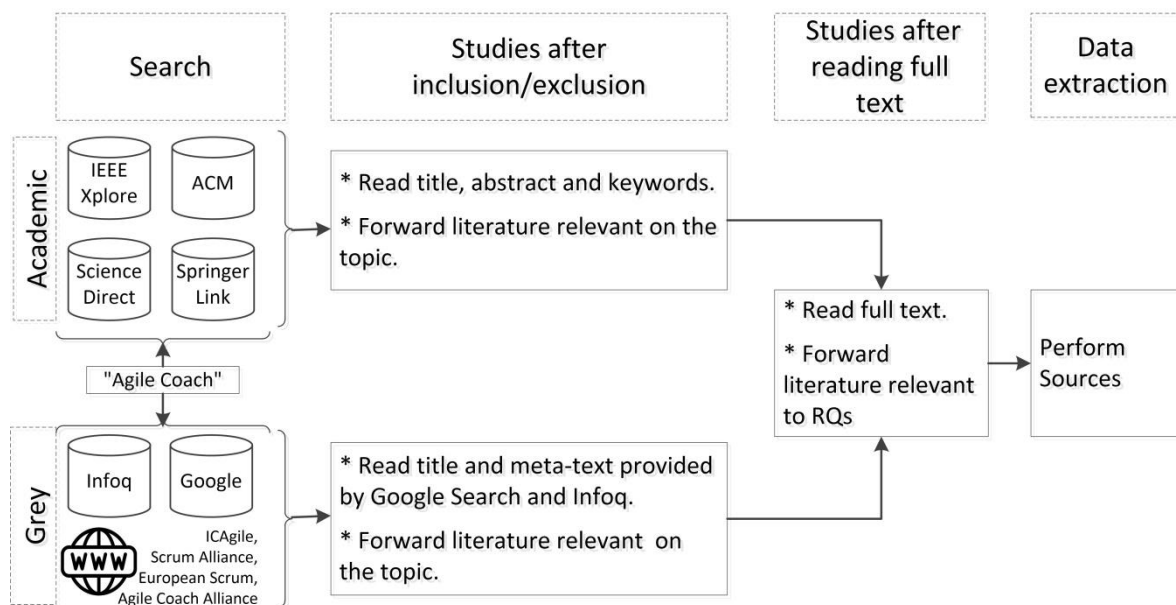

Figure 1: An overview of the search process**.**

Figure 1 shows an overview of the search process that is based on a study protocol. In this MLR, the first author carried out the study selection process and the second author reviewed the process, verified the outcomes and supported the resolution of doubts. The search string was purposely broadened to identify factors related to the role of Agile Coach that could be a source of potential risks. This MLR was performed by June-July 2019. First, the search was performed on six database search engines using as search strings, "Agile coach" OR "Agile coaches". For academic literature, four full-text databases were estimated as enough, namely Elsevier ScienceDirect, SpringerLink, ACM digital library and IEEE Xplore. For the grey literature, InfoQ and Google were selected due to this topic already stem from software industry. InfoQ provides software engineers with the opportunity to share experiences gained using innovator and early adopter stage techniques and technologies with the wider industry. However, InfoQ carefully peer review everything they publish. Moreover, four specialized websites related to Professional Certifications are included: ICAgile, Scrum Alliance, European Scrum, and Agile Coach Alliance. When we were using the Google's regular search engine, we use the stopping criteria called "effort bounded", i.e., only include the top N search engine hits based on the search engine page rank algorithm as recommend the guidelines proposed by (Garousi and Mäntylä 2016) to restrict the search space in MLRs. Table 1 shows the number of search results per database. As one can see, we found 547 publications in the initial search.

Table 1: Summary of search results for primary study.

Studies	IEEE	ACM	Science Direct	Springer Link	Google	InfoQ	Total
Studies retrieved	15	10	44	161	200	100	547
Studies after criteria	5	4	5	17	11	20	62
Studies after reading full text	2	2	1	6	7	4	22

We excluded articles based on title and meta-text provided by Google Search, while, we reviewed the titles, abstracts and keywords in the remaining databases. The application of inclusion and exclusion criteria was conducted by the first author. Below are the inclusion criteria applied:

- Studies are about the Agile Coach role.
- Studies are in the field of software engineering and factors that could be related to potential risks in agile software development.
- Studies were published online in the period 2010 to 2019 (this study was conducted during July-August 2019).

When a study was excluded, the following criteria were applied:

- Studies not presented in English.
- Studies not accessible in full-text.
- Studies that are duplicates of other studies.

When a publication was clearly out of the inclusion criteria, it was not included in the following phases of the selection process. When a publication accomplished with the inclusion criteria, the publication was included in the next phase of the process. When in doubt, we were inclusive of taking the publication to full-text reading. After that, publications were thoroughly analyzed by reading the full text. In this way, we attempted to ensure that the publication certainly contains relevant information for this study. By full-text reading, it became obvious that further publications should be removed because they did not accomplish the inclusion and exclusion criteria. In this case, the primary studies are the union of the scientific and grey primary studies. At the end of the process, the list of items was formed by 22 sources (see Table 1). In this chapter, the sources are referred in the form of [S01],…,[S22] and these labels are the same as in the Appendix A.

In what follows, the results are presented based on the major categories related with the Agile Coach role: i) Coaching competencies, ii) Professional certifications, iii) Experience, iv) Style of Agile Coach, and iv) Focus and alignment, v) Internal/External Coach, vi) Objectives of the coaches, vii) Target groups, viii) Value.

4   Results

Given that risks related to Agile Coach role are not explicitly mentioned in the literature, this section presents factors related to the role of Agile Coach and emerging human-related risks identified from the MLV. Then, in section 5, authors discuss the human-related risks of introducing the role of Agile Coach based on the identified factors. Table 2 shows two main categories, the first one is related to Agile Coach role itself and the second is related to business. In what follows, the main findings of each factor are presented.

Table 2: Summary of human-related risks.

Factor	Sources	Type	Human-related risks
Role			
Coaching competencies	[S01], [S02], [S06], [S07], [S09], [S11], [S14], [S22]	Negative	Lack of competencies Technical mistakes
		Positive	Solid skills set Wider-range ability to influence
Professional certifications	[S16-S21]	Negative	Not prove competence Wrong expectations
		Positive	Credibility Pertinent level of skills and Leaderfulness
Experience	[S06], [S07], [S08], [S10], [S11], [S22]	Negative	Lack of experience Technical mistakes Communication risks
		Positive	High value Lifelong learning
Style	[S11], [S13]	Negative	Short-lived impact
		Positive	Work engagement Healthy coaching (long-lasting change)

Business			
Focus and alignment	[S13], [S15]	Negative	Inappropriate focus and/or alignment Organizational dysfunctions Short-lived impact
		Positive	Share knowledge and experience Transformational success
Internal / External Coach	[S03], [S07], [S09], [S11], [S13]	Negative	Cost Wrong expectations
		Positive	Right balance Longer-term commitment to Agile
Objectives of the coaches	[S02], [S03], [S05], [S07], [S11], [S12]	Negative	Human factors Wrong expectations
		Positive	Work engagement Longer-term Commitment to Agile
Target Groups	[S02], [S03], [S04], [S06], [S07], [S08], [S11], [S13]	Negative	Human conflicts Wrong expectations Lack of recognition
		Positive	Work engagement Longer-term Commitment to Agile
Value	[S11], [S22]	Negative	Cost
		Positive	Reduction of organizational impediments Sustainable agile capability

4.1   Coaching competencies

In 2011, the agile industry needed a common definition and/or a learning path to grow in Agile Coaching [S14]. According to [S06], the best coach is one who is a "talker" and a "doer". Although coaching is a critical skill for Agile Coaches, ICAgile organized a panel in 2018 to discuss some key skills and attributes of Agile Coaches [S14]: (i) in control of themselves, (ii) devoted to the outcome, and hold the team and organization to that outcome, (iii) able to intervene: hard facilitation, give advice, raise awareness, be in service of a bigger outcome, empathy to meet a team where they are at, and patience. While coaching is a critical skill for Agile Coaches, they must also improve their skills in teaching and mentoring, as well as extend their competence in facilitating to include large, multi-team situations [S14],[S22].

Coaching Competencies are proficiencies that Agile Coaches are expected to demonstrate in their interactions with individuals and their organizations. According to [S14]:

- To be the change agent and work as a catalyst for the Coachee (client) organization. To be able to reach engagement with the whole organizational system and all the leaders that guide it. To have the ability to stimulate organizational reflection, learning and growth as well as connecting interdependencies.
- To be able to serve as an organizational mirror by accessing and surfacing the underlying system problems. To expose challenging symptoms and perform root cause analysis and be able to look below the surface.

- To be able to facilitate implementation, alignment and client agile adoption. During controversial moments and alignment-building activities to enable engagement to stakeholders. To keep non-biased views and facilitate a collaborative decision making.
- To keep a balance between the Coach´s agile expertise with the Coachee´s (client´s) goals and intentions. To understand and keep the nature of the client-consulting relationship whether as consultant or employee. To guide the process of client self-discovery, to have the ability to lead by example and ask powerful questions.
- Educate and guide the Coachee´s (client's) agile learning through the process of application and discovery. To be able to focus on stabilizing principles and varying practices that are aligned to the level of maturity of the Coachee's (client's) with an effective application of agility.

In other words, agile coaching is a subfield of coaching whose focus is to "*help teams or individuals adopt and improve agile methods and practice*" and "*rethink and change the way they go about development*" [S11]. Thus, an Agile Coach has to extract implicit and explicit knowledge in order to propose and introduce a novel (or appropriately adapted) leaner and agile development method [S09]. The attributes of *"an Agile Coach include experience in deploying Agile, in organizational change, in playing agile roles on a team, and in working with the business benefits of Agile"* [S07] . During their adoption of a new method, there are also many knowledge management-related issues linked with educating employees, measuring their confidence in new methods and based on this to fit new methods to the target organization [S09]. Furthermore, an Agile coach has the ability to challenge teams' perceptions of their capabilities and allow them to find their self-organizing behavior [S2]. Other roles facilitating self-organizing agile teams that could be played by Agile Coach are Champion, promoter and terminator [S01] (see Table 3).

Table 3: Roles Facilitating Self-Organizing Agile Teams [S01].

Role	Definition
Mentor	Provides initial guidance, understanding, confidence of Agile methods, and encourages continued adherence to Agile practices.
Champion	Gains the support of senior management to establish pilot teams and to propagate more self-organizing teams across the organization.
Promoter	Secures customer collaboration and involvement to support efficient functioning of Agile teams.
Terminator	Removes team members that hamper team productivity due to their inability to fit into the Agile way of working.

There are also coaching specialties which are based on a core skillset, expertise and knowledge that coaches possess [S13]. For instance [S22]: Technical / Product Research, Technical / Quality Practices, Development Operations, Development / Process Tools, Organizational Structures/Culture, Organizational Leadership, Scaling Agile / Enterprise Agility, Distributed Agile, Multi-Team Dynamics, Lean Principles and Lean Startup. However, sustainable organizational change implies Technical Mastery, Business Mastery and Transformation Mastery.

Based on the above mentioned, **potential risks** are *"Lack of competencies"* and *"Technical mistakes" (negative)* as well as *"Solid skill set"* and *"wider-range ability to influence" (positive)*

4.2   Professional certifications

The Agile coaching profession is relatively well-known and consolidated among professionals. There are specialized consulting companies and bodies of knowledge, specialized in Agile Coaching. Furthermore, conferences are being held on Agile Coaching where experienced practitioners share their ideas, and some of them even started to offer Agile Coaching courses in order to teach others how to become a qualified Agile Coach. According to Adkins [23], the Agile Coach role is designed to take care of performance and quality in an organization while they are part in the systemic reduction of organizational impediments and organizations build a sustainable agile capability . Appendix B shows well known certifications on this field. Since May 2018, ICAgile [S16] has accredited more than 70 courses for the agile coaching track, and more than 11,700 certifications have been awarded to approximately 9,110 individuals by these courses. Scrum Alliance [S19] is another well-known organization that offers two professional certifications to become a Certified Agile Coach, Certified Team Coach (CTC) and Certified Enterprise Coach (CEC). Apart from them, European Scrum [S20] and Agile Coach Alliance [S21] provide two more professional certifications: Expert Agile Coach and Agile Coach Certification, respectively. According to [S18], the learning path for agile coaching has established a common vocabulary, created an introduction to deeper learning paths, normalized the importance of professional coaching and professional facilitation. However, although the professional certifications offer continuing education certifications, some of them do not prove competence, and competence is what is needed [S18],[S22]. To address this gap, ICAgile creates practice and competence building programs that take the learner to the ICAgile Expert level but only 60 individuals have achieved that level up to 2018. Moreover, the ICE in Enterprise Agile Coaching (ICE-EC) [S17] will launch in June 2020.

Based on the above mentioned, **potential risks** are *"Not prove competence"* and *"Wrong expectations" (negative)* as well as *"Credibility"* and *"Pertinent level of skills and Leaderfulness" (positive)*

4.3   Experience

Apart from knowledge and a solid set of skills, Agile coach's experiences that support the mindset shift into the desired state of being are needed [S22]. During a typical coaching session, the Agile Coach explores the team dynamics non-intrusively and shares their Agile experiences and ideas to the team members with an intent to encourage him or her to learn and adapt based on the demands of the situation [S08]. Moreover, an experienced Agile Coach should have the experience of providing teachable moments without unnecessarily interrupting the flow of an event [S07].

Although, the professionalization of Agile Coach has emerged and the agile community keeps growing, there is evidence from numerous sources indicating a lack of qualified and well-experienced coaches to support the demand [S11]. In this sense, coaches could need mentors to

observe them in action and provide targeted teaching, mentoring and professional coaching in-the-moment in order to get the opportunity of resetting core beliefs or boosting the Coach's learning [S22]. It means the improvement of coaching practice. On the other hand, the importance of experience for the Agile Coach role is empathized in a study carried out by [S10]. This study presents results acquired from student coaches (N=46) in a realistic setting at an early stage of their studies.

In the same line, [S06] states that many Agile Coaches consider following the "*Shu-Ha-Ri*" concept of learning. *Shu* can essentially be translated as following, *Ha* means to adopt the techniques and *Ri* translates to leave/transcend. In other words, first practice by textbooks, then, you are in a position to adapt and transcend. Moreover, it is recommended for executives to bring in Agile Coaches to help teams not only move to Agile but also help their staff shift to the behaviors that exemplify an Agile mindset [S07]. Finally, the research results in [S11] reveal that Certified Agile Coaches are more credible although they do not necessarily provide higher value than non-certified coaches since experience matters.

Based on the above mentioned, **potential risks** are *"Lack of experience"*, *"Technical mistakes"* and *"Communication risks" **(negative)*** as well as *"Lifelong learning"* and *"High value" **(positive)***

4.4   Coaching Style

A critical skill for healthy coaching is identifying the right situation, and properly transitioning between a directive style coaching to a supportive and reflective coaching [S13]. Table 4 shows some of the typical conditions under which a coach selects one style over another.

Table 4: Coaching Style [S13].

Directive	Supportive and reflective
The coachee has low experience and knowledge for contextual learning. The coach has wide expertise in the subject matter.	The coachee levels of aptitudes, skillsets and expertise are really high regardless the level of expertise and skill set of the Coach.
The motivation and morale of the coachee are low.	The motivation and morale of the coachee are high.
The coachee is expected to follow the example of the coach. That is the way of leading of the coach.	The coach makes a reflection according to the coachee thoughts and makes the coachee to come to his own conclusions.

It can be appealing, especially for naturally directive leaders, to fall too often into the directive route [S13]. Half of the respondents in [S11] believe that supportive and reflective coaches provide higher value than directive coaches since they teach coaches how to be self-coaching. However, directive coach seems to be not only the easier form of coaching but also the less likely to leave a lasting impact on the coachee so that this means a purely directive route could ensure compliance, not engagement [S13]. Moreover, a study [S03] involving 46 agile practitioners reported that supportive coach help them to change themselves with less effort and time.

Based on the above mentioned, **potential risks** are *"Short-lived impact" (**negative**)* as well as *"Work engagement"* and *"Healthy coaching (long-lasting change)" (**positive**)*

4.5   Focus and alignment of coaching

In complex organizational settings, there could be two different coaching aspects, namely, focus and alignment. Focus areas include *enterprise (organizational) level* and *local (team) level*. According to [S13], team coaches are mainly focused on tools, frameworks and dynamics of multiple teams, with less emphasis on organizational transformation. On the contrary, enterprise coaches are more focused on organizational dynamics and more abstract elements of transformation with emphasis on senior leadership, upper management, organizational policies, and multiple organizational domains. Table 5 shows the level of coaching.

Table 5: Focus of Coaching **(Gene Gendel and Erin Perry 2015)**.

Organizational level	Local level
Educating senior leadership on inter-connection of various organizational elements within one Organizational Ecosystem.	
To try to influence and educate senior leadership and executives to become more agile across an entire organization.	To keep a balance between team growth and local optimization.
To asses team(s) and organization (s) through agile principles and practices to increase effectiveness.	To assist on the establishment of day-to-day interactions, ceremonies and agile roles.
To advise and give consultancy with organizations and leadership on different agile practices such as Lean, Scrum, Kanban and XP.	To advise teams with the adoption of basic agile frameworks (e.g. Kanban, Scrum, and XP).
To facilitate team (s) and groups to be able to achieve a higher quality on different aspects such as collaboration and to get a culture of continual learning and knowledge dissemination.	To enhance the improvement of the dynamics and maturity supporting single or multiple teams.
To develop a team, leadership and organizational agility by self-discovery and growth.	To give coaching to individual team members, scrum masters, and product owners.
To advise teams about the careful adoption of scaled agile frameworks as mechanism for organizational descaling (e.g. LeSS, SAFe, RAD)	To focus on test quality, coding standards and engineering practices.
To analyze systematic patterns, including norms, standards and behaviors.	To advise on different aspects such as metrics, living documentation agile requirements and communication
To enable an agile (Kaizen) culture and challenge the organizational and leadership status quo.	To defy the inappropriate behavioral problems that have been locally manifested (in isolation).

Regarding alignment, coaching could be placed: centrally or de-centrally. According to [S15], with agile coaching, being a centralized organizational function that owns transformation, one of its main deliverables becomes setting of standards and measures of success, by which the rest of an organization is measured. Although this could lead to organizational silos, it could make sense in small organizations. On the contrary, decentralized coaching is deep and narrow but takes time to cause significant and sustainable organizational changes. The coaches are locally aligned with teams, their customers and products, and immediately involved senior leadership.

Based on the above mentioned, **potential risks** are *"Inappropriate focus and/or alignment"* and *"Organizational dysfunctions"* and *"Short-lived impact"* (**negative**) as well as *"Share knowledge and experience"* and *"Transformational success"* (**positive**)

4.6   Internal/External coaching

Another factor is based on whether an organization can employ its own Agile Coaches in order to achieve agile transformation or simply hire external coworkers, i.e. in-house/internal coaches and coach-consultants/external. According to [S11] value in Agile Coaching can be determined as the difference between the costs of hiring/using an Agile Coach and the benefits brought by the Agile Coach to the company in question. The value (benefits minus costs) provided by the coach can be also categorized as financial and non-financial.

On one hand, internal Agile Coaches could contribute with deeper knowledge of their own organizational structure and culture as well as organization´s business and processes [S13], [S11]. On the other hand, a non-biased view of the organization and diverse experience can be provided by external Agile Coaches while they bring to the table experience of other organizations and industries, holistic and uninhibited views [S13], [S11]. However, an Agile coach should be hired before starting the Agile transition to manage the preparation phase [S03].

Depending on whether the Agile Coach stays with the team full-time and thus is coaching only one team at a time, or whether the coach stays with the team part-time and thus can coach multiple teams at once, [S11] also classify the coach either as a fulltime Agile Coach or a part-time Agile Coach. In this sense, participants in [S03] also pointed out the importance of having an on-site full-time coach during Agile transition. The study [S03] also recommended hiring a full-time on-site coach rather than an external coach as they can help teams in the right time when they are faced by various challenges.

In any case, an Agile Coach is confronted with the need to analyze the current state of processes, current level of employees' knowledge on processes, current satisfaction and obstacles, as well as the advantages offered by current development practices [S09]. The Agile Coach also should identify risks [S03] and understand both, the short-term and long-term pitfalls that can occur when a hierarchical organization is moving to Agile [S07]. Therefore, they can help mitigate the challenges ahead of time. They also should consider the ground conditions and make the winning strategy [S03].

Finally, every (internal/external) coach needs to define and discuss with coachee (individual or organization client) rules of engaging and disengaging [S13]. In other words, it must have a strategy in place for discontinuation of a coaching relationship. In case of internal coaches, they may fall back into their previous roles.

Based on the above mentioned, **potential risks** are *"Cost"* and *"Wrong expectations"* (**negative**) as well as *"Right balance"* and *"Longer-term commitment to Agile"* (**positive**)

4.7   Objectives of the coaches

Depending on the coach's mission, i.e. whether his/her objective is to manage the agile adoption of a team that is transferring to agile or to improve the performance of a team that has already started using agile and is struggling with it, one can identify adoption coaches and after-adoption coaches [S11]. Sometimes fully agile adoption is not possible. In this case, software companies need to do some activities in non-Agile ways [S03]. When teams are already applying agile practices, they seek coaching, they want to boost their performance in agile software development [S11],[S02]. Agile Coaches can address issues and challenges raised by teams that focus on adoption, culture, effect to -customer value, work flow, and quality of the product being built [S07]. In addition, the focus on after-adoption requires to assess the relative effects of sustained agile use (more recent use) in comparison with their initial use (less recent use), this potentially biasing effect is minimized [S02].

Organizations also need to consider Agile coach's points of view in different stages of Agile transition such as hiring competent members, team set up, preparing an action plan, creating progress criteria, defining business goals, and so on [S03]. The agile adoption process is more difficult within large organizations as they usually have many established processes that conform numerous standards and involve globally distributed teams [S11].

The results study carried out by [S05], which involve 49 agile experts, identified different aspects of human-related challenges throughout Agile transition process. Table 6 shows the impediments to agile transition and the people's perceptions about agile transition reported in this study. In this line, a mapping of the market for Agile Coaches highlighted that client perceptions of their problem differ widely from the coaching perception [S12].

Table 6: Human-related challenges and issues [S12].

High level	Low level
Impediments to Agile transition	**Lack of knowledge** about Agile, its principles, and its values. This leads to other challenges such as low collaboration, wrong mindset, and unrealistic expectations.
	Cultural issues make the transition harder than expected. This challenge sometimes arises from organizational culture rather than people's culture.
	Resistance to change is related to the involved people's concerns about their jobs and afraid of losing their roles in development process.
	Wrong mindset mainly arises from perceptions and beliefs about the development process, required roles and responsibilities, and their fear of change.
	Lack of effective collaboration results in difficulty in setting up a cross-functional team.
Perceptions about the change process	**Worried about the transition** involves about our future development approach.
	Enthusiastic but misguided. Lack of knowledge about Agile can make enthusiastic people misguided.
	Lack of belief in the change or lack of need for employing Agile methods represents a real risk for long-term success in the transition.
	Indifferent to the change means lack of enough motivation to start the change process.
	Unrealistic expectations or wrong expectations may lead to other challenges. Effective training, and full-time onsite coaching were reported as the most effective solutions that are useful to overcome this challenge.

Based on the above mentioned, **potential risks** are *"Human factors"* and *"Wrong expectations"* *(negative)* as well as *"Work engagement"* and *"Longer-term Commitment to Agile" (positive)*

4.8   Target groups

In agile settings, *group coaching* is typically focused on entire feature teams or Product Owner teams, where people are expected to have shared beliefs, norms and goals [S13]. Group coaching addresses team dynamics, roles, day-to-day interactions, metrics, reporting and so on.

Although, the Agile Coach can set up a dedicated session for group coaching or leverage existing group ceremonies (e.g. retrospective), group Coaching is often more structured and requires expert authority to be successful [S13]. Furthermore, an Agile Coach can provide consistency when multiple teams are adopting Agile at the same time while helping them both mechanically to do Agile and behaviorally be Agile [S07]. In other words, Agile Coach reinforces and ensures that the team continues both the expected practices and behaviors [S07]. Moreover, encouraging people to the changes, especially when facing problems, is also another duty of the Agile coach that facilitates the Agile transition [S03]. Supporting this, a study [S02] that involved 114 agile practitioners concluded that the role of an agile coach is a key factor in creating and sustaining well-balanced high performance software development teams by influencing agile usage. Moreover, an experiment [S04] that involved 10 teams of students revealed that coached teams outperformed non-coached teams since the Agile Coach emphasized the concept of "done criteria" and there was around 22% more coverage of software engineering practices.

On the contrary, *individual coaching* is one-on-one. Such coaching sessions are typically conducted in privacy [S13]. In this case, the Coach works with a single person on a personal level. Agile Coaches reach out to each individual member of the team, understand their expectations, beliefs and aspirations and help them to embrace the principles and practices of Agile [S08]. Therefore, individual sessions may address personal adaptation, happiness, job satisfaction, problems with management or subordinates, embracing roles and seeing career growth opportunities, dealing with personal challenges, reservations or fears [S13]. Despite that the coach motivates and influences the team, the coach wants the team to feel the ownership of the change to Agile [S07].

Individual coaching is often used to engage and support a Scrum Master or Product Owner as an individual [S13]. Here, the training is important but it is limited. Thus, training classes to get people oriented with new terminology and new concepts is a good approach, but how to be a good product owner goes beyond training classes since they exclude day-to-day competence [S06]. In consequence, the new product owner must be paired with a knowledgeable expert or Agile coach in order to do the work together [S06]. It means hands-on coaching in the related context of real-life projects is needed.

Both individual and group sessions can be pre-scheduled or situational/opportunistic, i.e. at moments, when Agile Coach finds ad-hoc appropriate moments to administer coaching [S13]. By providing the guidance of an expert the teams or individuals receive valuable information that speeds up the learning process and reduce the error rate [S11].

Based on the above mentioned, **potential risks** are *"Human conflicts"* and *"Wrong expectations"* and *"Lack of recognition" (**negative**)* as well as *"Work engagement"* and *"Longer-term Commitment to Agile" (**positive**)*

4.9 Value of an Agile Coach

The research results collected by [S11] from 8 Agile Coaches and 10 companies —5 companies that used an Agile Coach and 5 companies that adopted agile without the help of an Agile Coach— can be summarized as follows:

Table 4: Value of an Agile coach [S11].

Value	Considerations
The respondents believe that the benefits obtained through the Agile Coach exceeded the financial costs.	Half of the respondents think that Agile Coaches are perceived as expensive consultants.
All the respondents that during their experience of agile adoption used an Agile Coach would recommend it to other companies.	A certified Agile Coach could be more credible but not necessarily provides more value than another one that has no certification as experience matters.
An Agile Coach can provide financial and non-financial benefits through the adoption of agile methods.	There is difference in the value provided by different types of Agile Coaches.
The significant reduction of the risk of failure of agile adoption and the speed up of the adoption process is the value that Agile Coaches provide.	
Agile Coaches can assist with practicalities, such as how to do incremental design among many others.	
Benefits of using an Agile Coach are tailoring agile practices to company's needs, highlighting dysfunctions and waste in processes, sorting out industry related agile adoption challenges, and so on	Different factors such as the company size, complexity of its processes, nature of the industry and company culture determine if a company should implement an Agile Coach.

Finally, although, all companies claim the adoption was a success, a drawback of companies that adopted agile without the help of an Agile Coach was a larger learning curve [S11]. In support of that, an empirical investigation revealed that agile usage measured as intensity and extent of use of agile methods significantly impact agile effectiveness. The value of Agile Coaches is that they take part in the systemic reduction of organizational impediments so that organizations can build organizational agile capability based on their agile coaching capability [S22].

Based on the above mentioned, **potential risks** are *"Cost" (**negative**)* as well as *"Reduction of organizational impediments"* and *"Sustainable agile capability" (**positive**)*

5 Discussion

Behavior in social —team, project and organizational— contexts is both an important enabler of risk management and a source category of potential project risks (Bannerman 2015). As being software development is intensive in human capital, one of the main sources of risks in software development projects is the one connected to stakeholders and software people.

One way for reducing the risk of failure when adopting agile approaches is to use an Agile Coach (O'Connor and Duchonova 2014). In fact, according to a survey carried out by (VersionOne 2019), organizational culture issues remain the leading critical factor in the success of adopting and scaling agile. Thus, the three most significant challenges for agile adoption and scaling are reported as Organizational culture at odds with agile values (52%), General resistance to change (48%), and Inadequate management support and sponsorship (44%). Although other types of risks exist, our study is focused on these human-related challenges that are also source of human-related risks when introducing the role of Agile Coach.

From the nature of the Agile Coach, authors identify four factors related to the risks: Competencies, Professional certifications, Experience, and Style of the Agile Coach. **Professional certifications** and **Experience** are ways to build **Coaching competencies** to mitigate *Communication risks* and *Technical mistakes*. In the positive side of risks, *Solid skills set* and *Wider range ability to influence* based on *Credibility* and *Pertinent level of skills and Leaderfulness* along with *High value* and *Lifelong learning* should be part of the essence of an Agile coach. On the negative side of risk, *Lack of experience*, *Lack of competencies* along with *Wrong expectations* should be managed to avoid undermining the role of Agile Coach. Finally, the more supportive and reflective is the **Style of the Agile Coach** the more *Healthy coaching (long-lasting change)* and *Work engagement.* As opposite to directive style coaching results in *Short-lived impact*, i.e. negative risks.

From a Business perspective, authors identify five factors related to the risks: Focus and alignment, Internal/External Coach, Objectives of the coaches, Target groups, and Value of an Agile Coach. When **Focus and alignment** is pertinent, it could result in *Share knowledge and experience* and *Transformational success*. On the negative side of risk, *Organizational dysfunctions* and *Short-lived impact* could occur*.* **Internal/External Coach** implies *Right balance* and *Longer-term commitment to Agile in* the positive side however *Cost* and *Wrong expectations* should be mitigated. It is worthy to note that internal Agile Coaches is number one, being the most valuable in helping respondents scale agile practices in the surveys (VersionOne 2018, 2019). On the other side, external Agile coaches were reported fourth one, behind "consistent practices and process across teams", and "implementation of a common tool across teams" in (VersionOne 2018), and they did not appear in (VersionOne 2019).

The risks related to **Objectives of the coaches** and **Target groups** could result in *Work engagement* and *Longer-term Commitment to Agile*. On the negative risks, both factors are related to *Human conflicts* and *Wrong expectations* while *Lack of recognition* may occur among Target groups. Finally, **Value of an Agile Coach** is hindering mainly by the *"Cost"* but it seems that positive risks ––i.e, *Reduction of organizational impediments* and *Sustainable agile capability*–– outweigh negative ones*.*

In consequence, Agile Coach role is also a source of risk factors that could impact software development since that role is closely connected to people and social interactions. Moreover, it is worth noting that coaching in Agile approaches is slightly different from coaching in traditional

approaches (Parizi et al. 2014). Indeed, other Agile roles such as Scrum Masters could do "Agile Coaching" and they could become agents of change for their organizations using some of the skills that would be associated with Agile Coaching. However, an Agile coach brings also a wide spectrum of aspects from conflict management, facilitation, teaching, mentoring and professional coaching. This perspective focuses on identifying and developing personal skills and organizational capabilities that are important in successfully managing agile projects, i.e. Risk Management as a Capability as mentioned (Bannerman 2015). According to (Bannerman 2015), it recognizes that managing risk is about the ability to "do it", not just "plan it" —particularly in dynamic, uncertain and complex environments— which fits in Agile Software Development.

6   Conclusion

The goal of any coaching initiative should be to bring Coachees to a healthy state where learning and self-improvement are happening organically (Gene Gendel and Erin Perry 2015). It means that high performing organizations, high performing teams, and high performing people do not often happen organically but they are a return on investment. Coaching could keep them on their agile journey and help apply the mindset, process, and skills properly. In this context, an Agile Coach role offers an appealing option although there are companies that prefer to do their agile journey without an Agile Coach.

Our study identifies risks including not only the negative aspects but also the positive aspects that could lead to potential beneficial opportunities. In consequence, this chapter highlights issues for software practitioners and organizations to think about, as they decide whether to and how to, include an Agile Coach role. The main limitation is that our findings imply complex intangibles —such as individual and organizational culture— that are difficult to explore in research and measure in practice. Therefore, more research is needed.

From a software development perspective, authors, after the research conducted, underline that Agile Coaches could lead to a reduction of potential threats in software production. Being software development intensive in human capital, one of the main sources of risks in software development projects is the one connected to stakeholders and software people. Although pure agile approaches are not necessarily connected with the notion of project management (Leybourn and Hastie 2019), agile is adopted both in project-oriented structures and in new #noprojects approaches. In both scenarios, Agile Coaches can reduce the likelihood and impact of several risks.

Opportunities exist to extend the identification of risks and broaden how risk management is viewed and studied in both practice and research. Future work will be twofold. Firstly, it is aimed to investigate the impact of Agile Coaches in the previously defined scenarios measuring differences among them in terms of efficiency and efficacy and develop a risk management plan. Secondly, it is aimed to shed some light into the role of Agile Coaches as cultural coaches in global software development arenas.

Appendix A. List of primary studies included in the MLR

ID Source	Authors	Year	Title	BdD
S01	Hoda, Rashina; Noble, James; Marshall, Stuart	2010	Organizing Self-organizing Teams	ACM
S02	Senapathi, Mali; Srinivasan, Ananth	2014	An Empirical Investigation of the Factors Affecting Agile Usage	ACM
S03	Parizi, R. M.; Gandomani, T. J.; Nafchi, M. Z.	2014	Hidden facilitators of agile transition: Agile coaches and agile champions	IEEE Xplore
S04	Rodríguez, G.; Soria, Á; Campo, M.	2016	Measuring the Impact of Agile Coaching on Students' Performance	IEEE Xplore
S05	Javdani Gandomani, Taghi; Ziaei Nafchi, Mina	2016	Agile transition and adoption human-related challenges and issues: A Grounded Theory approach	Science Direct
S06	Kulak, Daryl; Li, Hong	2017	Getting Coaching That Really Helps	Springer Link
S07	Moreira, Mario E.	2013	Being Agile: Your Roadmap to Successful Adoption of Agile	Springer Link
S08	Boral, Sumanta	2016	Domain VII: Continuous Improvement (Product, Process, People)	Springer Link
S09	Pavlič, Luka; Heričko, Marjan	2018	Agile Coaching: The Knowledge Management Perspective	Springer Link
S10	Vikberg, Thomas; Vihavainen, Arto; Luukkainen, Matti; Kurhila, Jaakko	2013	Early Start in Software Coaching	Springer Link
S11	O'Connor, Rory V.; Duchonova, Natalia	2014	Assessing the Value of an Agile Coach in Agile Method Adoption	Springer Link
S12	Bulloch, Elaine; Frumkin, Alexander; de la Maza, Michael	2018	Mapping the Market for Agile Coaches	Infoq
S13	Gene Gendel; Erin Perry	2015	Agile Coaching - Lessons from the Trenches	Infoq
S14	Wick, Angela	2018	Defining the Competencies of Agile Coaching	Infoq
S15	Gendel, Gene	2018	Centralized vs. Decentralized Coaching	Infoq
S16	ICAgile		ICAgile > Home	Google
S17	ICAgile		ICAgile > Learning Roadmap > Enterprise Agile Coaching > Agility in the Enterprise	Google
S18	ICAgile		ICAgile > Learning Roadmap > Agile Coaching > Agile Team Facilitation	Google
S19	Scrum Alliance		Scrum Alliance Certified Enterprise Coach℠ (CEC) Certification	Google
S20	EuropeanScrum		Agile Coach Certification	Google
S21	Agile Coach Alliance		Home of Agile Coach	Google
S22	Adkins, Lisa		Developing an Internal Agile Coaching Capability	Google

Appendix B. Summary of Certifications

Organization	Certification	Acronym
International Consortium for Agile [S16]	ICAgile Certified Professional – Agile Team Facilitation	ICP-ATF
	ICAgile Certified Professional – Agile Coaching	ICP-ACC

https://icagile.com/	ICAgile Certified Expert – Agile Coaching	ICE-AC
	ICAgile Certified Professional – Agility in the Enterprise	ICP-ENT
	ICAgile Certified Professional – Coaching Agile Transitions	ICP-CAT
	ICAgile Certified Expert – Enterprise Coaching	ICE-EC
Scrum Alliance [S19]	Certified Enterprise Coach	CEC
https://www.scrumalliance.org/	Certified Team Coach	CTC
European Scrum [S20]	Expert Agile Coach	EAC
http://www.europeanscrum.org/		
Agile Coach Alliance [S21]	Agile Coach Certification	
https://www.agilecoachalliance.org/	Agile Coach Organization	

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