People Over Process: Key People Challenges in Agile Development

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Abstract: *There is a common perception that, while there may be some 'teething' problems experienced during the initial transition to agile, people are much happier, engaged and ultimately more productive in these environments. This study shows that this belief may not always hold true, identifying many serious 'people' challenges experienced by 17 large multinational organisations, all using agile for more than three years. The cases provide an interesting insight in that they involve instances where agile was implemented in a top-down manner across the organisations or at least across business units. This is in contrast to most accounts of agile which involve voluntary, bottom up adoption on small co-located teams developing systems deemed to be suitable for agile development. The people issues uncovered include a broad range of problems from recruitment of agile staff, to training, motivation and performance evaluation among others. The paper will conclude with a set of actionable recommendations as to how organisations can overcome these challenges, based on the better practices uncovered in the cases studied.*

Keywords: agile, adoption, methodologies, people factors

INTRODUCTION

While agile methods have been in use for quite a while, there are a number of reasons why it is important to examine the 'people issues' implications of utilising agile approaches in this context. Firstly, the growing popularity of agile methods is clearly evident and they "are fast becoming the adopted methodology commercially" (Tan and Teo 2007, VersionOne 2009). Secondly, the boundaries of agile are now changing, no longer restricted to small co-located teams and increasingly applied in environments outside of their 'comfort zone' (e.g. Poole and Huisman 2001, Drobka et al. 2004), thus presenting new people and human resource management challenges. Finally, in the early years, the decision to adopt agile was typically an insular, bottom up, voluntary one, where the project team could decide to embrace or rebuke the transition 'on its own terms'. Increasingly, suppliers, consultants, partners and customers and even public sector bodies (Jamieson, Vinsen et al. 2006; UXResearch September, 2008) are coercing the use of agile, either through a formal requirement to do so, or through necessity to ensure inter-organisational process alignment. The increasing prevalence of agile approaches, the lowering of traditional agile boundaries and growing pressure to adopt agile, all contribute to the need for human resource departments and project managers to address any associated skill and people challenges. An analysis of the literature e.g. Nerur, Mahapatra et al. (2005) and Schuh (2004), shows that agile environments are significantly different in context to environments where more traditional approaches are used (Table 1), although very often the distinction between the two is not so black and white.

For all of these reasons, there is a need to identify the problems that the agile transition may cause. While numerous studies document challenges in isolation, this study builds a comprehensive list of the most important challenges and develops a set of recommendations for how these might be addressed.

Project Component	Traditional	Agile
Control	Process centric	People centric
Management Style	Command-and control	Leadership-and-collaboration
Knowledge Management	Explicit	Tacit
Role Assignment	Individual – favours specialisation	Self-organising teams – encourages role interchangeability
Communication	Formal and only when necessary	Informal and continuous
Customer's Involvement	Important, usually only at the analysis phase of the project	Critical and continuous
Project Cycle	Guided by tasks or activities	Guided by product features

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Development Model	Life cycle model (Waterfall, Spiral, or some variation)	The evolutionary-delivery model
Desired Organisational Form/Structure	Mechanistic (bureaucratic with high formalisation)	Organic (flexible and participative encouraging cooperative social action)
Technology	No restriction	Favours object-oriented technology
Team Location	Predominately distributed	Predominantly collocated
Team Size	Often greater than 10	Usually less than 10
Continuous Learning	Not frequently encouraged	Embraced
Management Culture	Command and Control	Responsive
Team Participation	Not compulsory	Necessary
Project Planning	Up-front	Continuous
Feedback Mechanisms	Not easily obtainable	Usually numerous available
Documentation	Substantial	Minimal

Table 1: Contrasting differences between Traditional and Agile Approaches (Adapted from Nerur, Mahapatra et al. (2005) and Schuh (2004))

THE RESEARCH PROCESS

A two-phased approach was used in this study. Firstly, we conducted focus group discussions with software development executives, senior project managers and agility experts between June and September 2008. In addition to identifying an initial set of challenges, this phase acted as a test bed to evaluate the case study protocols used for the second phase. In the second phase we conducted seventeen case studies (see Appendix A) using in-depth interviews with senior personnel between October 2008 and January 2009. The cases include organisations that have embraced agile development very effectively harvesting benefits such as reduced costs, higher quality systems and more satisfied software development staff and customers. The studies also include some organisations that have experienced significant problems and even project failures directly attributable to the agile transition. We intentionally selected cases with such opposing experiences, which allowed us to compare and contrast, thus identifying the distinguishing skills and challenges related to agile adoption. We now present the key people challenges identified across the cases, along with practices uncovered to address these challenges. Where possible, we also try to identify how prevalent each issue was across the cases studied. For example, we may indicate how 5 of 17 cases encountered a certain issue while 12 of 17 may encounter another.

KEY PEOPLE CHALLENGES EMERGING FROM THE STUDY

#1 Developer fear caused by transparency of skill deficiencies

Developer fear caused by the transparency of skill deficiency was noted across seventeen companies studied. Interviewees outlined how procedures such as stand up meetings, an on-site customer and the use of storyboards and whiteboards made developer shortcomings very visible to the rest of the team, since these practices require direct and constant communication and collaboration among team members. For example, storyboards track the status of user stories and make a developer's lack of progress very obvious. Whiteboards (used by agile teams to communicate design issues), can also highlight the deficiency of technical and/or communication skills of any one developer since they need to present their ideas in front of their peers on a regular basis. In addition, continuous integration and automated testing means that developers cannot hide poor, low quality code. Exposing weaknesses of developers however can often be counter-productive. Eight teams spoke of incidents with developers having low self-esteem who even if performing reasonably well, were often made to feel inadequate in such a transparent environment. At the other end of the spectrum, full transparency created unhealthy environments in four companies where egotism was present and *"exhibitionists"* (Consultant, P), *"show-offs"* (Manager, L) and *"bullies"* (Consultant, P) were involved. Repercussions of this included discomfort among some developers (16 of 17

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cases), hostility among developers (7 of 17 cases), and developers leaving the organisation (5 of 17 cases) or at least changing teams (14 of 17 cases). It is too simplistic to say that these involved 'weak' developers. In fact, a very interesting finding was that *"weakness is relative"* (Manager, L), and that some highly respected and high performing developers were made to feel inadequate by those performing at an even higher level.

To address this challenge, developers need an environment where they feel safe to expose their weaknesses. In Company C, all developers completed short forms on a fortnightly basis where they could document any fears, issues or concerns they felt inappropriate for discussing in an open forum. In Company D, listing problems at stand up meetings was voluntary for new junior developers on one large project studied. In Companies B, D and M, junior or new staff had a separate, lengthier stand up meeting with dedicated mentors. Developers also need to be assured that they can get help to improve their skill set. In at least nine cases, pair programming was used where weaker developers were paired with those more experienced, and thus joint responsibility dissolved transparency of any potential weaknesses.

#2 The need for developers to be a 'master of all trades'

Across all seventeen companies, it was found that boundaries between developer roles seem to be less clear in an agile environment and that it was important that developers were competent in a broad range of skills as opposed to being an expert in one.

> *"To be a successful agile [developer] you need to be a coder, a tester, an architect, a customer, a quality assurance expert and a multitude of other things software-related" (Manager, M).*

As one manager in Company D described, rather than being a *"jack of all trades, master of none"*, a developer in an agile team needs to be a *"master of all trades"*. This multi-faceted skill set caused numerous problems. Firstly, almost all project managers found it difficult to find developers that displayed all of the skills necessary for agile, either externally or within their respective organisation. Training was also found to be more difficult. In four cases, management sent all developers on the team to all training courses, incurring high expense. In all four of these instances, prior to the adoption of agile, developers would only have received training in niche areas directly related to their narrow team role. The fact that agile encourages blended roles, is dependent on voluntary contributions and emphasises team as opposed to individual performance, means that team members may become a 'jack of all trades' but lack the opportunity to hone a smaller number of key skills e.g. Java certification. As a result, in the cases studied, some team members felt they were being disadvantaged when competing for promotion or jobs in the marketplace.

To address this challenge, a balance needs to be obtained between "master of all" and "master of none". Developers need to have broad knowledge on all aspects of software development but also need to be specialised in certain areas and hone their skill set in these areas. As a manager in Company G suggested: *"an agile developer requires multiple skills but still needs to maintain some degree of specialism"*. In Companies F, L and M, however, the distinct roles (such as tester, Java developer, database developer) were maintained, where it was perceived that "master of all trades" may be a potential issue due to large team size or conflict between developers.

#3 Increased reliance on social skills

Agile practices such as co-location, an on-site customer, stand up meetings, retrospectives and pair programming were all commonly cited examples that increase social interaction, thus heightening the need for social, communication and presentation skills. While the development of social skills was generally seen by all as positive, some interesting concerns and problems were raised through an analysis of interviewee responses. Firstly, it was evident

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across the majority of cases (15 of 17) that some personnel were technically very talented but inherently weak in terms of communication and presentation skills. While all managers saw the benefits of constant face-to-face communication, the fact that it was exacerbated to such a degree in an agile environment was clearly diminishing the productivity of some key staff:

> *"When your star player outperforms the rest by 5 to 1, but is not getting the work done because they are losing sleep and breaking into a sweat about standing in front of a group, you need to rethink your approach, and change it for them" (Manager, F).*

The customer-facing aspect of agile also caused significant problems in eight companies. It was clear that certain people *"you should never, ever put them in front of a client"* (Director, M). In fact *"being a good communicator is one thing. Knowing what not to communicate is much more important"* (Manager, O). Managers cited examples of developers revealing to customers politically sensitive and confidential information regarding contracts, salaries and opinions regarding weaknesses within the development team. An intriguing finding of this study is that, although both technical and social skills are required in an agile team, developers with strong social skills might be disadvantaged when they are recruited in a global software development context. A human resource manager described:

> *"When we were hiring home developers, they always presented and communicated really well but you wondered if they really do have the technical skills they claim to have. The developers in the offshore location presented and communicated terribly, but we were always left feeling their technical skills are better than what was coming across" (Manager, D).*

One obvious solution to this challenge is the provision of social skill training. In Company K, however, a more holistic approach was taken, and the development was built into a larger training program. For each new graduate, a video recording was taken of their stand up meeting presentations, which they would then bring with them to a required course for graduates called 'Communication and Presentation in Business'. Each graduate's recording would be watched and integrated into the course material, allowing each student to see how their skills were improving as the weeks and months progressed. Another mediating solution to the lack of social skills is to use appropriate documentation to facilitate communication, even though agile methods place emphasis on minimising documentation. In Company E, a manager found it was much harder to converse with less experienced developers without supporting documentation. The investment in documentation may be merited where a high percentage of inexperienced developers are involved.

#4 A lack of business knowledge among developers

Agile development involves constant, high tempo interaction between customers and developers. The embedded nature of the customer's role within the team increases interaction with all team members, and so, according to many of those interviewed, an absence of basic domain knowledge among developers becomes very obvious. A manager in Company L captured the potential implications of this quite well:

> *"If they (the developers) don't know the business basics, the customer loses confidence in their overall ability, and their technical strengths may be ignored".*

Quite a few managers spoke of the potential damaging, *"cancerous effect"* (Manager, L) of this problem, citing examples of customer indifference and disengagement because of the resulting perception that *"the team know nothing about our business so they won't deliver anything of value to our business"* (Manager, M). This was regarded as a challenge by 12 of the 17 companies studied and seemed to particularly problematic in seven companies where

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internationally distributed teams were involved. For example, one manager in Company K recalled her experiences with a distributed project involving the offshore location:

> *"They had the technical skills in abundance but no business acumen whatsoever... Getting the business angle across to the people (in the offshore location) was really tough. If we can break it down into 1s and 0s they are fine, but anything qualitative is very hard for them to work with. The transition to agile really caused problems with this".*

Training in the business domain was seen as one possible solution. 6 of 17 companies held training sessions on basic topics within the problem domain, such as accounting standards, basic management accounting and finance and marketing principles. Typically, such training went some way to addressing the issue but usually failed to consider the client-specific knowledge required. Getting the customer organisation to run the training seemed to be quite effective in solving this problem (2 of 17). In addition, running these in small modules on a frequent, phased basis seemed to be more beneficial than instances where training was delivered upfront on week one of the project before the team became actively engaged on their project (1 of 17). Finally, making the sessions interactive (1 of 17) allowed the developers to hone in on the niche areas they were finding particularly troublesome.

Moreover, almost all companies were making an attempt to resolve the root cause of the problem by recruiting staff and graduates with a combination of IT and business knowledge, and in three companies, actually recruiting domain experts. While the latter in particular requires significant additional investment, all three managers believed the additional resource was fully justified and significant value was added.

#5 The need to understand and learn values and principles of agile, not just the practices

It was evident in at least ten cases that while 'on paper' they were implementing agile practices, the ultimate goals of agility were not being achieved. Company O in particular captures this point. Two teams in Company O implemented agile at the same time, participating in the same three day agile training session. As can be seen from Table 2 below, both teams implemented the stand-up meeting and on-site customer practices but it is clear that, while they technically implemented the same practices, they did not achieve the same underlying goals. According to a manager in Company O, there was no single issue that caused such a difference between the two projects, but rather *"some intangible combination of staff personality, management style, cultural issues and other factors".*

Practice	Project 1	Project 2
Stand Up Meetings	• Time wasted due to late arrivals • Average 50 minutes, up to 1.5 hours • No responsive action • Highly critical atmosphere • Some people (US-based) frozen out	• Time set to include everyone • Time set aside for breakthrough ideas • Highly interactive • Non-threatening
On-site Customer	• 'Highly passive' • Not involved in spikes • Only role was user story validation – 'more of an editor' • 'Them and me' mentality • Averaged 4.3 days to give feedback on user stories • Attended 27 of 113 stand ups, 6 of 14 retrospectives	• Created brainstorming sessions • Constantly hassled other stakeholders (R&D, manufacturing, accounting etc) and organised meetings continually • Real-time involvement, live reprioritisation • Attended 43 of 45 stand ups

Table 2: Contrasting Implementation of Agile Practices

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Although formal training is seen as a typical solution to teach agile practices, it is not sufficient for development teams to adequately embrace agile values and principles. Some procedures identified across the companies studied included the provision of training and attendance at agile conferences focusing on values and principles. With regard to training, continuous and hands-on training was preferable to once-off training as a way to help developers absorb and retain agile values and principles where a manager in Company L claimed how "*the real value came from continuous training*".

In addition, coaching can complement training to assist a team along the journey of agile-transition. Generally across at least ten of the companies studied, senior team members played the role of coach, whose primary goal was to drive the effort of retaining agile values and principles within the team. However, the effect of coaching can also be obtained through swapping developers across agile teams which ensures cross-team observation and validation of agile practices, thus identifying "*bad habits*" (Company D). Periodically assessing the agility of a team using an assessment framework based on a set of agile goals as opposed to practice adherence may also help. Company A had adapted and dropped several agile practices as a result of assessment practices.

#6 Lack of developer motivation to use agile methods

A lack of motivation to use agile methods among developers was a challenge encountered by five companies studied. It was more prominent in companies where agile methods were adopted in a top-down manner. A manager in Company G observed that *"sometimes they have the competence but are not convinced it (agile) will work"*. In many of the cases studied, there was a perception that process innovations like adopting agile are often viewed as overly onerous, complex and time consuming.

In some organisations, mechanisms such as strong people involvement in the adoption process (2 of 17), training (8 of 17) and sharing of agile development experiences (2 of 17) were already in place to convince and motivate developers to adopt and use agile methods. A manager of Company G indicated how they continuously collected information regarding successful agile projects, in the form of multiple experience reports and then shared them among different project teams. Five companies collected experiences from different teams and customers and have gained valuable insights from them. According to various respondents, the sharing of agile 'success stories' provided encouragement and belief.

#7 Implications of devolved decision-making

While devolved decision-making is a commonly cited aspect of agile, it has caused significant problems among the companies studied: *"People were picking tasks they shouldn't have. It was self-organising gone mad"* (Manager, L). Devolved decision-making also means a change for project managers in some cases causing problems as "*project managers do not know what their role is*" (Manager, N). In Company L the manager cited anxiety of losing the traditional power as a *"problem among some managers"*.

Several agile practices contributed to devolved decision making, including pair programming, stand up meetings, regular retrospectives, and frequent informal communication. Sometimes however, team and peer pressure can be too much. A practice discovered in two companies is a 15-minute meeting between individual developers and the manager every week to ensure that all developers have ample opportunity to communicate any views or concerns they have which may be difficult for them to express in an open forum.

For actual team decision making processes, effective practices across the seventeen cases included a democratic voting system to ensure everybody had an input into every decision. In the decision making processes, as found in 3 of 17 cases, a project manager's role was

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adapted to that of a facilitator in an agile team who, in the end, made the actual decisions. Such role switching allows a project manager to act as a peer to the rest of the team maintaining an open-mind, while at the same time preserving much decision making responsibility which to a certain degree alleviates the anxiety of losing the traditional power associated with managers.

#8 The need for agile-compliant performance evaluation

Across the seventeen cases studied, it was found that while agile methods advocate people interaction, collaboration, mentoring, teamwork and transferring knowledge, there are many issues associated with the performance evaluation of these activities. Team collaboration is not easy to implement if performance evaluation and appraisal mechanisms are based on individual performance. A manager in Company L tells of one of his team member's experience:

> *"We had one guy, who was the guru of the team. While he was happy with agile during the year, he really felt demotivated when he was passed over for promotion. His argument was he spent most of his time giving advice, pairing with weaker developers and helping the team in stand-ups and retrospectives. In his eyes none of this had been rewarded and as his manager I have to agree".*

In five cases the criteria for performance evaluation (particularly at junior levels) focused on technical skills and the ability to follow direction whereas distinguishing factors in agile development, such as social skills, creative thinking and self-organisation, were neglected. In other instances, agile teams were largely evaluated according to traditional criteria and so according to those interviewed, results of performance evaluation were often not indicative of the true abilities of the team members. Meanwhile, performance evaluation of the on-site customer seemed particularly problematic and highly contentious. In at least four instances, the actual person doing the job felt aggrieved that they were not being rewarded properly:

> *"At the end of the day we can say the on-site customer is vital. In reality though, a marketing person is rewarded for their marketing work, and an accountant for what they do with the accounts. Time spent with a development team helping some other department be a success does not help them much in their own reviews" (Manager, E).*

Developing team-based performance evaluation with indicators tuned to agile attributes, therefore, can foster team collaboration and use of agile practices. For example, 3 of the 17 interviewed companies have developed a bonus program that is team-based rather than rewarding individuals. To make team-based performance evaluation more effective, team members can act as evaluators as well as being evaluated. Six companies have introduced "360º feedback" where all team members evaluate each other, as opposed to managers appraising subordinates, thus ensuring that voluntary contributions and mentoring are captured in the appraisal.

#9 Lack of agile-specific recruitment policies and suitably trained IT graduates

Due to a lack of agile-specific recruitment policies in place in most companies it can be difficult to find the right people that are needed for agile development. A manager in Company G described this challenge succinctly: *"The policies that we use in recruiting people do not really take into account agility. I do not even know how we should do it?"* The issue can be worsened by the fact that very few third level institutions incorporate agile methods and skills to any significant degree. For instance a manager in Company L said:

> *"We cannot seem to find any graduates who have done anything hands on or even gone beyond 1 or 2 lectures on agile methods".*

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Furthermore, according to those interviewed, degree programmes tend to lean heavily (if not entirely) toward intense technical or business skills but rarely incorporate both.

3 of the 17 companies developed agile compliant recruiting practices. For example, in Company L job applicants are required to refactor a piece of code and develop a set of user stories and acceptance tests based on an interview with a fictional customer. In Company A applicants are monitored during a 2 hour 'iteration' documenting user stories, estimating, prioritising, developing, refactoring, testing with a stand up meeting after one hour and a retrospective after two. This mode of recruiting quickly exposes the lack of technical and social skills of the applicants. Instead, Company I does something similar but actually drops a single applicant into a live team of developers as opposed to a mock environment (where the whole team are applicants). All team members then evaluate the performance of the applicant.

RECOMMENDATIONS & CONCLUSIONS

A key output from this study is a set of practices that effective organisations are using to overcome the challenges identified in this study. These are discussed throughout this article but are summarised below. While success is a hard thing to measure, all of the practices below were implemented effectively in at least one organisation, according to the respondents in each respective case. Many of these were implemented effectively in multiple cases.

Challenges	Recommendations
Developer fear caused by transparency of skill deficiencies	• Feedback outside stand ups, allowing the documentation of any fears, issues or concerns inappropriate for discussion in open forum • Stand up meetings voluntary for new junior developers • Dedicated mentor for new staff • Weaker developers paired with those who had more experience, taking joint responsibility for requirements
The need for developers to be a 'master of all trades'	• Use pair programming and pair rotation to distribute knowledge and facilitate learning • Encourage task self-assignment to allow developer work in different areas and learn new skills • Reintroduce specific roles when it is perceived beneficial to teams with e.g. large team size, conflicts between developers
Increased reliance on social skills	• Combine development and training program to provide customised training materials on social skills, using developers' own examples. • Using proper documentation to back up communication
A lack of business knowledge among developers	• Customer company runs training sessions on basic topics within the business domain and on company specific area(s) • Provide small training modules (on a frequent basis), making it interactive to allow developers acquire niche business knowledge required by the project • Recruit staff and graduates with a combination of IT and business knowledge
The need to understand and learn values and principles of agile, not just the practices	• Ensure multiple members get agile training or attend agile conferences • Agile coaching and championing • Ensure cross-team observation/validation of agile practices • Assess agility in terms of agile values not practice adherence
Lack of developer motivation to use agile methods	• Try to have multiple 'bought-in' developers on each team • Collecting and sharing successful adoption stories and positive experiences
Implications of devolved decision-making	• Build a sharing and learning environment to empower team decision-making • Implement a democratic voting system • Project manager plays the role of facilitator
The need for agile-compliant performance	• Performance evaluation needs to consider breadth of skills, not just depth • Performance evaluation to apply much higher weighting for mentoring,

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evaluation	voluntary contributions etc • 360° feedback a must
Lack of agile-specific recruitment policies and suitably trained IT graduates	• Develop specific recruiting practices tailored for agile methods to hire right people • Use team recruiting to find right person working in the team • Put newly recruited graduates on agile projects to get hands on experience

Table 3: A summary of people challenges and recommendations to address them

We believe that the findings from this study can be used for a variety of purposes. The list of issues can be used by organisations to assess the issues that they may be susceptible to when considering whether or not to implement agile, or to determine what problems they may be encountering if agile is already in place. This can be a very insightful exercise, given many of the problems identified in this study exist 'under the radar' or are, as referred to by one manager, acting *"as silent killers"*. The best practices used to overcome the challenges (listed above) could be used as a starting point for developing a recruitment or training strategy. This would be particularly appropriate where an organisation is undertaking a transition to agile. It is important to note that such practices may reduce or at least surface people issues, but it is unlikely to remove them altogether. It was clear from the many interviews conducted that the management of people issues is an art more than a science, that the source of the problem can be the organisation, the project, the team, or the individual and there is no technique that can solve all problems. Also, it is clear that some organisations may not be in a position to implement all of the recommendations due to cost, cultural issues, organisational structure limitations or a variety of other reasons. Of course some of these issues may be largely outside their control, with the lack of university graduates being a key example. Also, the study was limited in that those interviewed were typically in managerial positions and so it may be interesting to conduct a similar study ascertaining the views and experiences of developers. Identifying contrasts and conflicting opinions between developers and managers and reasons for those opinions may be insightful.

While exacerbated in an agile environment, not all of the issues raised in this study are new and in reality many have plagued project managers, HR staff and trainers for many years. For those interested in reading more about previous research on the issues raised in this study, please refer to Appendix B.

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Appendix A: Profile of Cases to be studied

Code	Firm Profile	Description of Agile Project	Agile Approach	Team Location	Number of Interviewees & their Roles
A	A leading global management consulting, technology services and outsourcing company, having 91 of the top global Fortune 100 companies as clients.	Internal project management reporting system	XP/Scrum	UK, US	4: 2 Partners, 1 Associate Partner, 1 Project Manager
B	Global leading provider of end-to-end solutions for real-time infrastructure in electronic, network, communication and industrial equipment.	New enterprise server product	Lean Software development	Ireland, US	3: 1 Director of Human Resources, 2 Project Managers
C	Leading global manufacturer of medical supplies. Its devices are used to diagnose and treat conditions in a variety of medical fields.	New Requirements Gathering Tool	Crystal	Ireland	2: 1 Project Manager, 1 Consultant
D	A regulator and protector of the Irish Telecommunications, Broadcasting and Energy sectors.	Internal reporting system	XP	UK	3: 1 Director of IT, 1 HR Manager, 1 Project Manager
E	Leading global technology services firm. Delivers a broad portfolio of IT and business process outsourcing services to clients.	CRM implementation and customisation for external client	XP/Scrum	India, Ireland	1: Project Manager
F	Ireland's leading telecommunications group providing telephone, internet and data transferring services.	CRM implementation and customisation	XP/Scrum	Ireland	2: 1 Director of IS, 1 Consultant
G	Large international company providing products in areas of Telecom and Automotive.	Automotive and Telecom products (devices for mobile applications, wireless)	XP/Scrum	Distributed Germany, Finland, China	2: 1 Project Manager, 1 Site Manager
H	World's leading manufacturer of mobile broadband infrastructure. Also provides optical transport equipment.	Software package for mobile devices	Lean Software development	Sweden, UK, US, India	2: 2 Project Managers
I	Leading provider of information security systems in the global markets.	Information security products	XP/Scrum	Distributed Malaysia, Finland	1: 1 Manager
J	Global technology firm providing infrastructure and business offerings in software and solutions that span from handheld devices to computer installations.	Web-based license registration system	Scrum	Ireland, US	3: Director of HR, 2 Project Managers
K	A global blue chip technology company. One of the major semiconductor manufacturers in the world.	New chip development and testing	XP/Scrum	Ireland, US	4: 1 Director of IT (Europe), 3 Project Managers

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Code	Firm Profile	Description of Agile Project	Agile Approach	Team Location	Number of Interviewees & their Roles
L	Leading global DBMS providers.	Software plug-ins for main database software product	XP/Scrum	Ireland/UK/ India	4: 4 Project Managers
M	Leading global producer of telecom equipment including core network switching, wireless and optical systems.	Hardware Development	Scrum	Ireland, US, India	3: Director of HR, 2 Project Managers
N	Leading global producer of cell phones including devices, services and software. Its wireless network products business is operated in partnership with Siemens as Nokia Siemens Networks	Mobile Devices	XP/Scrum	Finland, US	4: Director of IS, 2 Project Managers, 1 Agile Coach
O	Leading global electronics and industrial engineering firm including industrial automation, control systems, power distribution and transportation systems.	CRM implementation and customisation	XP/Scrum	US	4: 2 Consultants, 2 HR Managers
P	Leading global manufacturer of consumer electronics including TV appliances, medical systems and silicon systems solutions	Internal reporting system	XP	The Netherlands, US, India	3: 1 Director of IT, 2 Consultant
Q	A leading provider of fixed and mobile telephony services through telecommunications networks in Spain, Europe and Latin America	CRM implementation and customisation	XP/Scrum	Ireland	2: Director of IT, 3 Project Managers

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Appendix B: Supplementary Literature

Issue Identified in Our Study	Previous Research on People Issues in Software Development	Previous Research on People Issues in Agile Software Development
Developer fear caused by transparency of skill deficiencies	No literature as far as we are aware	No literature as far as we are aware
The need for developers to be a 'master of all trades'	Gallivan, Truex et al. (2004)	Cohn and Ford (2003)
Increased reliance on social skills	No literature as far as we are aware	Begel and Nagappan (2007); Hovorka and Larsen (2006)
A lack of business knowledge among developers	Becker, Insley et al. (1997); Crockett and Jeffries (1993); Cusack (1988); Fischer (1994); Hildebrand (1991); Pastore (1993); Pitman (1994); Ridgeway (1987)	No literature as far as we are aware
The need to understand and learn values and principles of agile, not just the practices	No literature as far as we are aware	Abrahamsson (2002); Agarwal and Prasad (2000)
Lack of developer motivation to use agile methods	No literature as far as we are aware	Cohn and Ford (2003); Layman, Williams et al. (2006); Petersen and Wohlin (2009)
Implications of devolved decision-making	No literature as far as we are aware	Cohn and Ford (2003); Misra, Kumar et al. (2009)
The need for agile-compliant performance evaluation	Thompson, Higgins et al. (1991)	Qumer and Henderson-Sellers (2008)
Lack of agile-specific recruitment policies and suitably trained IT graduates	Gallivan, Truex et al. (2004); Iivari and Huisman (2007)	No literature as far as we are aware

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