On the Agile Transformation in a Large-Complex Globally Distributed Company: Why Boarding this Journey, Steps Taken, and Main Foreseen Concerns

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Abstract—ORG, fictitious name, is a large company with complex-globally distributed projects that has recently started a "big-bang" transition to agile. About a year ago the new CIO announced it was time to aim for faster deliveries and decided on a company-wide roll-out to agile, including legacy systems. In this paper we report on an interview-based qualitative study that aimed to identify the reasons of why the company is moving to an agile approach, the steps took towards becoming agile during this first year of work, and the main concerns of management given the size of the company, the complexity of the projects developed, and the team's global distribution. We interviewed 18 managers, including members of the board committee that support the CIO in strategic decisions. Our findings add to the current literature on the topic by discussing the transformation in a large-complex scenario that, to the best of our knowledge, has never been reported in literature.

Keywords—*Agile Transformation, Large Company, Complex System, Global Software Development, Empirical Study.*

I. INTRODUCTION

Companies need to constantly improve their processes and revisit decisions made in order to keep up with new industrial paradigms such as globalization and time-to-market. Over a decade ago, new values such as frequent deliveries to the customer and agility have been foreseen as key to companies to survive in a market that started to require rapid and flexible responses to change. The Agile Manifesto [1] was then born and agile development has set foot in Software Engineering.

In the agile era, companies that had previously been following an hierarchical organizational structure and well-defined processes based on quality models such as CMMI, have now to make several decisions and reinvent themselves if they wish to stay competitive. The decision-making process to become agile is not simple and it involves much more than knowing "how to do" and "what to do" [2]. The core of this transformation, defined as *the process of leaving the traditional way to development software and adopting the agile philosophy, tools, and principles* [3], is in changing organizational culture and people's behavior and, as such, it requires organizational alignment among all departments and support from senior management.

Despite successful stories of large-scale companies that have migrated to agile (e.g., [4]), literature reports that this complex process brings numerous challenges to organizations

[5]. Therefore, it is important to be well-aware of the reasons for going through such a change, to understand the "day after day" of this transformation to realize how puzzling it is to "acquire" such new culture, and to be as familiar as possible of the potential pitfalls ahead.

This paper presents a report of the initial steps of the company-wide transformation at ORG, a large company with complex-globally distributed projects. In our interview-based qualitative study we sought *to understand what are the main reasons that motivated ORG to enter this journey, to identify the steps performed so far to implement the transformation and aim to become agile, and to name the majors concerns foreseen by management to succeed in such endeavor*.

Our main findings from our 18 interviews with managers located in the USA and in Brazil are: reasons for going agile are mainly aiming to reduce delivery time to customers and to reduce the communication gap between business and IT departments; a major reorganization including redefining roles and responsibilities and the command-chain, and training people on agile practices and ceremonies were the main first actions taken to prepare the organization for the change; and the complex ecosystem of applications and their dependencies as well as the teams' global distribution with no or little overlapping working hours are among the most cited concerns by the participants. We discuss these findings in light to current literature and by considering the company background.

II. COMPANY BACKGROUND

ORG (fictitious name) is a large IT multinational company with offices located over 5 continents. Software products to support the organizational processes are developed by the IT department. Demands to develop or to update these products come from the business departments, mainly located in the headquarters' office in the USA but with business representatives spread out over 30 countries. IT development teams are distributed among the headquarters' office and in Brazil, India, and Malaysia. There also also IT employees in China, Japan, Ireland, and Russia.

The IT department, at the beginning of the transformation initiative, used to follow a matrix structure based on business areas (e.g., sales) and IT functions (e.g., developers). Development assignments were mainly organized in projects that vary from the development of new products to the maintenance of

legacy systems, and project teams would mainly follow the waterfall model. Some Scrum practices were scarcely adopted in a project-based fashion to mainly support project management. Software development processes would vary from formal (following CMMI Level 3 practices) to informal (defined by the project members upon their needs).

A well-known practice at ORG is still in place: an annual project roadmap is defined in December based on the requests made by business representatives and recorded by business analysts. Business analyst managers in conjunction with project managers prioritize the requests and define a set of projects to be developed throughout the year. Priorities are defined based on business impact and on development costs, and approved by a committee board composed of senior business and IT personnel who directly report to the CIO board.

Up to the beginning of the agile transformation, distributed software teams were formed to develop the elected projects. Members were assigned to projects based on their skills and domain knowledge, despite of their physical location. Therefore, a project often has its roles distributed over several locations. By mid February each team would receive a business request document. The software team would start working to translate the business into software requirements led by the software requirements analysts. These would consult with business analysts to clarify business requirements and, when necessary, business representatives would be invited to join the discussion. Project managers would monitor the project progress based on a set of organizational performance measures that would be reported to senior management in a regular basis. Results from these measurements were used to determine whether a project failed, attended, or exceeded its performance goals. Although ORG has gone through a major reorganization, this roadmap assignment process has not been reconsidered yet as mentioned in Sections IV and V.

III. METHOD

To attend our research goal, we conducted an interview-based qualitative study. The semi-structured interviews were conducted in person on-site at the American and the Brazilian IT offices. The interviews with the 10 American-based representatives took place on the fourth month after the agile transformation process kick-off (Dec'14) and was conducted by one of the researchers while the 8 remaining ones with the Brazilian-based representatives took place during the ninth and tenth months (May and Jun'15) and were conducted by two other researchers.

The interview was focused in 4 major themes as follows: *i) participant's background*, we asked the participant to introduce herself and talk about her job description and responsibilities within the company; *ii) reasons for the transformation*, we asked her to elaborate on the reasons the company is going through such transformation that she was aware of; *iii) actions taken*, we invited the participant to introduce us to the activities she was engaged on or has been communicated about related to the transformation; and *iv) concerns*, we requested the participant to express her concerns about the transformation process as a whole considering the organization background.

Participants were pointed out by a senior manager, the focal point of the research project that this study is part of, and then

TABLE I.   PARTICIPANTS' PROFILE

ID	Job Title
US1	Manager on Process Improvement, Member of the CIO Board
US2	Quality Assurance Analyst (Process-based quality)
US3	Director on Process Improvement, Head of the CIO Board Committee and of the World-wide Agile Transformation Initiative
US4	Manager on Quality Management (Product-based quality), Member of the CIO Board
US5	Business Analyst Team Leader
US6	Business Analyst, Leader of the World-wide Business Analyst Community of Practice
US7	Business Analyst Manager
US8	Portfolio Planning Manager, Member of the CIO Board
US9	Portfolio Planning Manager, Head of the Roadmap Planning Department, Member of the CIO Board
US10	Director on Finance Application Development area
BR1	Manager on Services Application Development area
BR2	Director on Infrastructure area
BR3	Manager on Finance Application Development area
BR4	Manager on Services Application Development area
BR5	Manager on Financial Services Application Development area
BR6	Director on Infrastructure area
BR7	Director on Services Application Development area
BR8	Manager on Financial Services Application Development area

invited to participate on a volunteer basis. All 19 participants accepted our invitation; however, a US-based member called out in sick during our visit to the USA office and had the interview canceled. Thus, we interviewed 18 participants.

All participants are managers at ORG and are either a member of the CIO committee board, a director, or a development manager. They are working at ORG for at least 4 years and at most for 16 years. All participants are currently a member of the IT department but 5 of the US-based representatives had worked in the business department either as a salesman, a manufacturing manager, or a business analyst. Also, out of our pool of respondents, 8 of them are male (1 in the USA, 7 in Brazil) and 10 are female (9 in the USA, 1 in Brazil). Table I summarizes the participants' job position.

All interviews were voice recorded and later transcribed by each one of the interviewees. The shortest interview lasted 20 minutes and the longest 90 minutes, and they took in average 53 minutes. Our subsequent analysis was guided by grounded theory procedures [6]. We coded the interviews identifying factors for each of our topics of interest–reasons for the transformation, actions taken, and concerns, until we have exhausted the data and reached a final set of merged factors. Coding was done by each of the interviewees and later reviewed by an independent senior researcher that is part of our research project. Next, codes were merged into a single document.

IV. THE TRANSFORMATION FIRST STEPS

In this section we present the first steps of ORG's transformation to become agile. We first describe the findings about the reasons why the company decided to move towards this new trend and next what was done so far to promote the change.

A. Why Agile?

ORG has started its transformation to agile about a year ago. It all started when a manager with experience in a large e-commerce company was hired to lead the development of ORG's Online Store. One of his major changes as a manager

was to introduce agile to the Online Store development team. ORG's Online Store is an independent application and has a dedicated team to take care of it. For over three years the team improved its processes and the online store itself based on the expertise developed using agile to guide their development. A recent reorg has put this manager in charge of the IT department and as the new CIO his first world-wide announcement was that the company would go agile.

One of the main reasons behind this decision was **to deliver faster to the customer** given that *"the faster, the better"*, as argued by the Manager on Process Improvement [US1].

One of the Managers on Services Applications [BR1], the Manager on Finance Applications [BR3], and yet one of the Managers on Financial Services Application Development [BR8] also reported, respectively:

"Agile aims to deliver faster to the customer. Instead of spending 10 months specifying requirements, then 5 more months coding them and 5 more testing, the customer will be able to quickly see added value to the application in a shorter time." [BR1]

"It would be great if we could deliver faster since we have this daily pressure to reduce costs, as any other IT company also has." [BR3]

"(...) requirements that take four months to be developed and two more to be deployed, we want to change such scenario and deliver more quickly and often to the customer." [BR8]

The current long time window between the customer requesting a software and receiving it is also an important motivation for this transformation, said one of the Financial Services Managers [BR5]. He also said: *"Agile means frequent deliveries, causing the impact of the customer's decision to be handled in smaller slots of time and allowing changes during the process"*. This same reason was also mentioned by one of the Directors on Infrastructure area: *"(...) there is a gap in the customer expectations since IT takes too long to deliver what is requested."* [BR6]

Agility as **an attempt to be more innovative** is another important reason according to one of the Directors on Infrastructure area. He mentioned: *"We seek agility as a 'driving force' to innovation. We need to (...)"* [BR2]

The transformation to agile also aims **to reduce the communication gaps between business and IT** as mentioned by one of the current Directors on Infrastructure area:

"[Agile] expects closer interactions between business and IT, having the customer more involved. This approximation is welcomed and we do need it, but it can also be risky if the customer does not get engaged." [BR2]

The Business Analyst Team Leader added based on his large experience working on the business department: *"We can not forget that a lot that takes place in an organization goes through informal channels. Thus, this agile model will likely be good to make informal things formal."* [US5]

In addition, participants also reported that another important reason for adopting agile company-wide is **to be more flexible to changes**. For instance, *"The requirements are defined early in the year and sometimes they are obsolete*

when development starts." as reported by the Director on Services Application Development area [BR7]. Therefore, it is important that the development teams have a closer interaction with business to frequently discuss and re-prioritize what requests are more important at a given time, as mentioned by one of the Managers on Services Application Development area: *"Flexibility means we can change requirements with a cheaper cost and more easily."* [BR4]

B. Actions Taken

Once the decision has been made, the CIO and his committee board discussed a set of actions to be taken to promote the transformation and engage management in promoting them. At the mid of the fourth month, a world-wide announcement was made to the entire IT department marking the kick-off of the agile transformation. At this time, teams were informed that by the end of a 12-months period all projects had to be "acting agile". We report next all actions taken during the four months of discussions at the executive and strategic levels and the 7 months of changes at the operational level.

The company prioritized **reorganizing the former organizational structure**, which was a matrix structure. As reported by one of the Managers on Services Application Development area, *"The new structure is defined now by business areas that have their own internal functions."*. He supplemented: *"An interesting change we made was that the executive leadership was completely realigned. We have now a mix of new and 'ancient' people of the business department that are within a portfolio area to ensure the new ideas will be welcomed but that we will also not lose important implicit knowledge."* [BR1]

"Leadership is slowly realizing how positive this change will be. It is the matter of internalizing it and later sharing with their team members", added the Director on Process Improvement, the head of the world-wide agile transformation initiative [US3].

One of the main advantages of such organization change and moving more towards a model in which teams are responsible for what was assigned to them is *"To have clear accountability for decisions and deliveries. In our matrix form we had too many people in control and no one controlling anything."*, said the US-based Director on Finance Application Development area [US10].

After the major discussions about the organization structure, the focus turned to **training teams on agile practices**. Team members start then to learn how to adopt such practices in the context of ORG. Several presentations and debate sessions are organized by managers, development leads and architects to promote discussions on how agile within an enterprise with complex applications and that is globally widespread can take place. For instance, one of the Managers on Services Application Development area reported:

"Local presentation sessions to all members of a certain office were organized to take place wold-wide in the same week in which teams already going through the transition were motivated to report their experience to others as a way to encourage the adoption of agile and to share good practices." [BR4]

At the same time, some members were encouraged to carry out the Scrum Master's certification and use their knowledge to help other project members to align their actions to the transformation initiative, as mentioned by one of the Managers on Financial Services Application Development area: *"Some members were already trained as Scrum Master, but on Monday four more people of my team will be going to a training to learn new things. They are very motivated about it. They enjoy to learn new things."* [BR8]. In addition, managers are also learning along with their team member as mentioned by one of the Directors on Infrastructure area: *"We are receiving several trainings, both at the technical and at the managerial level on agile practices and we has been learning from each other as we put them in practice."* [BR2]

Communities of Practices was a key mechanism behind the success of the large-scale agile implementation in Ericsson, helping teams to mitigate some pressing issues of the transformation [7], and also a source of motivation to ORG's employees too, argued the Business Analyst who leads worldwide the Business Analyst Community of Practice [US7]. The Manager on Quality Management added: *"As important as training people is sharing what we are learning with one another, and here is a good way to do it. I hope they do not cut this practice off."* [US4]

Yet another action taken was **to identify and prioritize pilot projects** to serve as testbeds for assessing the side effects of the reorganization and overall changes promoted during the initial months of the transformation as commented by one of the Directors on Infrastructure area:

"We are prioritizing some projects to be pilot projects based on our understanding that they are more prone to be adherent to the agile philosophy. We have a priority list but we still keep some legacy projects running on 'traditional' [Waterfall] processes." [BR2]

Also, these pilot projects have been closely **supported by coaches hired to assist the company**. *"Local coaches were hired to support each of the IT offices. We looked for experienced professionals who have faced similar issues than ours in other large corporations."*, said the Director on Process Improvement [US3].

The benefits of having experienced coaches working with the teams is recognized as follows: *"They can more easily and quickly to recognize ways to enable the transformation."*. One of the Managers on Finance Application Development area supplements by saying: *"The coaches are already working with some pilot projects supporting refining the organization structure when projects involve other projects and teams. You know, we have all these dependencies (...)"* [BR3]

Another reported advantage of having coaches supporting the transition process is to ensure the agile practices are correctly used as exemplified by one of the Managers on Financial Services Application Development area: *"The coaches participate in all the ceremonies and help us understand if we are doing it right. For example, they helped us to revisit our team structures and set up the feature teams in a way that makes much more sense now."* [BR5] It was also argued by the Director of the same area, located in the USA: *"We are finally learning how to do things. We do understand what it means to do a stand-up meeting. We are not playing anymore."* [US10]

The teams are also aware of the role and extent of responsibility of the coaches as reported by one of the Managers on Services Application Development area:

"The coaches are responsible for helping the organization to make the transformation happen, but they are not responsible for the transformation itself, this is responsibility of each portfolio area. They provide us with the tools and helps us with their expertise. We have to make it work." [BR1]

Another major action taken was **to refine the team structures** based on the new organization structure. The teams began to take shape as 'feature teams' as described by one of the Managers on Financial Services Application Development area:

"Before this agile transformation, I usually had a team with resources allocated to it and the team members worked on the project, from day 1 to the delivery. When another project was up, then maybe I would have another resources allocated to work with me to deliver it. Now, I have an organized structure responsible for a major feature and this structure receives demands from several different portfolios and systems programs and we try to prioritize the demands according to the customer needs, by sprints, not as it used to be." [BR5]

Still about the refinement of the team structures, one of the Directors on Infrastructure area [BR6] and the Director on Services Application Development area mentioned [BR7], respectively:

"We have teams still working on a project-based form but trying to create new structures like feature teams. It is not an easy transition, for example, earlier today I discussed with a colleague about the testing area. The performance testers are still separated from development. This is something we have to change for us to be completely agile. We are not sure how to do it but I think we are going on the right track." [BR6]

"In the past, a project manager would receive reports from all members allocated to projects of a certain portfolio. He would manage how these people were working. Now, with the agile transformation, these managers are responsible for the portfolio management as a whole, they need to know how the features the portfolio is responsible for are progressing." [BR7]

The US-based Director on Finance Applications believes that *"It is great to have a multidisciplinary team, or this feature thing–I can not recall the name–where everyone needs to know all skills and to be trained on all aspects. This will make people more focused and committed. I like that!"* [US10]

To achieve that, the company is also *"refining the job descriptions and revisiting skills and competencies they expect each role to have"*, as commented the Business Analyst Team Leader [US5]. The Business Analyst also reinforced: *"It is important that we reconsider the competencies each role requires in this new model. For instance, we had 6 levels of business analysts, now we have business analysts and business software analysts merged in one single role, we are still revisiting their set of expected competencies and skills."* [US6]

Further, some teams identified the need to **mix agile practices from different methods** to compose what they need

to support their work as highlighted by one of the Managers on Financial Services Application Development area: *"Some teams are adopting only Kanban, some only Scrum. But there are several teams that are using 'Scrumban', as we named here. This is when a team only uses the concept of Sprint from Scrum but adopts the Kanban way to work."* [BR8]

V. CONCERNS

Despite the initial actions taken by the company, there are still open questions in the opinion of the managers. They are aware that in such a transformation process one can expect that as decisions are taken and implemented new issues will come up. Certain actions will be taken and will result in positive outcomes, others will have to be reconsidered. They agree that this is part of any maturation process. However, there are key points they consider critical, mainly due to their large-complex globally distributed configuration, and that are still to be discussed as presented next.

The biggest concern reported by all participants is the transformation occurring in a company with **a complex ecosystem of software applications.** This is of concern given the large number of interconnected applications that attend multiple business areas (e.g., sales, manufacturing, finances, HR, etc) and legacy products maintained by several organizational departments and by highly distributed teams. Such concern was expressed by the US-based Business Analyst as follows: *"Interlocks–as interdependencies are mostly named at ORG–will be a big headache."* [US6].

One of the Managers on Services Application also mentioned: *"We have over 2 thousand applications forming a well-connected web, an extremely complex data stream that is globalized and yet serving regional needs in several cases where our client–several company's departments–have no globalized processes."* [BR1]

Another concern about the high amount of interdependent applications is how the 'feature teams' are being set up. Some managers understand that a team at ORG will never be completely independent from other teams given the dependency among the applications. Thus, releases have to be coordinated. One of the Managers on Services Application Development area reported:

"All applications are very well interconnected, then now we have a concept of release. In theory, it would be ideal to have a release every 3 months, but in practice this can vary because I depend on others to get my feature done and some projects have still not been migrated to this release idea." [BR4]

One of the Directors on Infrastructure area also mentioned about this same issue: *"If I need to automate a process, the process will probably hit several systems to complete the task. Thus, the automation needs to have all applications with a 'ready status' to be able to be delivered."* [BR6]

The **limited spread of the transformation to parts of the IT department** is among the major concerns of several managers. For instance, training and coaching have been only assigned to support development teams. Infrastructure and services teams are having to provide services to development in an 'agile fashion' without having been included in the transformation initiative as reported by one of the Directosr on

Infrastructure area: *"It is necessary to look at the software life-cycle as a whole, including the question of provisioning infrastructure. The training offered is very good for the development team, but infrastructure has no clear guidelines defined yet so we feel kind of lost"* [BR2]. He added: *"The technological complexity of the environment, I think, is another important factor. We are talking thousands of database, thousands of applications [silence]. Then, when I have to talk about a transformation that will affect, for example, 'refreshing a hardware structure' to all applications of a portfolio, then I have to ensure that I will be able to handle such major change and this has not been discussed yet but I am already facing such an issue."* [BR2]

The other Director on Infrastructure area is concerned about the available infrastructure itself: *"How can we support constant deliveries if we are not sure which are the infrastructure needs for that and we do not have enough DBAs to work or even servers to support the applications?"* [BR6]

On the other hand, the Director on Finance Application Development worries that *"the quality of the service provided by production support people can be jeopardized since their way of work will not be in sync with development. These guys still have to be fast to provide solutions to live issues but they might not know how to interact with development teams anymore since they are not aligned with what the coaches are doing."* [US10] The Business Analyst has a similar worry: *"We need to ensure consistency in some level so we stay functional and make people's life easier."* [US6]

To make the customer adopt agile in their processes is another concern related to the transformation boundaries within ORG. For instance, the Director on Finances Application shared: *"What we need is a proper customer involvement. This is really a 'big sticking part of all this'. We need customer who can use requirements in an effective way. They have to be committed to do it and we also need to learn to be disciplined about it."* [US10]

One of the Portfolio Planning Managers added: *"We urgently need a centralized solution for business personnel to make their requests and prioritize them."* [US8]

The Financial Services Application Manager commented: *"Customer representatives are aware that the company-wide is going agile, but are not directly involved in the actions taking place so far, so I guess that they have not yet realized that they will have to be more active overall, to respond faster to our requests and to more quickly consider what are their priorities, to be able to handle new deliveries in a faster pace, among so many other things."* [BR5].

The Business Analyst Team Leader argued: *"What customers have to realize is that we need a day-to-day proximity with them throughout the development cycle but when coding the contacts will likely slow down. We do understand that interacting with IT people takes away from their daily job duties but in the end we are providing them with solutions that will help them in the end to better do their work. So they need to find a balance."* [US5]

"We can work with PO [product owners] proxies, if necessary to make it work. We are okay with that", concluded the Process Improvement Manager [US1].

The Manager on Quality Management supplemented: *"We believe that by involving more the customer we can increase the overall customer satisfaction with IT services. This is what my team is looking for in this transformation: to have better results in our periodic customer satisfaction surveys."* [US4]

The Director on Services Application Development area highlighted: *"We definitely need the customer closer to the IT department, and fast."* [BR7]

The **annual roadmap** to decide on budget for the departments is also a concern. The Manager on Finance Application Development area is afraid ORG might collapse in the coming year:

"There is no one looking at the roadmap so far. We are still learning how to distribute our projects in an annual basis now (...) In fact, what we need is to learn how to prioritize requests as the year goes by so the customers will always get what they need faster. It really does not matter what model we are following, we need rules to decide on what adds more value, so prioritization will be made easier and more clear." [BR3]

The US-based Finance Director argued: *"Agile fits well when there is a lot of unknowns' but it cannot be good to fixed contracted models like ours."* [US10]. His office partner mentioned: *" Our budget is fixed, we will likely never change that. Effective prioritization is the key."* [US10]

In addition, one of the Directors on Infrastructure area reported: *"The company has an annual roadmap, so we plan in accordance with the resources and budget we receive; I still have no clear vision of how it will look like really with agile."* [BR2]

One of the Portfolio Planning Managers, responsible for the annual roadmap planning confessed: *"We do not know we have to change the way we do our budget forecast but we still have not found a way and the clock is ticking. It is dependent on the business budget funds so it is not just changing the process, it is more complicated than that."* [US9]

The Manager on Process Improvement added: *"We need to work based on priorities."* [US1] Her colleague supplemented: *"(...) We just are not sure how to move from a cost-based model to a priority-based one. I think the first step is to have a demand supply staff, like a roadmap change management board, to ease things down next year. Then we buy ourselves some time."* [US8]

The **global distribution of the teams** is another factor that concerns most of the managers. ORG started in the USA, later created an office in Brazil, next in India and Malaysia. There are also groups of IT professionals allocated along with business offices in Ireland and Russia, and other places. Over the last 13 years, the teams went from co-located to distributed between two countries (e.g., USA-Brazil, USA-India) and finally to distributed over three continents (e.g., USA-Brazil-Ireland-Malaysia). Differently from a large number of agile companies in Europe that are distributed up to 5 countries within the same time zone or, at most, 1 or 2 hours apart, at ORG teams have the challenge to have to coordinate with remote teams members that are often 8-14h distant from one another. This concern can be perceived in the following

excerpts by one of the Directors on Infrastructure area, the Manager on Finance Application Development area, the Manager on Services Application Development area, respectively:

"We work with distributed teams. Everything we do is distributed. My team is distributed over 4 continents. It is very challenging to have a synchronous meeting, even when we make an effort to compromise our working hours. Not even to mention that for more that we try, it will never be the same than working side-by-side." [BR2]

"There are just too many people over too many countries around the world to effectively be flexible and agile in our processes." [BR3]

"We have five thousand people distributed among Americas, Europe, and Asia, and this will not change because it is how our business survive. We need to be where our end-client is (...)" [BR4]

Most of applications at ORG were born when the company was still small and with a single office. Despite, they have been maintained by teams of senior professionals that are well aware of how the applications work. As people retire, new members are moved from junior to senior positions and being assigned to be in charge of keeping the applications working. With this company-wide transformation, **old technologies and legacy systems** become a serious concern as reported by one of the Portfolio Planning Managers: *"We are still learning about whether agile is fit for all projects we have. Some might never be able to go agile like the legacy systems. We are still not sure yet."* [US9]

The Manager on Services Application said: *"Our applications were not designed thinking on agile methods. They are 10-15 years-old with legacy code that is very difficult to have a feature team responsible for it, for example."* [BR4]

The Manager on Finance Applications said: *"In a complex environment with different systems communicating with each other and integrated by old technologies, it is insane to try to move legacy systems to agile."* [BR3]

Other concern is about **Brazilian's laws and fiscal year's budget** as mentioned by the Manager on Financial Services Application:

"The shares must be tendered and we are still managed by quarter to quarter within the fiscal year. Management is tied up to the fiscal year, which ensures pre-delivery and planning visibility different from what happens in agile, I think. The cost is likely discussed for the short term deliveries, without considering a closed scope." [BR5]

The Manager on Finance Application Development reported: *"I have some demands that vary greatly according to the [Brazilian] government and the law under ORG is hosted here [in Brazil]. For instance, if the law changes, we need to change to be compliant with it. Also, the [Brazilian] government is always changing rates, thus we have to adjust the systems in a very frequent fashion."* [BR3]

Agile evangelists is also a concern because they often believe only in agile in itself, not in a process that can be effective through a transition and that represents a culture change. Transformation is a slow process, so many people

do not believe that teams can be effective in cases where the company is still running some projects on 'traditional' processes. This issue is mentioned by the Services Application Development and Financial Services Application Managers, respectively:

"Evangelists do not believe that change can occur and be effective. They just believe in what is described in the agile manifesto. They end up damaging the transformation process. We know it will be slow (...)" [BR4]

"(...) a problem that I see today is that agile is kind of a religion, there are many people who strongly believe that it can even cure cancer [laughs]." [BR5]

Lack of formal documentation for requirements is another issue cited by a few participants as showed by the excerpt below:

"So, if you do not have any documentation, it has happened several times to us, to have projects that goes back and forth and then our customers say no–customer here is always internal departments. They say 'it was not what I wanted', then we say 'but it is what you documented' so we have how to defend our position. We always had this fear to miss formalities despite all the interactivity that agile offers." [BR1]

The adaptation and the redesign of tools to support work throughout the organization is a less concerning issue but something the company knows that will have to be considered sometime sooner than later. For instance, the Process Improvement Manager mentioned: *"We will need tools to support virtual stand up meetings, visualization of data exchanged among people to facilitate comprehension of what is going on given that most team members do not work with co-located colleagues and have large time zone differences, and so many others that I could spend the entire hour listing here."* [US1]

VI. DISCUSSION

As other companies [8], ORG has different motivators to aim to 'become' agile. We could perceive that the most important reason why ORG decided to go agile is similar to those reported in literature (e.g., [9]): to deliver faster. This is one of the main characteristics of agile development and proven to be still a common issue in industry.

The reorg of the former organizational structure reported by some of the participants is a natural reaction when an organization is moving to a new paradigm (e.g, from Waterfall to agile). When the company was using the Waterfall model, it was fit to have a matrix structure. However, when the migration to agile started it was easy to perceive that the organizational structure needed to change to support teams working based in features using evolutionary and iterative development.

Training team members on agile practices is an incisive step to the transformation that includes qualifying people on the 'basics' of the new mindset (e.g., self-training, trial and error, changing priorities), as reported by Gandomani [10]. Our findings also indicated that such trainings were one of the first actions to be taken at ORG, despite the large amount of employees already familiar with agile practices. The training offered not only the discussion of agile concepts but also how

to put them into perspective at ORG based on the company context and background. This was cited as one of the main benefits of having the training sessions.

Pilot projects are common strategies to test whether something is working and it was also used by ORG. It started with a set of a few projects only, and now is a company-wide strategy, as mentioned by our participants. This was consider one of the successful factors to support the transformation in large companies such as in Gap, as reported in [11].

Coaches hired to assist the company is among other of the successful factors cited by Gandomani [10]. Such action has allowed people at ORG to discuss their points of view, to ask for clarifications, to have mediators to guide discussion, and to have experts mentoring their actions.

The developers of the Primavera Systems [12] reported that when a company decide to migrate is common to follow a certain agile method as the main method to be followed such as Scrum, or a mix of such methods like 'Scrumban'. Professionals report that having a method to follow helps them to guide what has to be done with different needs of projects. This also took place at ORG and was also pointed out as a facilitator.

About the concerns reported here by the ORG managers, some of them are similar and others are new to literature as discussed in the coming paragraphs.

The concern related to the complex ecosystem of software applications that ORG has present in its daily activities in still an open question in literature. We found challenges and limitations reported related to the usage of agile practices in a distributed environment (e.g., [13]) and on a project with dependent projects (e.g., [4]), but none referred to the same complexity as in ORG (having both aspects altogether in a same project, for instance).

The limited spread of the transformation discussion to the IT department only is another concern. For being a large company with several financially independent departments, the transition has been so far just been discussed among IT personnel. Business people are aware of the transformation but they still are not involved in it in practice. Torgeir and Nils [14] proposed a research agenda for agile in large-scale in which they cite that customer collaboration is still an open issue in such setting. ORG is facing this issue and little is know in literature to help them overcome such this challenge.

As per the annual roadmap concern, we found a study from Borland [15] that showed that an annual roadmap was one obstacle, having the company moved to a catalyst solution. The new strategy has been established based on a common understanding among the involved parts and the agility was achieved across their product delivery value chain. ORG knows this is one of their key topics of concern and that changing it involves more than changing software engineering processes and task allocation.

The global distribution of the teams is a barrier to the true transformation to agile at ORG. Managers have already realized that there are some practices that do require close co-ordination and fast decisions have to be made for short releases be a feasible reality at the company, and that long distances

with lack of overlapping hours make them discussions almost impossible to happen. Korhonen [16] identified that distance does make it hard for agile teams to work but that the distance itself does not imply or affect the quality of working practices per se, contradicting the perception of ORG managers.

ORG has no clear direction about the transformation of old technologies projects and legacy systems. Literature reports successful cases when implementing agile in such scenarios. For example, Shah and Nies [17] reported practices to move from large legacy applications to agility, as follows: Inspect and Adapt (having agile attitude), Go slow to Go Fast (to establish a plan and work incrementally), Prepare to Sustain (to have a dedicated role to inspect and adapt the process), Divide and Conquer (break monolithic projects into smaller projects), and Piggyback (to try initiate something already accepted rather than something new).

Lack of formal document for requirements is yet another issue described as the barrier in triaditional projects as reported by Cristal, Wildt and Prikladnicki [18], for example, and also mentioned as a concern by ORG managers.

On the other hand, local laws and fiscal year's budget as well as agile evangelists are still open concerns not yet mentioned in literature.

Agile transformation is not a simple process to go through. However there are reports in literature describing successful cases in this transformation (e.g., [4]), there are still open questions when the transformation takes place in a large-complex globally distributed scenario as reported in this paper and discussed above.

VII. Final Remarks and Future Work

This paper presented a report of the initial steps of ORG' company-wide transformation to agile. ORG's two particular configurations in relation to other large companies that have already been through this transformation are: (i) it has an ecosystem of applications that are dependent on each other and (ii) it has large teams globally distributed around the globe with no or little overlapping work hours. Both characteristics make ORG's situation quite unique, thus likely requiring specific measures to leverage success.

Despite the challenges and the early stage of the transformation process itself, we could observe that ORG is following the same direction path of most successful transformation initiatives as reported in literature. However, we do know that the concerns revealed by our study will have to be discussed and handled by ORG when the time comes.

We are currently designing a second field study. We aim to interview professionals of large companies, senior coaches and consulting professionals that have participated on such a transformation in large companies in order to identify what are the main challenges they have gone through and which good practices they propose. This work is inspired in an informal benchmarking we conducted while attending an agile-based international conference in May'15. Our main goal with this second study is to add to Fontana and colleagues [19] that identified the following categories for maturity in agile: practices to become agile, team composition and behavior, deliveries (evolution from traditional to continuous delivery),

requirements (transition from traditional requirements elicitation to use stories), product (practices to improve the software product) and customer relationship, and work to supplement the mechanisms they point out to support agile teams to evolve.

References

[1] K. Beck and colleagues, "Manifesto for agile software development," 2001. [Online]. Available: http://www.agilemanifesto.org/

[2] S. Nerur, R. Mahapatra, and G. Mangalaraj, "Challenges of migrating to agile methodologies," *Commun. ACM*, vol. 48, pp. 72–78, May 2005.

[3] P. Ranganath, "Elevating teams from 'doing' agile to 'being' and 'living' agile," in *Proc. of Agile Conf., Salt Lake City, USA*, 2011, pp. 187–194.

[4] C. Fry and S. Greene, "Large scale agile transformation in an on-demand world," in *Proc. of the Agile Conference, Washington, USA*, 2007, pp. 136–142.

[5] K. Korhonen, "Evaluating the impact of an agile transformation: a longitudinal case study in a distributed context," *Software Quality Journal*, vol. 21, 2013.

[6] J. Corbin and A. Strauss, *Basics of qualitative research: Techniques and procedures for developing grounded theory*. Sage publications, 2014.

[7] M. Paasivaara and C. Lassenius, "Communities of practice in a large distributed agile software development organization – case ericsson," *Information and Sw Technology*, vol. 56, no. 12, pp. 1556–1577, 2014.

[8] R. Valade, "The big projects always fail: Taking an enterprise agile," in *Proc. of the Agile Conference, Toronto, Canada*, 2008, pp. 148–153.

[9] G. Cloke, "Get your agile freak on! agile adoption at yahoo! music," in *Proc. of the Agile Conference, Washington, USA*, 2007, pp. 240–248.

[10] T. Gandomani, H. Zulzalil, and M. Nafchi, "Agile transformation: What is it about?" in *Proc. Malaysian SEng. Conf., 2014, Langkawi, Malaysia*, 2014, pp. 240–245.

[11] D. Goodman and M. Elbaz, "It's not the pants, it's the people in the pants - learnings from the gap agile transformation what worked, how we did it, and what still puzzles us," in *Proc. of the Agile Conference, Toronto, Canada*, 2008, pp. 112–115.

[12] B. Schatz and I. Abdelshafi, "Primavera gets agile: a successful transition to agile development," *IEEE Software*, no. 3, pp. 36–42, 2005.

[13] D. Turk, R. France, and B. Rumpe, "Limitations of agile software processes," *arXiv preprint arXiv:1409.6600*, 2014.

[14] T. Dingsøyr and N. B. Moe, "Research challenges in large-scale agile software development," *ACM SIGSOFT Software Engineering Notes*, vol. 38, no. 5, pp. 38–39, 2013.

[15] D. Wilby, "Roadmap transformation: from obstacle to catalyst," in *Proc. of the Agile Conference, Nashville, USA*, 2009, pp. 229–234.

[16] K. Korhonen, "Evaluating the impact of an agile transformation: a longitudinal case study in a distributed context," *Software Quality Journal*, vol. 21, no. 4, pp. 599–624, 2013.

[17] V. Shah and A. Nies, "Agile with fragile large legacy applications," in *Proc. of the Agile Conference, Toronto, Canada*, 2008, pp. 490–495.

[18] M. Cristal, D. Wildt, and R. Prikladnicki, "Usage of scrum practices within a global company," in *Proc. of the Int'l Conference on Global Software Engineering, Bangalore, India*, 2008, pp. 222–226.

[19] R. Fontana, V. Meyer, S. Reinehr, and A. Malucelli, "Progressive outcomes: A framework for maturing in agile sw development," *Journal of Systems and Software*, vol. 102, pp. 88–108, 2015.