

Using an Agile Approach to Free the Organization from “R&D Paralysis”

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Abstract

This experience report describes how agile development methodology was used to sell a major R&D undertaking to a technology organization dominated by traditional waterfall projects. The report deals with the entire life cycle of the project, including the initial sales pitch, team setup and challenges related to introducing agile development and sustaining it throughout the project.

1. Background

OMX is a Swedish company that owns exchanges in the Nordic and Baltic region, and develops and provides technology and services to companies in the financial securities industry around the globe. Within the OMX group, OMX Technology provides software products and services to customers on the financial market worldwide. Revenues in the 400 MUSD-range and some 1500 employees make it a medium-large company by Nordic standards.

2. At the crossroads

In June 2004, OMX Technology had gone through some hard times; an offensive strategy with several acquisitions followed by a major downturn in the market for securities technology had forced the company through several rounds of restructuring and downsizing. In the business area focussing on front end trading applications, a new strategy had been formulated, including a major R&D effort to develop a new family of products that would replace several existing systems as well as open up new market segments. Pre-studies had gathered requirements and outlined the architecture for a suite of products that would cover needs ranging from very small up to major

brokers and investment banks. The problem was that pre-study results indicated a size of investment that would require approval from the company board of directors. It was clear that the price tag in combination with a projected time to market of 3-4 years (and an additional 1-2 years to reach a positive ROI) would make it next to impossible to get that approval. In addition, an extensive search for development partners had been carried out, but no partner was available that could help implement the strategy within an acceptable time frame. Senior management was faced with the tough decision of whether to invest, divest or even close down the operation, and there was an obvious risk that the organization would simply stay paralyzed and run out of time.

3. The sales pitch

Within parts of the development organization, agile development methods had been in use on small-scale customer projects since the year 2000. As experiences with this team had been very positive, discussions of whether to spread the use of agile methods to a bigger part of the organization had been ongoing for a while in the mid-management layer as well as within the development community. The mainstream project management in the company was very waterfall oriented, and reactions in these discussions had ranged from enthusiasm ("Sounds good! Let's do it!") to passive resistance ("Maybe, but not right now...") and downright hostility ("No, that will never work. We should implement RUP instead."). Senior management did not take part in these discussions, but did feel that the current processes weren't all that efficient and were asking for "renewal of the development factory".

In the spring of 2004, when learning about the R&D dilemma, some people within development decided to join the dark side and stage a classic sales pitch. The first (and easiest) part involved convincing the division development manager that the organization should run an experimental project that would prove/disprove some of the architectural assumptions as well as try out the use of agile methods in an R&D context. This was also something which could be mandated on a division level, without the need to involve the board of directors. 1600 man-hours and 4 months later, the team had created an embryonic trading application and had also gained experience (not all positive) of using agile methodology. By this time, the division development manager had also been convinced that agile development was indeed the way forward in order to accomplish the "renewal of the development

organization and processes” that had now been given to him as a personal goal by the division manager.

The next step of the sales pitch involved putting together a presentation for the division manager, where it was pointed out how current market trends and drivers identified development speed, flexibility and low cost of change as the critical success factors and that these were all addressed by agile methods. In addition, working in an iterative, agile manner would allow a step-wise investment approach that would minimize risk, make it possible to re-align plans along the way to fit with upcoming business opportunities as well as shorten time to market considerably. Also, it was all too easy to find examples showing that the current command-and-control style of project management could not promise the same benefits. The icing on the credibility cake was when one of the product management staff was going through material from his Gartner research subscription and stumbled upon a development "hype-cycle" diagram showing that agile development was indeed no longer something new and scary. Naturally, some time was also spent going through the basic principles of agility, although most emphasis was put on what business benefits agility would imply. The same material was also presented to development middle management, the developers as well as the project management office. The division manager probably didn't understand or buy into agile development 100% based on the presentation alone, but she definitely did like the business benefits we were promising. It became evident that we had reached a turning point when the slide with arguments against outsourcing the project to a 3rd party came up and was met with “Let's not go through this. I do agree that this is something we should do ourselves”. Most of all, she liked the way this approach would enable us to actually start doing real development work rather than continue discussing, writing reports and hunting for partners that could provide a silver bullet.

The concrete result of the sales pitch was that the original "sell everything to everyone" approach was replaced with a new short-term strategy where a smaller segment of the market would be addressed first. The goal was to go live with the first customer in a 12-18 month time frame and the product should be developed through the execution of two projects, where the conclusion of each project would act as a tollgate for further investment decisions. It was foreseen that the product strategy might have to change along the way, both because customers would come aboard and influence requirements, but also because the search for partners was still ongoing and could potentially lead to

integration issues. The first project was estimated to 3200 man-hours and would run between December 2004 and March 2005. If successful, it would be followed by a 5400 man-hour project running between April and November 2005. After that, a broader roll-out to increase market share as well start phasing out existing products was foreseen. However, no effort was made to provide any detailed planning at this stage.

At the initial steering group meeting, the scrum master briefly described the agile approach and the expected benefits. As the only comment from the business area manager was “Sounds like music to my ears”, it was clear that the sales pitch had been successful. Now, it was just a matter of delivering according to the expectations...

4. Team and stakeholders

Since the project was considered to be top priority, a certain degree of cherry-picking was possible when putting together the initial team. However, team selection was made more complex by constraints on availability due to ongoing delivery projects as well as a wish that the team should include competence in all the existing front office product areas. It was also not clear to what degree the testing, documentation and user experience departments should be involved in the project. In the end, six developers were chosen to form the core team and the team was given the option to request additional competencies on a per need basis. Of these six developers, three were extremely experienced developer/architects/gurus and three were senior developers. Two of the four were very experienced in the chosen technical environment, but all had some previous knowledge of it. All had very good domain knowledge. Only two of the team members had working knowledge of agile development even though all six were familiar with the basic concepts. The scrum master was an experienced development manager, well familiar with agile development concepts, but without any experience of hands-on agile project management.

A senior business analyst took on the role as product owner and a steering group was established consisting of the scrum master, the product owner, the business area manager/project sponsor, the business area development manager, the project office manager and a representative from sales.

5. Method

As mentioned earlier, agile methods had previously been used within the organization, albeit to a very limited extent. These projects had all been small,

consisting of 2-3 developers working with a methodology heavily inspired by XP, with major focus on Test Driven Development and continuous builds. In these projects the agile team had worked without a formal project manager or team leader, something which had been a cause of concern in the more traditional parts of the organization. However, these projects had also proven successful in terms of meeting deadlines and fulfilling customer expectations and this was one major reason why the team was allowed to try the agile approach on a slightly larger scale.

The experimental project had also been run on a very informal basis and although it had produced the desired results, not everyone was satisfied with the absence of structure on the project level. When planning the first "real" project it was agreed that a more structured approach would be required and Scrum was chosen as the project management framework. No one in the team had any previous experience of this method, but the main reasons for choosing it was the low threshold to get into it, its relative independence of what development practices you chose to employ and the fact that it had a proven track record. Within Scrum, the team adopted an XP-like approach with test driven development (TDD), collective code ownership and continuous builds. Pair programming was partly applied on a "semi-optional" basis. The team was seated together in a part of a huge open office area and also managed to seize an empty storage room which was furnished with network outlets, a phone and some extra whiteboards. It was then used for sprint planning meetings, daily scrums and technical discussions/design sessions. The decision was to have a truly self organizing team, with the scrum master acting as a facilitator and remover of impediments rather than being the decision maker. Scrum was applied pretty much by the book, with 30 calendar day iterations, sprint planning meetings at the beginning of each iteration and sprint reviews and retrospectives at the end.

6. Environment

The product was to be based on a .NET architecture and consequently, the development environment was based on Microsoft Visual Studio.NET. In addition open source tools such as NUnit, CruiseControl and SubVersion were used to provide a fully automated build and release environment. The only tools used within the team for project planning and control were whiteboards, the project Wiki and an Excel spreadsheet used by the product owner to document the product backlog. In the first half of the sprint planning session,

the selected backlog and the sprint goal would be written down on a whiteboard, and during the second half another whiteboard would be used for creating the iteration backlog with estimates. The scrum master also entered the information on the whiteboard into the Wiki, to keep the project history.

8. Challenges & Experiences

To avoid bickering about methodology - something which had been a bit of a problem in the experimental project - a mindset workshop was held with the team prior to starting the first iteration. The workshop dealt not only with the theory and application of agile methods in the project, but also discussed difficulties, doubts and fears about this way of working. In the end, the team reached a common understanding of the methodology that would be used in the project.

However, once the project was underway, it soon turned out that old habits die hard. This became especially evident in the case of TDD as design method versus more traditional upfront design and copy-paste reuse of old code chunks. Also, some team members struggled with writing test cases prior to writing the code. Dealing with this required a good deal of discussions as well as hands-on coaching by the team members that were experienced with TDD/XP. Also, the amount of mandatory pair-programming was increased to reduce this problem.

An interesting phenomenon was the "mid-sprint crisis" that occurred about half way through the first few sprints. The team members that were new to agile methods suddenly felt anxious that they were not progressing fast enough and actually asked for traditional and more formal follow-up on activity level. Every time the team was faced with this dilemma, it was discussed after the scrum meeting and the agreement was to wait a few more days to see how tasks progressed before taking any actions such as going back to the product owner to reduce scope. And every time, the sprint goal was met and the sprint review was successful. In retrospect, using a burn-down chart would probably have provided an effective cure for this disease...

After the first two sprints, the team was joined by a tester. This triggered discussions with the testing department who were used to traditional waterfall style projects and consequently wanted to start with defining a test strategy, writing test plans, test cases and other formal documentation. We made it clear that our method required a re-definition of the tester role, requiring a much closer cooperation between the tester and the developers and a minimalist approach towards

documentation. This challenge could probably have been overcome easier if a tester had been involved from day one.

The 30 calendar day iteration was considered to be just about the right length by development team and stakeholders alike. In the middle of the 2nd sprint, however, it was challenged by the sales department: they had a new lead that was considered really, really, *really* hot, but would require a major shift in direction of the development and work needed to start immediately. The scrum master brought the issue to the attention of the steering group and suggested that either the sprint would be finished according to plan (postponing the decision of whether to pursue the new lead to the next sprint planning meeting), or we should decide to execute an abnormal sprint termination. The response from the business area manager was: “Abnormal sprint termination? No, I don’t like the sound of that - the sales guys can wait for the next sprint planning.” And sure enough, before the end of the sprint the lead had cooled off considerably and the project had avoided a wild goose chase.

Despite the support from upper management to run the project with agile methods, the scrum master had to spend considerable time to satisfy the project office by producing traditional project status reporting on a monthly basis. Actually, after the first presentation of the project and the method to the project office staff, they decided that this project needed to be monitored more closely than a regular project, because it was deemed to be riskier than the average project (no “complete” activity list with “accurate” estimates, no Gantt charts etc...). This was a bit of a nuisance, but was a necessary trade-off to provide organizational leeway for the project. Also, much of the information for this reporting was readily available from the corporate time reporting system and the project Wiki. The bean counters in project office were happy to see that the project had very stable and predictable resource utilization. Needless to say, this didn’t pose too much of a problem as it is an inherent characteristic of any agile project. Even so, it was a welcome change for them not having to worry about cost overruns. In addition, they were surprised but pleased to see that the project continued to meet its monthly milestones. Of course, the more zealous “classic” project managers couldn’t believe it was possible to run a project without “complete” work breakdown structures and Gantt charts. On the other hand, they couldn’t really argue against the fact that deliverables were on time and within budget and that the project was all green lights on their otherwise mostly red and yellow project dashboard.

Continuous sales work throughout the course of the project, for instance reporting progress, highlighting successes and discussing lessons learned, was done for several reasons: it helped to ensure continued organizational support, it spread the word about agile development to other corners of the organization and it also reinforced people’s awareness and understanding of what agile is all about. One unexpected positive side effect was the buzz created in the large open office space (containing the entire development department of 100+ people) from the demo held in conjunction with the Sprint reviews. The mere fact that a bunch of people, including managers, gathered around the desk of one of the developers and commented on the sprint result gave the project a lot of unofficial PR and increased credibility in the organization.

The ongoing sales effort also included tasks like reminding the project owner of the features and benefits of agile development projects. When he suggested things like “Maybe we should include a database in the platform now since we’re likely to need it within a year”, he had to be gently nudged back onto the right train of thought: “No, because with an agile test driven approach, the cost of change won’t be prohibitive even if we wait 9 more months with adding a database. On the contrary, including a database will add unnecessary complexity at this stage”. A defining moment was overhearing the product owner a few weeks later, using the same arguments in a discussion with his boss.

However, the most powerful of all selling points was that the project really lived by the agile principle of “working code is the primary measure of progress”. As a scrum master, it was a tremendous advantage to wrap up a status presentation to the steering group or the project office with a casual “let’s see what the application looks like today” and just fire it up on the projector screen. This tool was successfully used by the scrum master and the product owner on numerous occasions, in formal meetings as well as in informal discussions in the office space.

9. Results

The first 3200 hour project was completed as planned and resulted in a trading application that was not ready to deploy in a live environment, but was something that the product owner felt was more than good enough to start showing to potential customers. Actually, this provided yet another powerful argument in the continuous internal sales and marketing campaign for agile methodology. After spending less than 5000 hours (the experimental project + the first

“real” project), the project had produced an actual application that people could see, use and have opinions about. By contrast, in another part of the OMX organization, a similar R&D effort had used nearly four times as many hours, and had produced loads of documentation and PowerPoint slides, but no actual code (except for a pilot version of a piece of the new infrastructure).

The first customer of the product went live successfully in November 2005, less than a year after the start date of the first phase of the project and well within the 12-18 month time frame stipulated by the project sponsors. The project had encountered several major changes along the way, including re-alignment of the product strategy, transfer of the entire team to Orc Software (an OMX subsidiary), major changes in requirements, as well as changes of scrum master, product owner and addition and removal of team members. Some overtime had been required, but none of the heroic 24x7-style efforts usually experienced in earlier projects within the OMX organization.

10. Conclusions

Selling agile to the organization is best done bottom-up rather than top down; start small, be patient and try to build on success stories. In this case, the agile approach helped “un-freeze” the organization, making it possible for upper management to actually get started with a major R&D initiative rather than go through a tough and lengthy decision process. The sales effort is not one-time; it needs to run continuously in parallel to the actual project and on all levels of the organization.

Somewhat surprisingly, it proved easier to sell agile to higher management than to middle management and

many of the developers. While higher management was quite enthusiastic about the possibilities to change their minds down the road, middle management seemed wary of the apparent loss of control. To some developers, the notion of TDD and just-in-time minimalist design was very hard to grasp or even accept.

Of all the selling points, the most efficient one proved to be the ability to show working software at an early stage and continuously throughout the project.

As the project unfolded, the feasibility of the TDD approach to enable a fast paced development and low cost of change was proven several times over. Using TDD as design method works well to make sure that the project and product stays agile, but is also hard to implement as some developers consider it counter-intuitive.

Building an agile team from scratch is a non-trivial task and success is neither automatic nor quick. Expect people to fall back into old habits and to occasionally experience anxiety and second thoughts.

11. Epilogue

The product is still being developed using Scrum and as of April 2006, negotiations with a major customer are in progress for a big contract that will (if signed) ensure a positive ROI for the product.

Also, the success of this project led to the adoption of Scrum in other parts of the OMX Technology organization and much to the delight of the author, some of the most die hard sceptics of agile methodologies are now found among the advocates and practitioners of Scrum.