A Warehouse Management System (WMS) Implementation for the Fashion Industry

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Introduction

The logistics industry is very large and contributes to a sizable amount of the world's GDP. It is also an essential component for goods exchange within and between countries. However, it is quite disparate, consisting of a multiplicity of actors of considerably different sizes and different levels of professionalism. The 10 largest freight forwarding organizations control only 45% of the market[1] and have embraced Agile ways of working only on an ad-hoc or partial basis. Logistics processes are still predominantly manual and although progress has been made, automation and integration are still lagging. This has led in some parts to the emergence of e-Logistics startups which have set out to change this industry by "digitalizing" the supply chain. Who, between the traditional logistics and e-logistics actors, will remain dominant in coming years has yet to be seen. Agility, specifically Scrum, will almost certainly play a role.

The case presented here not only demonstrates that it is possible to use Scrum in logistics, but that it can also be done with a high level of efficiency and yield great results. This case also demonstrates that Scrum can be applied to both product development and projects.

The Business

The context is seen from a Logistics Service Provider (LSP) which offers comprehensive logistics services to its clients. These include local and international transportation, warehousing activities, consolidation activities, quality control, and customs brokerage.

The customer was a premium Italian fashion company specializing in several lines for women including clothes, blue denim collection, shoes, accessories, luxury collections, beachwear, underwear, a leisurewear sport collection, and kids wear.

The concerned business was a warehousing distributor serving both Italy and European markets, with inbound flows (production companies) coming from China and Turkey. The LSP was already responsible for quality control, consolidation, and international transport of goods from China and Turkey to Italy. With this new awarded business in the European market, the LSP was extending the management of the supply chain to the distribution of goods to the European retail shops as well as business-to-customer (B2C).

To support this new operation, the LSP required a Warehouse Management System (WMS) to handle the flows of goods within and outside the warehouse as well as multiple interfacing capabilities with its customers (i.e. Electronic Data Interchanges (EDI)). The project timelines were fixed at 8 months and non-negotiable. Pushing the deadlines even by a week would have meant missing a fashion's season which was not an option for either party.

Traditionally, the LSP would come forward with proposals on how to handle the various flows. Within this process, customer requirements were considered. However, in this instance, the customer wanted to have a say on how the flows would be organized within the warehouse in

[1] https://hub.controlpay.com/controlpay-scm-logistics-en/ff

addition to having specific and numerous electronic data interchange (EDI) messages to handle at various points in time.

The Product

The product that the LSP used to support this project was based on the versatile WMS: JDA Warehouse Management (JDA WM), formerly known as Red Prairie Discrete. This application comes with endless possibilities of configuration, customization and development such as the design of your own screens (Desktop GUI, web based, Radio Frequency (RF) screens, etc.), processes, triggers, EDI messages, and workflows. The possibilities offered by JDA WM ensure that one can build its own tools within this application (i.e. billing module creation).

All development done by the team used the proprietary JDA MOCA (programming language), apart from Java, which was used for radiofrequency (RF) screen customizations. Code was checked in, unit tested, and integrated with the existing increments in the form of packages which were deployed automatically via scripts into a four-tiered environment: Development, Test, QA and Production.

The technical tools for the development pipeline were Apache Subversion (SVN), Tortoise and JIRA software, among others.

The Team

At the start, the development team was comprised of four fully allocated members without any previous Scrum or Agile experience. The regional WMS manager in charge of the team had previously implemented Scrum in other teams with positive results. The team was later increased by adding two more developers. The team was of international composure with Dutch, Indian, German and Italian nationals residing in various European cities.

Challenges

The challenges of this project were many. Among the most important were:

Financial penalty for non-working system

To ensure that maximum attention and dedication was exerted by the LSP on this project, a €1 million clause penalty was inserted in the contract and was to be paid in case the system delivered was a non-conforming system as “per specifications.” Those requirements were to be inserted as an addendum to the contract.

Unclear and evolving requirements

The requirements expressed during the project were all written in Italian, recorded in a contract addendum as time passed, and were subjected to several changes except for well-defined interfaces. The requirements had to be translated in some parts into English to make intentions and details understood by the entire team. Naturally, not everything was or could be expressed

in written form and some written statements were ambiguous, which put the LSP in a dangerous financial situation.

Language constraint

The customer engagement was extremely difficult due to a simple yet major constraint: language. The customer was speaking Italian with very little knowledge of English. The development team itself had only one person who spoke Italian with a very limited understanding.

Interfaces and external dependencies

The number of electronic interfaces for this project was more than double the average WMS solution's size (15 instead of six). To make the matter more difficult, those interfaces were to be developed by a member sitting outside of the development team, creating a critical dependency.

Business Acceptance

The regional executive team who was overseeing this project had never heard nor seen any teams practicing Agile or Scrum. Statements like "we have to be more agile in our way of dealing with customers" were common but without any practical understanding behind them.

Traditional way of working

The team was mature for some parts in the usage of JDA WM but was still accustomed to the old way of working. This looked like one project manager developing a schedule plan, overseeing the tasks, reporting statuses to management, and being the interface between the team and managers/customers. The mindset had to change with the development team taking ownership for their actions.

No co-location

At the start of the project, the team members were in four different countries (Switzerland, Netherlands, Germany, and Italy). This was not an ideal situation as it made communication more difficult and less effective.

Team composition and allocation

The team composition changed during the project as individuals had to be reallocated for a variety of reasons. Most commonly, these included supporting logistics colleagues on new business opportunities or assisting to resolve complex incidents for operations. Other than two to three core members, the focus factor of individuals on this project varied greatly.

Hard deadlines

There were two hard deadlines:

- **The start of the business** had to be 1st of October, as this was when the new fashion's season was starting. Missing this date was not an option.
- Having **all EDI interfaces ready** by early July. Past this date, the customers' team members were on long holidays (July/August being holiday season in Italy) and not available to test or answer technical questions.

No physical warehouse

The contract was signed with the idea of having a dedicated warehouse and operational team ready for this new operation just one month before the starting date. This decision was putting a lot of components at risk. It raised questions such as how the company would ensure that there would be a working software supporting operations if neither of those operations nor physical warehouse are available.

Finally, this was the biggest European logistics project in this LSP's history. Given that a US project with very similar components had taken four times the budgeted amount, overpassed deadlines, and required a small army of external consultants to complete just two years before, a new way of working was required.

And it had to be Scrum! But...why?

Why Scrum?

Many of this project's challenges were what made it so fit to enter in the iterative, incremental and continuous improvement process that is Scrum.

First, the requirements were unclear and fuzzy, left to several interpretations and written in a foreign language. Not everything could be clearly expressed but it had to work and properly support operations and the customer (think "working system"). We had to quickly build something to see if it worked and fit the needs and requirements of the customer.

There was also no certainty that the originally assembled team would be able to absorb the required work, but those hard deadlines had to be met no matter what (think "how much to do" versus "productivity of the team"). With Scrum and story points, we could track the productivity of the team. By reviewing and estimating the backlog regularly, we were able to see if we were on track.

Finally, the team was looking to develop and complete this project without surging hours, which characterize many of the projects in the logistics industry (think "sustainable pace" and "product quality").

Success factors

Besides the development team members themselves, the following are key factors which greatly supported the team moving to Scrum:

- **A supportive manager**
  The manager who suggested and supported the introduction of Scrum within the team had implemented it successfully within the Corporate WMS team. This resulted in a high performing team developing innovative solutions such as customizable WMS templates, reducing customer average implementation times by two months.

- **Corporate team and toolchain with Agile in mind**
  The Corporate WMS team who was supporting the regional WMS implementation teams was accustomed to Scrum and was developing and sustaining a toolchain which supported Agile development.

- **A dedicated Product Owner (PO)**
  This was the hardest sell and the biggest win that there was for the development team: convincing the regional logistics executives that the team would not be able to make any progress without a dedicated product owner. This was achieved through a tough negotiation tactic from its manager to the executives: without a dedicated PO, the development team would not be able to commit on the deadlines nor quality of deliverables for this project.

Progress and Successes

The LSP took the following steps to overcome the various challenges of this project.

Creating awareness

To start with, every team member was trained on the fundamental Scrum elements (events, roles and artifacts). This was done at the very start of the project. Due to budget and time constraints, only half of a day was dedicated to training, but we ensured that continuing education was not forgotten in this project.

Creating visibility, inspect and adapt

Once the team has been trained and the product backlog created, it was important to make progress visible to our stakeholders. This was done via Sprint Reviews where the logistics stakeholders could review the increment and provide feedback which would later be added to the backlog. Virtual Kanban boards were also in place through JIRA.

Taking ownership

By conducting the Daily Scrum, we ensured that progress of items was made visible and that the development team would take ownership of the items and start acting as a team.

Working as a Scrum team

The team had to work as one with the completion of the Sprint goals in mind instead of being driven by the completion of individual tasks. The mindset changed from “my tasks versus your tasks” to “our tasks.” It took a couple of Sprints to understand how teams would progress towards the Sprint goal but once it settled, we had members giving a helping hand to each other without a second thought. A good example was the testing period when the most experienced member went sick, and the other members seamlessly replaced him with a high level of motivation.

From I-shaped skills to T-shaped skills

JDA WM is a comprehensive software requiring several specialists to make full use of it. In a typical JDA project, role segmentation such as project manager, functional consultants, techno

functional consultants, and developers are common. As soon as individuals in the team started to work as one instead of being segmented by their role, knowledge sharing began to occur. Individuals such as our business analyst would get involved in configuration and testing and warehouse functional consultants started to get involved in the development of EDI messages. With deliberate effort, the team only became more multifunctional as time went on.

A strong Product Owner

This project had a knowledgeable Product Owner who spent a considerable amount of time with the customer and the developers to elicit requirements and validate the backlog items' completion. An Italian native, the Product Owner was a key interface between the customer and the development team.

Sizing the backlog to commit

Three months after the start of the project, and due to contract signature, the request came to commit to the deadline. By that time, the requirements had formed and had been expressed as product backlog items (PBIs). A backlog refinement session took place to size the non-estimated PBIs. There were over 840 points to complete, but the historical velocity was showing clearly that only a 440-point goal was achievable. Based on this review, a request was placed for an additional team member in addition to a few product backlog item change proposals. All proposals were accepted.

Value of certification

To foster continuous improvement and ensure that Scrum values were lived and exhibited, a motivated member of the team was properly trained and certified and acted as a Scrum Master for the team. They ensured that the events took place with efficiency and effectiveness and that they were time boxed. They also ensured that all necessary actions were taken after retrospectives.

Co-location

The most notable progress during this project was made when the Product Owner and development team had an opportunity to meet in person and on-site. This was in Eindhoven (Netherlands) at first, while most of the developers were in Milan, Italy later on. Several of those on-site meetings had to be organized in way that ensured significant progress would take place. When meeting in person was not possible, phone calls, video conferences, and text messaging were used on a regular basis.

Include external elements within the Scrum team

While working as a Scrum team is an extremely efficient method for delivering value, being dependent on externals teams that are not Agile is not. The strongest dependency was on an EDI developer which was not part of the team. After intense discussions between the regional WMS manager and the EDI resource manager, the EDI developer was included in the development team, which made processes much more efficient.

Catering for variations

Scrum is optimal when the team composition does not change and team members are fully allocated to the product development. In this case, team members were both added and removed or re-assigned during the project. The estimated percent of allocation of each team member (focus factor) was estimated at the beginning of every Sprint to properly calculate the capacity for that given Sprint. This considered holidays.

Example: The team has a historical velocity of 50 points per one week Sprint. The next Sprint contains a public holiday, the focus factor of each team is only 80% and the capacity for the Sprint would be 40 points (50*0.8).

To have a proper baseline due to the focus factor, we referred to an extrapolated capacity of five full time employees (FTE) working at 100% allocation in addition to the actual number of points done by the team.

Dry runs in the office

No warehouse space or operations were available to test whether the system would work under actual conditions until one month before going live. To remedy this issue, some office space was used as a fictional warehouse complete with mock cartons, labels and merchandises used to simulate actual conditions, with the Product Owner acting as a warehouse operator.

Breakdown of features and stories

As the system required to support the operations was huge and complex, the necessary items were broken down into several components. Among them where:

- Configured system
- Interfaces
- DDAs (new screens)
- Reports
- Labels
- User Devices
- Triggers

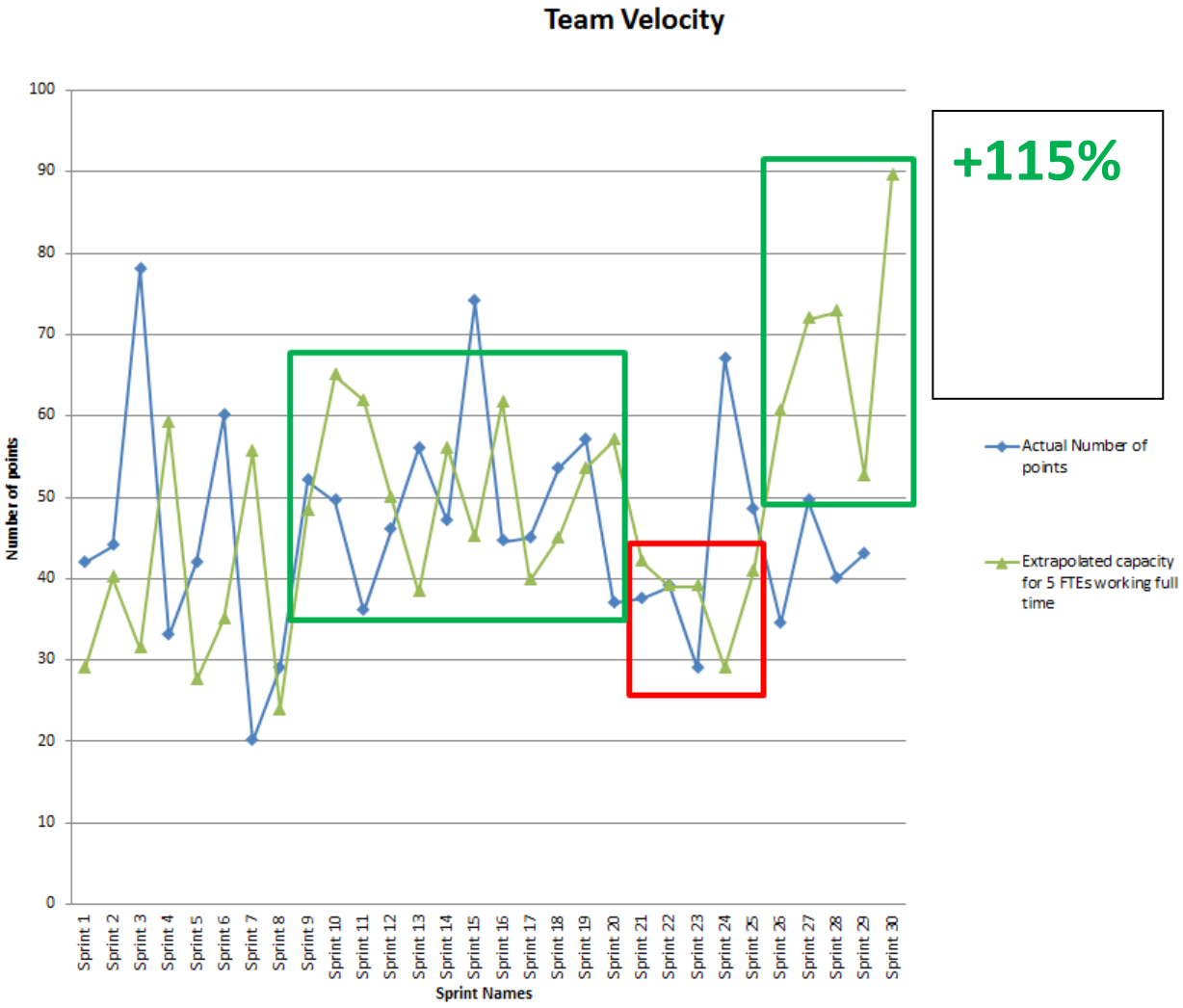
The related epics and stories could be found under each of these components. The components were placed on a graphic board which enabled quick identification of which components and epics were completed and displayed the real-time progress of the team.

Continuous improvement

Throughout the project, the team never missed going through retrospectives, thanks to their Scrum Master. This ensured that elements of bad Scrum were discussed and acted upon in a timely manner. The elements ranged from very simple (e.g. individuals not coming on time) to more complex (e.g. improving the deployment steps).

Metrics

The velocity for the duration of the complete project (30 Sprints) is illustrated below.



<u>Key takeaways</u>:

- An overall positive trend: despite some fluctuation between Sprints, the productivity of the team is increasing.
- Time during which the team was performing reasonably well, indicated by the green areas.
- The impact of holidays: the red indicates a time that the customer was on holiday. The team was unfortunately not able to complete stories due to lack of feedback even with the Product Owner present.

Overall, the productivity increase between the first three Sprints and the last three Sprints is of 115% for a team of five FTEs.

The productivity gains could have been greater, but the changing work allocation of some team members induced context switching, which limited performance.

The best Sprint results were always achieved when team members were co-located and 100% allocated to the Sprints.

Conclusion

Scrum can make the seemingly impossible possible. Thanks to empiricism, Scrum creates a reasonable amount of certainty and predictability in the uncertain and complex world of product development. Without a doubt, this logistics project would have utterly failed should the traditional project software development phases been strictly adhered to. The timelines for a project of this size were quite strict without any place for rework or changes in a waterfall process. Scrum ensured that we had a working, tested and validated software at the end of every Sprint and enabled us to continuously reflect on our progress and brainstorm possible improvements.

Naturally, not all the aspects of this project were approached perfectly – Scrum is after all, simple to understand but difficult to master, but Scrum is what made this project a success. The project was completed on time, on budget and to the customer's satisfaction. After this project, the regional WMS manager went on to a different department and assisted development teams in scaling Scrum. At this moment, over 50% of the development teams in the LSP organization have adopted Scrum and/or other Agile methodologies (Kanban, XP) thanks to earlier successes in the organization.