

Aligning Strategic Planning with Agile Development: Extending Agile Thinking to Business Improvement

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Abstract

Many development teams have successfully used Agile Development to build quality software, but often these projects have failed to effectively contribute to overall company success. Our feeling is that this failure is due to the fact that most companies' strategic planning processes have not been aligned to take advantage of the flexibility and adaptability of Agile Development.

We strongly believe in the power of Agile Development; however we feel that this alone is insufficient to make every software project successful. Projects must be coupled with a complimentary approach to strategy to in order to achieve the overall business goals. If Agile Development is to continue growing in the business community, complimentary strategic planning capabilities must be developed that share the same agile philosophies.

1. Introduction

Cyrus Innovation is a consulting group in New York City specializing in agile software development, usability design and operational consulting. It is our belief that during software development projects, we as developers tend to forget that we are creating a system for other people to use, and specifically, that not all business problems can be solved by building software faster with fewer bugs.

Agile philosophies believe that anything can happen on a project, so planning for change and postponing decisions will tend to benefit the

project on a whole [1]. So what happens when the software team can handle the change, but the business it is supporting can't?

To handle this situation, we extend the philosophies of Agile Development and merge them with systems thinking and holistic design aspects from other operations and management methodologies in order to create a more holistic solution. When we take this approach, interesting things happen during the development process that would not have been foreseen at the start, and would not have been noticed if we had only practiced agile techniques.

The following is an account of one particular experience in which we extended our purview to more than just software development.

2. Situation

One of our customers—a restaurant chain with 25 retail stores in Manhattan and a centralized kitchen facility in Long Island City, Queens (5 minute drive to Manhattan) —needed to improve aspects of their operations that were breaking due to their rapid growth. Their main objective was reducing operating expenses by cutting down on the food product wasted each day. The director of operations calculated that he could save approximately \$200,000/year in food costs for every 1% in waste reduction. He hoped the new ordering system could reduce waste by up to 15%.

Our client's primary goal was to have his stores and central kitchen cut down on the amount of food wasted from overproduction due to

inaccurate ordering by improving the ordering system. His idea was to have the store managers improve their ordering accuracy so that the kitchen would not over produce as much. To do this, he wanted to move from their fax-based system to a web-based ordering system that would capture the daily orders, store inventory and end of day waste levels in all his locations.

Based on this, we began building a simple ordering system using our XP/Agile-based process.

3. Focusing on meeting project Goals

“...we realized that the feature set we had collected, if built into a functioning system, would not actually deliver much value to their business.”

In a typical agile development project, our first step would be to meet with our client (or XP Customer) and capture the features (stories) that they are interested in building. This would be followed by estimation and prioritization in an XP planning game.

During an initial meeting with our client, we discussed the features that they wanted to build and which ones were of the highest priority. Since their goals were to reduce the food product waste, they wanted to know how much food they were actually wasting. The stories were:

Table 1: Initial stories
Waste tracking form is available to store managers to track their daily inventory levels
Operations manager can see how much a store manager is over ordering each day
Operations can see reports by product type
Store managers would see report showing them how much they were over ordering on a daily basis
Operations manager can download CSV files of ordering history

After this initial session, we realized that the feature set we had collected, if built into a functioning system, would not actually deliver

much value to their business. We realized that waste tracking alone was not useful because we didn't know how much inventory was present to begin with.

Consequently, we took a moment to quickly analyze the operational environment in which the system would be used. Our analysis focused on the sequence of steps in the operations and how each one of those steps contributed business value for our client. The result was a map of the value stream through the company, starting with product sales, moving to ordering more products to replenish inventories, to producing more products and finally to delivering the product back to the store.

With this model, we then sat down with our client and decided to do a second planning game. The time focused on how we need to do to this flow to improve it ability to generate business value. The stories became:

Table 2: Revised stories (after value flow analysis)
Waste tracking form is available to store managers to track their daily inventory levels
Commissary can see aggregated totals for daily soup order
Commissary can print packing slips per store for soups
Commissary can print delivery invoices per store for soups
Store manager can record the amount of left over soup each day

Upon completion of this cycle, our client had a system that was not only a completely working system, as XP requires, but also added the value that an agile business requires [2]. In this case our customer had more than a high quality software product; they had a system that clearly and effectively delivered business value. If they decided to change their overall priorities and focus on a different part of his company, then this system would still be of value to his operations.

4. Temptation to Tamper

“We created temptation to tamper – the owner wanted to make new policy decisions without knowing if the ordering process was stable.”

During the second iteration of the project, we encountered a situation that we now recognize to be a tell-tale sign of an operation that is not focused on throughput but rather on local optimization.

Their current ordering process dictates that store managers place their orders to the kitchen by 4pm. However, the 4pm deadline does not give the kitchen enough time to prepare all the food for the next day, so they actually begin food production at 10am. As a result, the kitchen regularly overproduces by as much as 20% in order to account for variations in store orders.

The problem for the store managers is that they don't know until 4pm how much they have sold for a given day, which they use as the best indicator for what they will sell tomorrow. Based on their current production processes, no amount of juggling and prep-work on the kitchen's part will eliminate this problem. Although we considered using just-in-time methods or smaller, distributed kitchens, this solution was not possible at this point.

Believing that he had control of the ordering process and wanting to reduce waste in the commissary, our client asked us to build him a feature that will lock all the store managers out of the system by 11am; in effect forcing them to place their orders before they know what they actually need. We were actually sitting with him at the commissary talking with the kitchen manager when he stated, “A ha! I can now force all the managers to have their orders placed by noon!”

Concerned that this was only going to force the store managers to over-order to manage the variation in sales, we decided to approach a colleague, Dr. Georgantzas at Fordham University, professor of business policy and system dynamics, for help on how address this situation. Our discussion with him lead us to realize that in order to solve the timing of order placement problem, we needed to understand the various factors that were causing variation and develop an systemic approach for making improvements to the process.

Dr. Georgantzas explained to us that the first thing we needed to identify was what data to we should capture with the new system. He worked with us to create a preliminary model of the flow of inventory through the system which identified various points at which information could be collected.

His recommendation to us was that we should first find out where the waste is occurring before we try to reduce it. Currently, our client's operation demands that the commissary over produce by 20% in order to handle the variations in store orders. If we force the store managers to place the orders earlier in the day so that the commissary doesn't produce as much food, we could very well be forcing the managers themselves to over order and thus causing the waste to occur at a different point in the process.

Our experience with modeling the business process made us realize that initial system features should not in fact automate business policies. In our case, the decision-making should stay with the store and kitchen managers themselves [3]. The effect of moving the order submission time would not reduce the amount of waste that the system produced; it would only shift the waste from the commissary to the stores themselves. Worse yet, by forcing the store managers to submit their orders early, the managers might order less than they would have been able to sell, thereby losing sales

We learned that a feature which enables a ‘blind’ blanket policy decision will not improve the system nor will it help the company reduce waste.

5. System Dynamics

“...the entire system was dependent on knowing what the actual demand would be on a given day.”

After the initial system was in place and being used by the store managers, we met with our client to decide what area of the system we should add on to next.

We discussed with him several features, such as decision making support for store managers and centralized ordering. However, each time we began to look into the details of what the system

would do, we discovered that there were too many variables at work in his business to be able to prioritize what features were most important.

We discovered that at the outset of a planning session, our client often assumed he knew all the details of the operations, but when we get into specific feature design and development we found that in fact he didn't understand the dynamic complexity of his logistical problems.

Seeking expert advice, we worked with Dr. Georgantzas to develop a system dynamics model¹ in order to understand in more depth the movement of inventory through the system as well as customer demand. We identified the influences and interactions of the participants (store managers, commissary manager and operations manager) as well as the customers who buy the products. We quickly realized that the entire system was dependent on knowing what the demand would be on a given day. However, since it is very expensive to capture customer preferences and difficult to understand purchasing decisions in the store without disrupting their normal behavior, the solution was to capture key pieces of data from the current system in order to understand how the various factors involved affected each other.

With this realization, we were able to create features in the order management system that would collect specific information at specific times. Consequently, when we met with our client, we used the need to capture data for modeling demand as the method for determining which features were of the highest priority.

We are now using the data collected from these features to run various scenarios through the dynamics model and will test which ones match historical data most accurately. The results of which we will use to determine which subsequent features will be of the greatest business benefit to our client.

In my experience, most customers have many ideas about the features they want to implement based on a vision for what is best for their company. However, due to the nature of dynamic complexity of business situations, it is extremely difficult to gauge which features will truly be effective in the long run, and sometimes even in the short run. By testing different scenarios through a system dynamics model, it is possible to gain a better understanding of which features

will improve the system and hence the overall business.

6. Experience Reflections

It is necessary to have a systematic way to judge which features will be more beneficial to a development process. Traditional business analysis techniques are insufficient because not only do they not take into account how systems change over time, they are in fact quite resistant to change. Consequently, Agile Development processes cannot rely on these traditional techniques and must search for other more compatible techniques like systems dynamics.

During this project, we used two different mechanisms for prioritizing features, and plan on using a third. For the first mechanism, we used a flow based analysis in order to determine how to add value to our clients operation as soon as possible. For the second, we used the need to understand the dynamics of the operation to prioritize features. The third mechanism, which will be employed when data capture has been completed, will be to run scenarios through the models to identify which features will be of the most value for the least cost for our client.

The XP customer will tend to drive development without regard to how features impact the business system from a throughput perspective. As described by Dr. Porter in *Competitive Strategy*, "Left to its own devices, each functional department will inevitably pursue approaches dictated by its professional orientation and the incentives of those in charge. However, the sum of these departmental approaches rarely equals the best strategy [4]." This tendency can lead to local optimization of a particular area of a business system, resulting in a very limited ability to make sustainable holistic improvement.

In Lean Thinking, there is the idea that efficiently delivering a product that nobody needs is still waste [5]. This is the situation that is currently facing many XP development teams. If business managers do not adopt analytic techniques that are more synergistic with XP, the developers themselves simply become a local optimization of the software development process. As a result, XP by itself cannot drive overall system improvement and thus by itself cannot make a company sustainable.

Several existing techniques have been used in recent years to improve business throughput, including Lean Thinking and the Theory of Constraints [6]. However, system dynamics offers a powerful way to make predictions about what parts of a system need improvement. The combinations of these methods for systems analysis and Agile Development offer an incredible opportunity for business improvement.

7. Acknowledgements

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8. References

[1] See Chapter 18 of *Agile Management for Software Engineering* by David J. Anderson (Prentice Hall, 2004) for a discussion of the business benefits of agile methods.

[2] One of the rules of Lean Thinking is to empower workers to make their own decisions

[3] As described on systemdynamics.org, “System dynamics is a methodology for studying and managing complex feedback systems, such as one finds in business and other social systems.”

[4] *Competitive Strategy*, Michael Porter, Free Press 1980

[5] Described in *Lean Thinking*, Womack and Jones, Free Press 1996,2003

[6] Described in *The Goal*, Goldratt and Cox, North River Press 1992
