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Case Study: Fostering Meaningful Change with the Large Format Printer Division at HP

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Abstract

Sustaining meaningful, strategic change in any organization can be difficult, particularly when there are strong personalities and established practices in place. Most initiatives are either too broad in their changes, or fail to address the needs of participants.

Within the Large Format Printer Division at Hewlett-Packard in Barcelona, despite some of the strongest front-end analysis practices in the industry, projects continued to face delivery challenges similar to those in many other companies.

Management decided to take action and revert the trend in declining product development efficiency. The authors collaborated with the specific intent to provide lasting and meaningful change for the group.

Through a series of interview sessions with all of the key people in the team, we collected a wide range of different perspectives: current practices, pain points, and suggestions for improvement.

As the stories were collected, a broader picture began to emerge. This was a strong, disciplined engineering culture, with strong elements of practice in place that needed to be reinforced and leveraged for the needed improvements.

Rather than making recommendations that could easily be dismissed, we focused on collaborating with the teams to help them find a solution they could embrace. The resulting solution required more of a change in perception than behavior.

In deployment, we worked with management, marketing and engineering to help them understand the value of change in their terms, and the energy of the group grew quickly. As the information sessions progressed, there was greater demand for participation.

We describe the initial situation within the group, and the approach to selecting and implementing appropriate changes. We will reveal the deceptively simple viewpoint that was the core of the changes, the effect on the culture and project results that have taken place since.

Biographies

Jim Brosseau

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Jim has been in the software industry since 1980, in a variety of roles and responsibilities. He has worked in the QA role, and has acted as team lead, project manager, and director. Jim has wide experience project management, software estimation, quality assurance and testing, peer reviews, and requirements management. He has provided training and mentoring in all these areas, both publicly and onsite, with clients on three continents.

He has published numerous technical articles, and has presented at major conferences and local professional associations. Addison-Wesley Professional published his first book, **Software Teamwork: Taking Ownership for Success**, in 2007. Jim lives with his wife and two children in Vancouver.

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Natural from Barcelona, Spain, Carolina has been in the technology industry since 1992, first in medical devices and later in the printing industry. She has worked in new product development as development and as QA engineer; she has also acted as team lead, and initiative manager for international and multidisciplinary projects.

As a matter of fact Carolina speaks fluently 6 languages.

Carolina has recently relocated with HP to the USA to broaden her experience in Program management for new product development in the printing industry.

Carolina lives with her husband and 4 children in San Diego, California.

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Sustaining meaningful, strategic change in any organization can be difficult, particularly when there are strong personalities and established practices in place. Most initiatives are either too broad in their changes, or fail to address the needs of participants.

Within the Large Format Printer Division at Hewlett-Packard in Barcelona, despite some of the strongest front-end analysis practices in the industry, projects continued to face delivery challenges similar to those in many other companies.

This case study is presented from two perspectives: inside the business (Carolina) and outside, from an external consultant's viewpoint (Jim). We go back and forth between the inside and outside perspective, chronologically through the engagement. Both perspectives help us understand the complete picture, and we will see that only when the perspectives are brought together in a team environment do we see the complete value of the engagement.

Outside Perspective: Overall Industry Context

Change is tough on anyone. We'll fight tooth and nail to avoid change, even if our current situation is untenable. Dealing with this human barrier is the key to driving effective change.

As consultants, there is the old story that we can identify the top three issues that clients face before we even talk to them. First, they will have challenges around how they define and manage the scope of what they want to build. Secondly, because of this first challenge, they will have deficiencies in estimation and planning, and many schedules are driven primarily by time constraints than any credible understanding of how long it will take. Thirdly, because of the first two, the teams will not have the infrastructure for effective change management.

That's the easy part. The tough part is to understand how each of these three issues manifests themselves for each client. While many organizations are finding value in adopting agile approaches, they are acknowledging these challenges and addressing them by embracing a dynamic environment.

For some organizations and some products, though, there is an opportunity to perform a deep analysis of the customer problem up front, and use this as a basis for developing a product. This turned out to be one of those places.

Inside Perspective: The Existing Situation

The balance is easy to break and difficult to keep. The balance in a mature organization is essential to most of its members. Break it and you will be in trouble.

Changing an organization and not impacting that balance was something that worried both the management and myself (Carolina).

Before this initiative, engineers would attend meetings to try to catch up with overall project information and more specifically with the customer requirements that they had to deliver. That was easy as long as they only reported to a small or medium project, as the engineers were able to manage and filter all information about the whole project.

When the projects grew in complexity and number, for efficiency sake engineers became horizontal (delivering the same piece to different programs). They also felt more pressure for multiple and more rhythmic deliveries.

Program synchronization among the members became unmanageable as there were too many people needed in a room. Many of them had the sense of wasting their time.

Engineering teams began to be more complex, with more layers of hierarchy. We worked in a matrix model, assigning each engineer one program for primary responsibility, but also being the owner of deliverables for different programs.

What began to happen is that many requirements were discussed without enough criteria because the owner was not present.

Extra management layers were added and then engineers were diluted in the organization. Their access to reliable information was heavily reduced and the "theoretical" information channel was not working well.

The communication skills did not grow at the same pace as the organization and what happened is that there was missing information all over the place.

Nothing gets engineers more nervous than being out in the dark. And that began to happen a lot.

Outside Perspective: History With The Team, and Why Go Back?

I (Jim) originally worked with this Division in Barcelona several years earlier, with what can be called drive-by training. Back then, two jam-packed days of bullets of information hit the group, but nothing really came of the engagement. There was no opportunity to facilitate effective change of any kind. Combine this with the long flights over to Europe and back, and the time away from the family and I quickly decided that this sort of engagement wasn't all that rewarding for me.

The same group called over a year later. They were now really interested in change. They had found an internal champion and a budget, and asked if I was interested in pitching in. Despite the past experience where I had sworn it just wasn't worth the effort, I now jumped in with both feet.

One of the first things I look for with clients is the team dynamics. If we consciously understand the rules that govern our actions as well as those of our peers, we have harnessed a very powerful tool.

As with many large groups in this industry, this group demonstrated a wide variety of situations and responses. A diverse group will always bring a number of different players to the table, and it can be fascinating to step back and watch the moves the players make.

This particular group was dominated by what one could call a pack of alpha males: very bright and competent, and also very adept at working the system to help them achieve their goals. They had advanced within this system through leveraging influence, exhibiting behaviors that demonstrated their superiority, and at times maneuvering craftily through the political landscape. They leveraged their deep technical knowledge, but this was not their strong differentiating trait. They understood the game being played, played it well, and thrived in their environment. They played to win.

There were others that saw the game for what it was and chose not to get caught up in the machinations. They had found their niche, their comfort zone where they could gain satisfaction from a job well done despite the game going on about them. They were not as deeply impacted by their environment, and could perform well in a wide variety of different games – while they may not have come out as the dominant winner, they were also less likely to suffer deep losses. Consciously or not, they behaved in a manner that supported both themselves and others.

Finally, there were those that were frustrated by the games. They were often overwhelmed by the strong players, sometimes to the point of having to leave the game altogether, through choice or through exhaustion.

We clearly had a wide range of viewpoints that we needed to address with this engagement.

Inside Perspective: Why Did We Follow This Approach?

We heard the consequences; engineers were verbal about the issues. We had internal reviews where much of the feedback was complaints.

Identifying the causes could be a difficult work for the insiders as we are part of the problem and it is difficult to know what “we do not know”.

Doing a good job about solving the problem in a balanced organization without breaking it looked huge. It was important to keep the “status quo” as it had to be part of the solution. It was also difficult to provide a different way of doing things to a group of colleagues that have worked together for a long time.

We attempted to look for the solution a couple of times without a real plan and a real effort towards it. Complaints kept on coming, so a group of senior managers decided to give change another chance. I (Carolina) was appointed, and I actually did get some resources.

Being supported by management, I decided to give this a different approach. I went for a deep change.

Right from the beginning I had in my mind to do extensive research on what was going on, with a detailed design of what should be happening instead. I knew from the first minute that I needed external help that no insider could give me.

So I looked for the best available help in the industry and that led me to Jim, who guided me through the research, which went from informal to more formal. We got data to compare to and he told me where to look.

Outside Perspective: What We Found in Discussions

The group certainly had what would appear to be all the classic symptoms of trouble in the area of requirements. Projects were being significantly delayed and resources were cannibalized from other projects to pick up the pieces (hence delaying those projects, sometimes before they got started). Key resources on the team spent a great deal of their time answering the same questions from different people, and felt bogged down with their efforts. E-mail was the primary communication source for changes that occurred during the project (and we all know how effective E-mail can be for maintaining a clean audit trail).

With a little bit of poking around, though, they had some real strengths to build on. They had a great handle on the competitive landscape and set objectives for their projects based on specific quantified factors relative to their competition. They took the time to identify composite personas for their different user classes to ensure that they had a common understanding of their client and could reasonably gather the breadth of critical use cases. They even started to manage all their projects in terms of a broad strategic portfolio rather than unrelated projects with no leverage between them.

They spent a great deal of time up front defining the business requirements, and their practices were among the best I (Jim) have ever seen in the industry, yet they had all these symptoms of requirements problems.

Where was the challenge?

The challenge was in the minds and attitudes of the team members themselves. Most of them approached requirements as something to do on a project before you get started to actually build the product. They had two modes of operation. The engineers would start out chilling their heels with requirements work in the early stages when the pressure was low. At some point in the project, an imaginary switch would be turned on, and suddenly it became time to get busy.

At that point, all that requirements work would be cast aside; they were under pressure to get what they perceived to be the real work done. Build some prototypes, evolve them into the final system, and then switch over to fixing bugs as a means of getting the project completed. Changes were made on the fly in a scramble to get things done, and the overruns began. Eventually a product was shipped, and the whole cycle started again after management rewarded the heroes that saved the day on this challenged project.

The team needed to appreciate the true value that their early requirements work could provide them.

Here is some context for our decisions in Barcelona. We ran a diagnostic of current requirements practices with all participants to use as a baseline prior to our efforts (this was used, with permission, from Software Requirements, 2nd Edition (1), Appendix A). As with most diagnostics we have run, we found a broad range of responses, and the results were a great way to get everyone thinking about the breadth of issues to address.

We began to see some interesting trends in the data when we broke the twenty questions into four categories: deriving requirements from predecessor information; developing the requirements in a disciplined fashion; using them as a basis for successor products on the project; and effective change control. For all of the groups that we have worked with so far (this diagnosis has been performed with 25 different groups thus far, in a wide range of companies), they tend to score higher in the first two categories than in the last two.

It appeared that this group was not much different. Many companies put significant effort into developing their requirements, then fail to leverage their full value, either by not referring to them or failing to reasonably manage them throughout the lifecycle. Often, this leads to the perception that the whole requirements effort is a waste of time - is overhead work. The cycle can spiral out of control, and teams fall into the code-and-fix approach for getting their work done.

On the positive side of this challenge, we had the opportunity to frame potential changes in the context of work that is currently being done. All the effort in place provided powerful insight into the problem space and structure into defining an effective solution, so change in this context did not involve a great deal of additional work, which is usually the greatest barrier to change.

Indeed, in this situation, we needed to weigh the cost of everyone discovering and solving important issues independently (the status quo) against the cost of managing an infrastructure that allows people to actually find the information that has been collected up front (the better future). The arguments for change become much more compelling as we get people to recognize that the information exists, and we provide improved mechanisms for finding and maintaining this information.

The requirements gathering effort was fine here; it was the knowledge management that needed to be addressed, as well as the habits and perceptions surrounding the initial efforts on the project. We refined the problem from trying to put a reasonable requirements development process in place to helping people appreciate the value in the work they are already doing. This was still a challenge to resolve, but a much more precise area to focus on.

That work they were doing up front was the real effort to drive project success.

Inside Perspective: What People were Thinking

People had different expectations about the outcomes of our work, especially in the beginning when no communication was being done. These expectations could be classified in different ways.

There were people that thought that someone would become the middle man, who would have all the information from marketing. These people wanted someone to

tell them what to do so they could focus on the “important” work, which is engineering delivery. They did not look at requirements work as part of the solution. This was a simplistic way to see things.

There was another group of people that wanted to have a say in the solution, in a confrontational way. They felt they had a lot of experience in different projects and knew what “others needed to do”. They had the need to know more and the need to feel they were part of the success, because they felt like heroes in many projects. They were used to being treated as key people. In the end, these were the easiest people to deal with.

There were the skeptics. Nothing we could do would help in any way. Our destiny is to keep on dealing with the same issues project after project, and fatalism was the key in their discourse. Those people had an engagement problem.

And of course, there were also other people with other opinions and attitudes as well.

Everyone thought there was a problem with requirements, but there were many descriptions of the problem and many suggestions for how to solve it. This is a very positive thing, as that eased our work a lot. We benefitted from other people’s experiences, and as everyone felt there was a problem, change was easier to implement.

During the process, those mindsets were evolving. At some point, we could feel a lot of people “thinking about the solution” and contributing by coming back to us and explaining “my solution” as if this was their idea. That part was fun and it was great to be part of such a change in people’s opinions.

Outside Perspective: The Changes We Introduced

We listened to a lot of people: how they worked, the pain they were feeling, the suggestions they had for making things better. It was clear that everyone experienced significant pain, but everyone had a very different sensation for this pain. With different perspectives, the perceived ramifications of the challenges were different as well. As we correlated our information, we started to see a picture developing. We had uncovered a root cause, which was the disconnect between the initial business requirements gathering and the subsequent implementation. We could finally start attacking the real problem.

We went back to the people in face-to-face meetings to discuss the findings, both the strengths and opportunities within the team. We started to help them paint a picture of what a better world might look like. To do this effectively with the different groups, we ended up painting a gallery of different pictures. One where there was predictable closure on projects, another where there was less disruption and chaos. We painted a picture where projects could happily co-exist without stealing resources and the group as a whole could leap ahead against the competition.

We walked them down the path of how to get to these places. We had carefully selected the path of least resistance. There was little proposed disruption to the way they did work in the past. Indeed what we suggested was an infrastructure that

would allow them to do the things they wanted and needed to do in an unfettered manner.

We then ran a significant amount of...well, not quite training, more like acclimatization. We reinforced the concerns that the pain was universal, walked them through the root causes we were trying to excise and the changes that would allow that to happen. Everyone had the opportunity to express their challenges, and in seeing the broad range of perspectives, different groups started to bond. We worked with almost as many managers as we did technical staff to reinforce that they had the critical role of removing the roadblocks that could get in the way (including some of their disruptive behaviors from the past). As the changes were incorporated, we worked with their partners that were across the globe, creating more managed communication across all groups.

There was only one critical adjustment that we made, which was one of perception. As the group was quite comfortable driving their development efforts based on the burn-down of defects, we proposed the idea that *an unimplemented business requirement can be treated essentially the same as a defect*. Rather than cast aside that wonderful business analysis that was done, we suggested they take that information and seed their defect tracking system (enter these unfulfilled business requirements into the system as defects) before implementation started. This gave them a way of working in the same environment they were used to (low culture shock), but allowed them to trace back to the original requirements.

This was the only change; no additional “best-practices” were added to their workload.

There was universal support. Beyond engagement in the classroom, there was a buzz around the coffee machines that went beyond caffeine, and as the training progressed there was an increased demand. Lunchtime discussions were centered on looking forward to getting started, rather than 'anything but that training'. Criticisms were almost exclusively suggestions to go further with the implementation, but we were careful to ensure we could walk before we ran.

Compared to the reaction to the stock training eighteen months earlier, it was a different group. Except that it was actually the same group. In the earlier training, there was relatively little investment, and virtually no value gained. We were merely helping them spend their training budget. Now, there was significantly more investment, but there is also an overwhelming upside. This turned out to be a strong business decision.

The difference is that we didn't lecture or ramble on about what they should be doing. We listened, we coached, we solicited input, we facilitated. We helped the team find their own better place, which was not that far from where they were in the first place.

Inside Perspective: Current Practices

When we first proposed our solution, we wanted to implement it in a controlled way for only one project, then extending process improvement later to other projects in their beginning stages.

That got in the way of some people who wanted to implement our designed solution more aggressively. They wanted the solution for everything now, without understanding that change needs to be controlled in a consistent way.

A quiet period was negotiated. After a few months of success in the pilot project where these changes were working, I (Carolina) had to incorporate the changes into six more projects within the organization. I also had to help build databases for horizontal components deliveries (project components that were very similar from project to project but differences between them needed to be well controlled).

As I could not control all details in all those projects, I needed help. As the projects had essentially different needs, different approaches were redesigned for each one. Those designs were not my responsibility anymore.

The requirements project left my hands before I was ready for it: as when you are raising children, they leave before you think they are ready.

Looking at it now with the distance and time, I think the project was ready. Everyone went through the training and was aware of what to do and what not to do. The proof is that complaints about requirements engineering dropped significantly in the list of engineering complaints.

All the requirements engineering activities that happened afterwards were improved, with more understanding and more suited for the organization.

Outside Perspective: The Challenge of Sustaining Change

Many companies that change the way they do business often find themselves falling back into their familiar old habits.

It's not a software team syndrome; it is part of the human condition to quickly lose what has not been conditioned and reinforced in favor of what is familiar, regardless of the consequences.

In *Leading Strategic Change (2)*, Black and Gregersen suggest that change is a cycle as follows:

“Stage 1: Do the right thing and do it well.

Stage 2: Discover that the right thing is now the wrong thing.

Stage 3: Do the new right thing, but do it poorly at first.

Stage 4: Eventually do the new right thing well.”

We start in a state where we are doing the right thing, and doing it well – the proverbial status quo.

Something happens (market conditions change, for example) and we find that while we are still doing the same thing, and doing it well, it is no longer the right thing to do. In software, I would modify this to suggest that while in the status quo state, some disastrous event or astute introspection highlights that we actually weren't doing the right thing in the first place, but we were oblivious to the problems.

We change our behavior, and initially, the new practices, although they are the right things to do in the new situation, are not being done well. In software, this is where we learn to see the value of appropriate application of “best-practices”. For the

situation in this study, this crucial step was minimized: we did not introduce any “new” practices, thus minimizing the learning curve.

It is at this point where we need to ensure that there is strategic continuity in what we do. We need to constantly reinforce our belief that the new behaviors are the right ones, through demonstration of our new successes, however small initially. Until we start to see those new successes, we need to focus even harder to ensure our efforts don't fall off the rails.

We need to strive to truly institutionalize our changed behaviors, while recognizing that they may be subject to that same disruptive change cycle in the future. More than demonstrating simply that we can do it, more than even showing the benefit, we need to get to a point where it becomes rote. When it becomes rote, we need to continue to reinforce the practice, to make this reinforcement part of the practice itself, part of our culture. We need to constantly recognize the positive efforts in the group, share the positive experiences as a standard part of doing business, or those improved practices are at risk of being neglected into oblivion.

It is an ongoing effort to avoid the tendency to backslide into our old habits.

Inside Perspective: What has Happened Since

Since I (Carolina) left, the ownership of the project has changed a few times. Very different people with very different opinions have had this ownership. Their ideas and design are quite different.

One thing that remains is the alignment in the organization that we created with our training. Another is the awareness of what is a good practice and what is not and what are the consequences of these.

It now looks like no one owns the initiative, but it is alive and embodied in the engineering mindset. The Project managers continue to grow the requirements database. There are more uses for our design and more and more projects are controlled.

For my current work, I need to contact the people I used to work with. I have access to their projects, and also get some information periodically to design new project requirements structures. I am amazed by the maturity and detail of some of the new projects Barcelona is creating.

I could say Barcelona is now a leading edge organization in Requirements engineering, without being aware of it.

Lessons Learned

Overall, this initiative was a success for three key reasons:

1. Everyone (management, marketing and engineering) was involved in the initiative, from the solicitation of their diverse perspectives through the understanding of how potential changes would affect each of them differently.
2. The proposed changes were extremely simple to implement (to interpret unimplemented business requirements as defects), leveraging off of the

- group's existing strengths and carefully tying these strengths to existing behaviors that were already part of the culture.
3. The engineering team took ownership of requirements management, and the effort was carefully managed and sustained over time to ensure that these new behaviors truly took hold.

References

- (1) Software Requirements, 2nd Edition, Karl Wieggers (Microsoft Press, 2003)
- (2) Leading Strategic Change, J. Stewart Black and Hal B. Gregersen (Prentice Hall, 2003)