Can Requirements Tool Vendors Tell Us About User Needs?

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Abstract—**Early in 2009, faced with the start of a complex systems development the Systems Engineering team at Phonak decided to procure a requirements management tool. This experience report describes our tool selection process and provides insights both to those selecting tools and to vendors offering tools to the market.**

   Keywords-requirements tool selection;

I. INTRODUCTION

This paper is an experience report. It describes our approach to the procurement of a requirements management tool and, in particular, what went well and what did not.

It specifically describes our planned approach, how that plan worked in worked in practice and the results.

Early in the selection process we focused on the ability of requirements tool vendors to understand User Needs, or, more specifically, the User Needs of one (very important) potential customer. Me!

   Later in the process we invited a limited number of vendors to understand our requirements in detail, but not in so many words.

   The results of both stages of the selection process provided a learning experience for both ourselves and our prospective suppliers.

The paper does not reveal which tool was selected or offer a silver bullet recommendation to cure all known requirements management problems (such a tool doesn't exist). Instead, the reader is encouraged to use a tool selection method based on their own requirements.

Lessons learnt provide insight to how we would approach the tool selection problem in future together with suggestions to tool vendors on how they could simplify the process of selling tools and services to clients like us.

II. CONTEXT

A. Business

Phonak is part of the Sonova group of companies, one of the largest manufacturers of hearing instruments.

Employing close to 7000 people we operate globally under a number of brands. Our 2009/10 turnover exceeded CHF 1.5 bn (an increase of 20.1% on the previous year).

B. Problem Context

Hearing Aids are Simple Products and they have been around for many years. What's the fuss about? A summary of recent changes in the hearing aid business will help you to understand the requirements problem we are facing today.

As recently as the 1980's they were simple analogue amplifiers that had their volume adjusted to suit the users' needs using a screwdriver.

By the mid 1990's hearing aid technology had transitioned to digital technology and with this came a step change in functionality of the products as well as significant changes in how the products are configured (for example gain is no longer a single global setting, but is adjusted per frequency band using PC software). Also, remote controls were added to the system and products started to offer a range of advanced signal processing technologies such as beam formers and frequency compression.

As illustrated below, current hearing aids have evolved even further. The addition of wireless technologies enables a pair of hearing aids to operate as a single system. This system can now include third party devices such as MP3 players, cell phones and TV interfaces. Some of our products even communicate via web portals to SAP during our sales process.
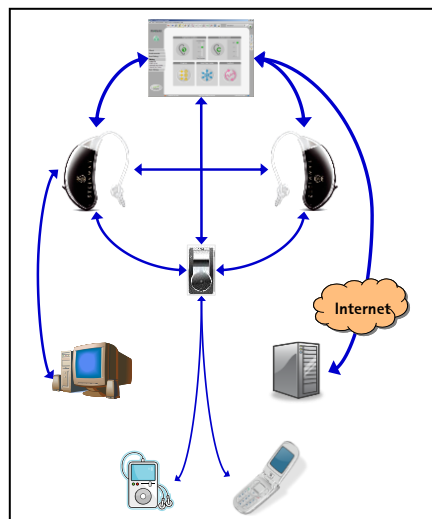
The complexity of our products is clearly increasing rapidly. If we add to this increasing complexity of the business as a whole through this adds another dimension to the challenge. Both the development of new brands such as Phonak Acoustic Implants and Sona and the acquisition of others such as Advanced Bionics and InSound Medical it is not hard to see that we are in a rapidly changing environment.

As if this wasn't enough, the hearing market has become a much more aggressive, resulting in a shortening of product lifecycles. It is no longer an option for us to bring a new product to market every year or so. Each brand currently launches one or more product families every six months!

III. PROBLEM STATEMENT

A few years ago, in response to these changes, the firm introduced a systems engineering team to the R&D department. This team has made good progress; however, the introduction of "system thinking" remains a work in progress. The team is small and the rest of the business is still learning what the function of the team is (and specifically what system requirements need to be).

Our stakeholder mix is very rich, including skills ranging from silicon design to psychology!

Early in 2009 this team was tasked to deliver systems requirements for a new platform this platform comprises hardware and software to support multiple product brands. Given the changes in the size, shape and complexity of our business it should be no surprise that this was the first time we had embarked on a project of this scale.

We decided to procure a requirements management tool to support this effort. We saw a number of advantages in migrating to a tool at this time:
- requirements reuse would be a significant plus,
- to help us manage complexity, and,
- we needed to simplify our lives, taking us away from manual processes and enabling us to share specific sections of content with specific readers.

In selecting a tool, we also needed to bear in mind that, prior to the start of this project the systems engineering team had been writing requirements Word for some time. Our stakeholders had become used to documents with a specific structure and layout and some text styles have specific meanings which were well understood by our stakeholders. Retaining this formatting in our deliverables was very important to us.

The experience of creating word based requirements had enabled us to develop our requirements processes such that we were able to describe our needs in some detail. This proved to be a great asset when procuring a tool.

IV. THE SELECTION PROCESS, A FOUR STAGE APPROACH

We decided to follow a four stage approach to tool selection. The steps where:
- find a list of tools (and pre-filter),
- aggressive selection to produce a short list,
- formal evaluation and selection,
- trial and purchase.

However, as the project had already started we had both limited time and limited resource (1.5 FTE's) available for selection, implementation, support and, of course, requirements engineering. What is more, there was a real risk that the selection process could be overtaken by events. Specifically, if the selection process took too long business pressure would force us to drop the tool implementation process and return to using Word.

A. Find a list of tools

We used the list of tools from http://www.volere.co.uk/tools.htm as our starting point. This was a semi arbitrary choice, the site was on the first page of hits from a Google search for "requirements tools" and we happen to know some of the people from the Atlantic Systems Guild who run the site (which brings a degree of personal confidence in the data).

This list was pre filtered to remove tools designed for purposes other than Requirements Management (for example, there was some version control tools on the list). These tools would not make it through the next evaluation stage so why waste time on them?

B. Aggressive selection to produce a short list

The result was an almost overwhelming list of candidate tools, 71 in all.

So, how do you reduce a (very) long list of candidates to a short list in less than a day? Do you call a salesman? Do you download evaluation copies of each of the tools? No, you simply don't have time to do this.

A good approach is to ask yourself "Do the vendors on my long list understand where I am right now?", "Do they understand what it feels like to be on this side of the fence?", "Do they understand my User Needs?", and "Do they know what I need from them right now? In short, "Do they DO Requirements Engineering?"

So, let the fun commence! Our approach was very simple, to give each vendor web site five minutes to tell us what the product can do. If they can describe their tool in such a short period of time they may have done some real requirements engineering.

Some real examples:
- "download our white paper": one was 76 pages of text! - Fail
- "download a free evaluation copy": which requires me to have "free" time and implies my time comes for "free" - Fail
- "we'll call you back for free": the salesman - Fail
- "watch a 3 minute video summary": Ah, someone might understand where we are.

This very simple approach reduced our list of 71 vendors to a short list of only 6!

C. Formal evaluation and selection

Our next step was to take a look at the tools on the short list. We decided to invite the remaining handful of vendors in demonstrate their products to us.

Rather than invite vendors to show us their "out of the box" demonstrations we defined a scenarios for the vendors

to demonstrate. Given that we had been developing requirements in Word for some time we had enough understanding of our own needs to enable us to describe simple scenarios for this purpose. Aside from taking the vendors away from their tried and tested sales presentations this was also a useful exercise for us in that it forced us to think about what we really did on a day-to-day basis.

We created a description of our business, a sample fictitious requirements document (so NDA's weren't needed) and multiple scenarios for them to demonstrate. This included both sample requirements documents and specific requirements we had for our tool.
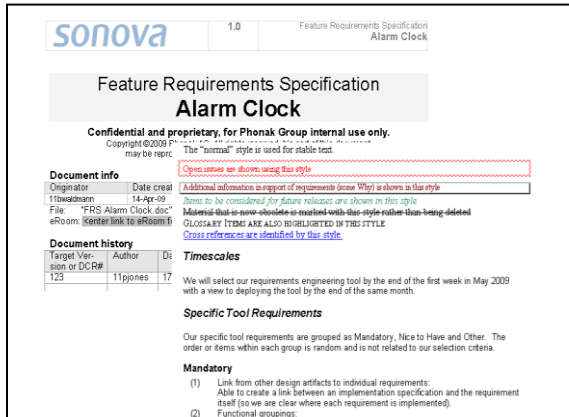
In addition we also created a sample scenario for them to follow. A step by step list of actions that we would like them to demonstrate with the document we delivered.
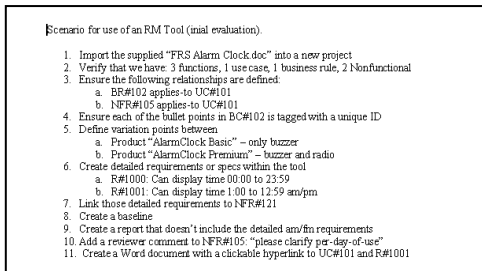
We invited the six short listed vendors to visit us and show us how their product would satisfy *our* needs. In addition two internal staff were nominated to represent our current tools (Word and Excel) and set the bar for the others to beat.

The invitation included the scenario and we set a time limit of two weeks after which we expected the vendors to visit us and demonstrate how they would implement our scenario

The results were as follows:

Some vendors agreed to do demonstrations; some did not bother to respond.

Some visited and demonstrated the scenarios as requested; others offered "out of the box" sales presentations.

Some sent team members with both technical expertise and customer facing (requirements elicitation) skills; others had a "techie" on the end of a phone.

One vendor replied: "I'm very happy to put a demo together, but if <xx> is a requirement, we might not be the right choice for you. If that puts us out of the running, that's regrettable. I am absolutely convinced that you would be very successful with <tool> in your organization, but I can't let your time be wasted."

D. Trial and Purchase - The Final

These demonstrations narrowed the field to two tools. Neither of these tools fulfilled all of our requirements (both came close) so the final stage was a simple side by side comparison of two tools. This comprised a hands-on technical evaluation of the tools together with an analysis of cost of ownership etc.

One tool was selected, life was good, we notified the vendor they had been selected, installed a time locked evaluation and started to use the tool aggressively, then…….
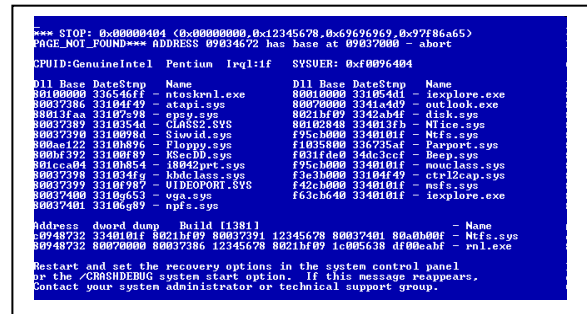
… the blue screen of death! We had so many crashes that we lost faith in the tool we had bought. We had pared down our list of 71 tools to zero, exactly one less than we needed!

V. TIME TO REVIEW THE SELECTION PROCESS

At times like this it is good to take stock of where you have been. Did we make the right decisions, is there anything we missed? What could we have done differently?

We returned to that reply: "I'm very happy to put a demo together, but if <xx> is a requirement, we might not be the right choice for you. If that puts us out of the running, that's regrettable. I am absolutely convinced that you would be very successful with <tool> in your organization, but I can't let your time be wasted."

This vendor had taken the time to read, understand and analyse our requirements. They didn't approach us to "tell us how we should work"; they simply wanted to discuss a single specific requirement. We had responded to this by striking them from the list of candidates.

We asked some questions:

Q: Does it meet our requirements apart from <xx>?

A: Yes

Q: How does its price compare with the others?

A: Licensing costs are significantly lower, but there must be a catch!

Q: How much do they charge for services?

A: They don't offer services, users don't need them!

Q: If we just buy it and try it, can we migrate to something better later?

A: No problem, lots of export formats and the data is stored as xml.

This is low cost and low risk. We have a small project running right now and we could try this tool for real. Let's give it a go.

VI. RESULTS

It is possible to select and purchase a good requirements tool in a very aggressive timescale. Based on a clear understanding of our requirements processes we took two months from the decision to look at the tools market to buying the tool. The first deliverables developed in the tool were produced five weeks later.

Focusing the procurement process on our specific needs forced us to define some aspects of our implementation at an early stage. By the time of purchase we had already made decisions about how we would structure our work, defined a requirements metamodel and invested some time in preparing a tool independent electronic glossary. In short, before we purchased the tool we knew how it would handle the complexities of our working environment.

This experience demonstrated very clearly that expensive doesn't always mean better.

In reality, one of the lowest cost tools came closer to meeting our specific needs than the more expensive heavyweights.

We bought one of the lower cost solutions and, two years later, we are still using it and see no reason to move on so the results of the selection process are basically sound.

VII. SUMMARY

In order to select the right tool for you, you must take control of the selection process and drive it to completion.

It is vitally important that you know your own tool requirements. This must include things like resource availability for tool use and admin. With this you can match the tool to the resources available. In our example the upkeep of a high end tool would have drained a significant proportion of the resource available in the team.

Specifically, one of the tools that was demonstrated came close to pressing all of the right buttons, however, we felt that the administrative overhead (database tuning etc.) would have consumed too large a slice of the available requirements engineering resource

Our scenario based approach was a very effective instrument in the tool selection process because it:

- enabled us to compare like with like,
- confirmed that the vendors could deliver a tool to meet our needs,
- took the vendors away from their polished marketing routine and towards our reality as users of the tool.

What is more, the selection process provided us with a great opportunity to review our own ways of working.

The selected tool has been in place for close to two years and it

- has proven to have been a good choice,
- is easy to use (without consultancy services),
- has scaled to meet our needs and remains easy to use and support.

Our decision to retain the formatting our stakeholders understood was a good one. It meant that we did not need to re-educate our stakeholders or try to reinvent our quality system. A measure of how successful this was, is that it took many months for stakeholders to realise we had migrated from manual document product to generating reports from a tool.

Finally, the decision to conclude our selection process with some hands on use of the selected tool proved to be a good one. In this example this final step before purchase proved to be invaluable when the tool proved not to be as robust as we had hoped.

VIII. OUR LESSONS LEARNED

When a requirements tool vendor starts to discuss requirements, stop and listen. We should have done this better as it would certainly have saved us time and would probably have reduced my personal stress.

Clearly, some tool vendors have put considerable effort unto understanding the requirements of customers when they are purchasing requirements tools, others have not.

IX. LESSONS FOR VENDORS TO LEARN

Know your customers' requirements, not only from a tool usage perspective but also from a tool selection point of view. Many potential customers have very limited time to select from a very large pool of products.

Tailor your offer to the size and maturity of your customer which, as in our example, can be quite different to the size of the business.