

# Mjølner's Software Process Improvement: A Discussion and Strengthening Using the SPI Manifesto

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**Abstract.** Mjølner Informatics A/S is a Danish software company with 80 employees; we produce software for a broad range of domains. In this paper, we present our company's software process improvement program. We describe the history, the current status, and the challenges that we are facing. We use the SPI Manifesto's three values and ten principles as a basis for an evaluation of our current practices and as a guide for future improvements. This way we show that the SPI Manifesto can be used as both a benchmark and a checklist for improvements of a SPI organization. Furthermore, we point out the principles and values of the SPI Manifesto that have been "implemented" in our efforts to create Mjølner's software process.

**Keywords.** SPI, SPI Manifesto, Software Development Methods

## 1 Introduction

Mjølner Informatics A/S was founded in 1988 as a spin-off from a Scandinavian research project on object-oriented software development with Aarhus University as a main partner. Mjølner develops custom-made software for a number of Danish and international customers, both in the private and the public sector. Among our customers are large companies like Danfoss, VELUX and LEGO and a number of Danish ministries, e.g., the Ministry of Foreign Affairs.

Our trademark is to combine a high professional competence with effective and flexible project management and cooperation with our customers, with emphasis on knowledge sharing, innovation and partnership. Most of our employees have a university degree in computer science or software engineering. Many employees are in their 30'ies, and – as in many similar companies – most are male.

Mjølner has its headquarters in Århus and a department in Copenhagen. We are organised in four different sections: embedded systems, desktop applications, business and web systems, and external consultants. Our external consultants work full time on site at other companies, and the other three sections develop systems in-house. In addition to the sections, we have a user experience centre, which is dedicated to ensuring that all our solutions have a high degree of user-friendliness and are well aligned with the work processes that must be supported.

Mjølner has a very flat organisation, where everybody can speak up with their opinions and be heard. There is a high degree of employee democracy and the employees are trusted to decide the best possible way to meet their goals.

During the last six years, Mjølner has experienced a growth in number of employees, in customers, and in sizes of projects. Before that, the consensus in the company was that there was not much need for a software development process. Highly skilled employees in small teams did whatever was necessary to deliver small software solutions to our customers.

In late 2004, however, it was realized that to support our growth, a natural step was to start work on a software development process. This was the advent of Mjølner's SPI initiative.

This paper consists of two main sections. In the first main section, we will present our development process, the organization of our SPI work, and the history of SPI at Mjølner. In the second main section, we discuss how we have used the SPI Manifesto to put our SPI into perspective and thereby as a source to improve our efforts.

## 2 SPI at Mjølner

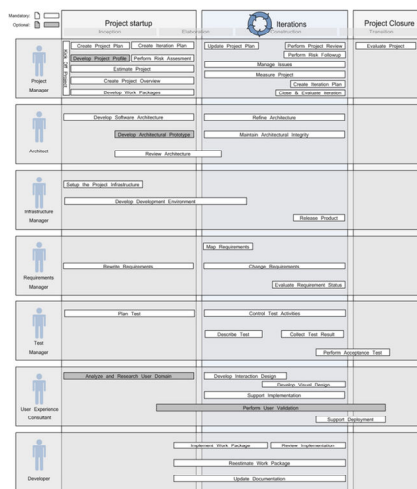
### 2.1 Mjølner's Software Development Process

We have given our software development process a name that can be used by everybody to refer to the process. The name is MUP, which is short for "Mjølner Udviklings Process" (Mjølner Development Process in Danish), and leads the thoughts to the Rational Unified Process (RUP) [RUP], which have been the main inspiration of the MUP.

The MUP is based on iterations and in the development of the process descriptions, it has been a focus area to describe the most central aspects and leave the details to the people executing the process. So the steps of the process primarily describe the results that need to be achieved - not exactly how these results should be achieved.

The MUP is compromised of 7 roles:

- Architect
- Developer
- Infrastructure Manager
- Project Manager
- Requirements Manager
- Test Manager
- User Experience Consultant



These are the only roles used in process descriptions. All artifacts and task descriptions are assigned to one of the 7 roles to ensure a clear distribution of responsibilities during project execution.

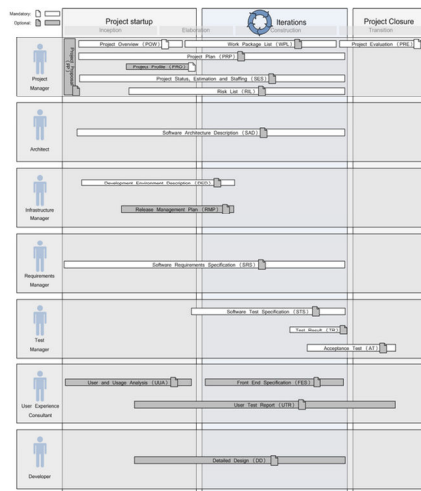
The main representation of the MUP consists of two graphical views that give an overview detailed enough to enable the more experienced users to get the information they need alone from this overview.

The first view shows all the defined tasks of the process. For each task it is shown graphically where in the project lifespan the task should be executed, and which role is responsible for executing the task. Furthermore it can be seen if the task is mandatory or optional. A tooltip on a task gives a brief description, and by clicking a task, you are taken to the detailed description of the task.

The other view shows all the artifacts of the process. The artifacts are also placed according to the responsible role, and according the timeline of the project. This overview gives the opportunity to go directly to the artifact description or to the relevant template.

These overview pages are always used as the basis of process discussion, and give a clear picture and a platform for process discussions.

Because not all projects are alike, three versions of the MUP have been defined: MUP, miniMUP, and taskMUP. These versions have different levels of complexity, and reflect projects with different levels of risk. Furthermore, the process tool we use gives each project the possibility to augment the process by inserting comments anywhere. These comments are only shared by the people on the particular project. Thus, two instances of e.g. a taskMUP process will vary by the adjustments made by the projects in question.



## 2.2 Mjølner's Software Process Improvement Organization

The SPI organization of Mjølner consists of the following 4 identities. In the following the role of each identity is explained.

- Seven Process Communities
- SPI Coordination Committee
- SPI Coordinator
- SPI Council

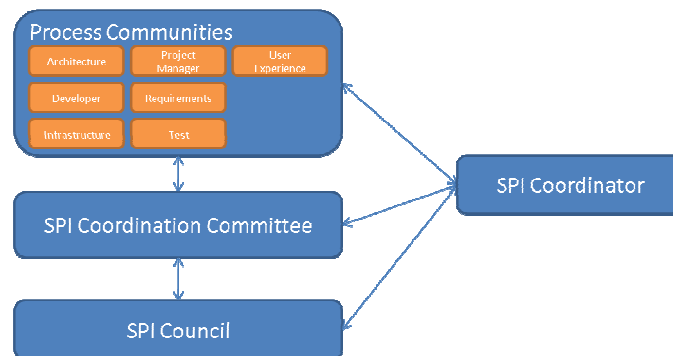
Maintenance and improvement of the process descriptions is primarily driven by the 7 process communities. There is one process community for each of the roles. All employees are encouraged to sign up to one or two process communities. The purpose of a process community is divided into:

- Ensuring that the part of the MUP handled by the process community is up to date and that the necessary improvements of the process are carried out.
- Creating a forum for professional discussions regarding the relevant subject matter, for example project management. Here focus is on sharing knowledge, experience and evaluating current practice.

The members of a process community meet with regular intervals, typically 1-2 times per month.

To ensure a coordinated effort between the 7 communities, the leaders of the communities and the SPI coordinator comprises the SPI Coordination Committee. This group meets once per month. The group addresses the process challenges that spans multiple communities, and discusses the boundaries of the responsibilities of the different communities. Some process improvements must be done in all parts of the process at one time. These types of improvements are decided upon and controlled by the SPI Coordination Committee.

The SPI coordinator (the first author of this paper) is responsible for coordinating all of the SPI activities in the company. He is a part of the SPI Coordination Committee and the SPI Council. The primary goal of the SPI coordinator is to ensure that all the SPI activities in the company align with the SPI strategy of the company, and that no community departs from this strategy.



The SPI Council is steering group of the SPI organization. The SPI Council sets the vision and goals for SPI in the company, and must approve major changes in the processes - for example the addition of roles or changing the mandatory status of an artifact.

The diagram shows the organization. The communities have been placed at the top because they are the most important group when it comes to ensuring improvement of the software development process. There are no full time employees in any of these groups. The SPI Coordinator is a 20% time position, and the rest fits the SPI work in between their other tasks.

### **2.3 The history of Mjølner's Process Improvement**

In 2004 the 25 employees of Mjølner did not work according to a defined process, and the only role defined was the project manager. In late 2004 the management of Mjølner decided to begin activities to establish a defined process for the software projects in Mjølner. At this time a person with process experience was hired as SPI Coordinator to facilitate the process.

In Mjølner there has always been a very flat hierarchical structure, and the culture welcomes questions to management decisions. The opinions of the employees are highly regarded by the management. Therefore, it was obvious for the management that the process should not be created by a select few and then pushed to the rest of the organization.

Instead the SPI Coordinator together with a management group decided on a number of central roles around which the process could be built. After the roles had been presented to the employees, the number of roles was adjusted because of relevant input from the employees. The adjustment was a simplification that left out a couple of more "theoretical" roles and left the roles that everybody could identify with.

When the roles were established in the beginning of 2005, the Process Communities were formed as the next step. All employees had to enlist in at least one and preferably 2 Process Communities. This was done to ensure that all employees were involved and heard – even the sceptical ones. The first task of each Process Community was to write the process of the role it represented.

Even though it took a long time before the process description was ready to be used, the division of the work in a project almost immediately began to follow the division of roles. The Process Communities proved to be a very good way of sharing knowledge about best practices as part of the process discussions.

The main component of the process description was decided to be what we called "quick cards". Several people were afraid that our process would be as big, confusing and unreadable as they had heard from other companies introducing processes. A Quick Card was kept small, so that all text could be on one screen, and all quick cards used the same template. The Quick Cards were implemented in Wiki, so that everybody could always contribute to a process.

A year later - in the beginning of 2006 - the process was ready in the first version, and the SPI Coordination Committee and SPI Council was formed. The process descriptions were refined extensively during 2006. Most importantly, a number of variations of the MUP were introduced as it quickly became apparent that the "one size fits all" model would not work. Different sizes, risks, or complexities of the projects had different versions of the MUP.

To help institutionalizing the new process a "MUP week" was introduced in the end of the year 2006. Each role had 1 hour during the week to present their part of the process for the whole company. This together with other markers like the MUP mug made it crystal clear for everybody in the company that Mjølner now had a process that must be used and what that process consisted of.

The following years the process descriptions evolved driven by the process communities and the users themselves. Our process description was given free to edit by everyone as is typical for a Wiki. This, however, had the flip side that the descriptions drifted and became unfocused and ambiguous. After two years of this, the process descriptions needed a rewrite to ensure that the descriptions were written uniformly across the roles and to ensure the correct focus.



We therefore abandoned the wiki and last year we moved our process description to a tool dedicated to a software process. Furthermore, all the descriptions were aligned to have almost the same form and wording. On top of this, we have made the SPI Coordinator responsible for the process, and he is the only one that can release a new version of the process. The downside of this is that now people are reluctant to react on errors in the descriptions because it takes a little greater effort.

### 3 Using the SPI Manifesto

In this section, we will relate Mjølner's SPI work to the SPI Manifesto [SPI Manifesto]. In summary – and for easy reference – the three principles are that the authors of the manifesto truly believe that SPI:

1. Must involve people actively and affect their daily activities (A, People )
2. Is what you do to make business successful (B, Business )
3. Is inherently linked with change (C, Change)

We will refer to these values as VA, VB and VC.

These values are related to the following ten principles:

4. Know the culture and focus on needs (People)
5. Motivate all people involved (People)
6. Base improvement on experience and measurements (People)
7. Create a learning organisation (People)
8. Support the organisation's vision and business objectives (Business)
9. Use dynamic and adaptable models as needed (Business)
10. Apply risk management (Business)
11. Manage the organisational change in your improvement effort (Change)
12. Ensure all parties understand and agree on process (Change)
13. Do not lose focus (Change)

We will refer to these principles as P1-P10.

The SPI Manifesto can be used as a kind of ideal to evaluate our own SPI against. It can be used to identify strengths and weaknesses and can at the same time give pointers to where we should be looking for improvements.

In the following sections we present a number of the insights we got from the SPI Manifesto. Our insights are not a one to one mapping to the values and principles, so the sections below are structured after insights and not after the values and principles.

In each of the following sections we have added a reference to the values and principles relevant for the chapter. VX is value X, and PY is principle number Y. The numbering follows that of the sections in the Manifesto.

### **3.1. Involvement (VA, P1, P2)**

The primary way that we ensure active involvement of people is through each employee's membership of one or two Process Communities. In the communities, there are lively discussions and constructive disagreements, and it is in the process communities that many important issues are identified that should have attention in Mjølnér's SPI work. Active involvement is catalyzed by our open culture that encourages people to participate and contribute, e.g., by giving presentations on books they have read, conferences they have attended, or on case studies about their current or past projects.

Previously, we did not have the Developer role and that meant that software developers, who did not have a particular role in a project besides being a developer, sometimes felt alienated regarding MUP. They did not feel that the MUP were for them, but for the other six roles. This is a major problem because most employees in Mjølnér are developers, and the MUP should not be seen as, e.g., the project manager's or the software architect's tool only, but applicable and useful for project members in general and the organisation as a whole.

This problem has been addressed by the explicit establishment of the Developer as a role in the MUP and by describing the developer's activities and paying special

attention to developer's needs.

An obvious but very important lesson learned is that there is a strong connection between broad involvement in SPI throughout an organisation and people's motivation. These two factors imply each other; involvement requires motivation, and motivation requires involvement.

### **3.2. Culture and organisation (VA, P4, P1)**

From the very beginning of the SPI initiative at Mjølner, establishing the right SPI culture has been an important issue. Mjølner's culture is characterised with keywords like democracy, grass root activities, trust, delegation, informality, peer relations in projects, and social and helpful behaviour. Mjølner has won awards on work-life balance, which indicates that preservation and further development of Mjølner's culture is a high priority within the company, from top management and through the entire organization. In general, SPI can in many companies and situations be characterized with keywords like order, formality, control, and measurements.

There is an obvious contradiction between Mjølner key cultural elements and SPI key elements, and it has been necessary to pay much attention to this aspect in our SPI organisation. The key element in our SPI culture is the fact that the process communities have the responsibility for the content of the process. Another example is the constitution of the SPI council. We have very explicitly picked people from the organisation such that there was a proper balance between "hard-liners" and "soft-liners" in the council. We wanted to have the culture in all its diversity represented and present, when overall SPI decisions should be made. In this way we have transferred the culture of the company to the culture of SPI.

Mjølner needs to be a learning organisation to keep competitive advantage, and this is primarily addressed in two ways. The first way is via the Process Communities and the knowledge sharing that takes place there. The second way is taken care of by the MUP, which prescribes that all projects must be systematically evaluated, when they are finished. The project manager is responsible for gathering the lessons learned and for writing an evaluation report, which must be presented for relevant stakeholders in the organisation. This presentation ensures that the knowledge reaches the relevant parties – which often will not work with written reports.

We have created a culture around SPI that matches the principles in the SPI Manifesto and at the same time matches the culture of the company and focuses on what is needed by the employees.

### **3.3. Continuous improvement (VB, VC, P3, P7, P8, P9)**

The business of software development is very dynamic so we can not keep our market share if we continue to do as we have always done. We need to be flexible and adaptable, and it is important to ensure that our software development process can and



will be changed when necessary. In the tool support for our process descriptions there is support for any project to comment or elaborate on an artifact or a task description. The intention is that these comments should be gathered and evaluated regularly. This is a contribution to continually ensuring alignment between practice in our projects and “theory” in our process descriptions.

This means that from both the managers and the employees there is a committed focus on changing. And a major part of our SPI effort is used to manage the changes and ensuring that the relevant people know why a change have been made and how to act from now on. The changes are driven by employees and therefore we seldom see reluctance to adopt the new things.

To get sensible improvements of the process, it must be ensured that all parties understand and agree on the process. The Process Communities are responsible for the process descriptions but also responsible for institutionalizing improvements. This is done primarily within the Process Community but also by presenting the changes to all employees. Furthermore we have established overview pages of the process that gives everybody an overview at a glance. We keep the process easy to access and understand and thereby reducing the need for education and getting a high agreement on the contents of the process among the employees.

Due to the fact that the improvements primarily are employee driven, we do not have an established improvement program, and we do not measure effect of our improvements. Furthermore, we have no formalized risk process in place when it comes to process changes. Even though we are employee driven we believe that measurement and risk management is something we can use to improve our SPI work and get a higher business values from SPI.

However, basing the improvements on experience and measurements is a difficult issue, where there are two “schools” in our company. The advocates of the first school believes that the only sensible thing to measure is time consumption because they believe that not much good can be done using measurements of other things. On the contrary, they think that quite a lot damage can be done by trying to measure – and thereby formalize – things that are inherently unformalizable, e.g., a concept like “quality”. The other advocates of the second school see a potential in measuring things like lines of code, etc. It is an ongoing issue and an ongoing debate within our company how to balance these two approaches.

We should improve our measurements of improvements in the future, and be more aware of the risks of the improvements. But it is important for us that focus on measurements and risks will not slow down our improvements, as it is a important business objective to be able to change quickly.

### **3.4. Using models (VA, VB, P6)**

From the beginning of the SPI efforts in Mjølnær, the focus has been to establish a process that will help us make better software faster. Being compliant with a model or

getting a process certification has been seen as something that might be nice, but not as a goal in itself.

As we have seen, the MUP, Mjølner's Software Development Project, has RUP, the Rational Unified Process [RUP], as the main source of inspiration, but not as the only source. Now, we briefly mention other software development approaches that have had an impact on the MUP.

The RUP was a state-of-the-art process that came out in the late 90'ies, and was a kind of best practice that drew from decades of experience with software development. In the early 2000's, however, a radically different approach emerged and began to catch attention: agile development [Agile], in contrast to more plan-driven development, which is the family of traditional approaches to which RUP belongs. Our industry in general, including our company, have paid much attention to agile development methods during the last decade; the Agile Manifesto [Agile Manifesto] was published in 2001.

In Mjølner, we strive to balance the ideas of classical plan-driven approaches like RUP with the agile mindset and values in our projects. We run projects which are entirely carried out as prescribed by Scrum [Scrum] and we also run projects using more traditional approaches. In some of our contracts, e.g., with public customers, we are required to use PRINCE2 [PRINCE2] as project management process, or to be compliant with a certain level in CMMI [CMMI]. Choice of the proper development method is influenced by many factors, and in most projects, we combine elements from plan-driven approaches and from agile approaches.

In general, we believe that approaches, which focus a lot on the establishment and maintenance of well-functioning teams are preferable; see, e.g., [Peopleware] for more about this subject. Moreover, we think that it is important to prevent unnecessary bureaucracy and superfluous and annoying procedures; see, e.g., [Lean].

Seeking inspiration from various sources has been an excellent approach because it means that we from day one have kept an alignment of what we do with what we describe we do. When adopting a full model, there will be a large number of new practices that have to be institutionalized over time. Instead we are adopting the new practices one by one when relevant and thus reduce the gap between process and the daily work.

Furthermore, we have found that it is crucial that our process descriptions are not too detailed. In previous versions of the MUP descriptions, some parts had grown too detailed, and thus were prescriptive in an obstructing manner and not very useful because different projects required different approaches. It is very important to give skilled people room to think and to use their creativity. A process should not describe or prescribe too much, but instead focus on the result needed.

So we are using models as proposed in the SPI Manifesto and it works very well for us.

### **3.5. Business objectives (VB, P5)**

We are seeing an IT market where there is a growing demand for more knowledge-intensive services. Our customers do not just want to have a specific algorithm implemented; they want an IT system that fits the users and the business and they do not know how this is done best. So it is an important part of our business to strive for an increasing professionalism and knowledge when it comes to creating software. A part of our business is also to share our process knowledge with the customers and thereby improving the abilities of the customers, and this further emphasises how important SPI is for our core business.

All our process improvement initiatives are based on our need to increase professionalism and are based in our three core values. Mjølner has a set of values that permeates everything we do – including SPI. It is the VIP values. The three letters stands for Knowledge sharing, Innovation and Partnership (in Danish).

Knowledge sharing means that we share our knowledge with each other and with our customers. Our SPI organisation facilitates this sharing of knowledge. Knowledge is what our business is all about and the important factor if we want to improve our processes.

Innovative ideas are welcomed also in process improvement initiatives. We believe that new ideas must be given room to evolve even if the contradicts the more widely accepted norms. These new ideas can be an important part of getting a lead in the market.

Our process improvement initiatives comes from everywhere in the company. When an improvement is in the making, the ones driving the improvement can be sure to meet support and constructive criticism. We are all partners in the quest for improvement, which means that the MUP is our shared process - not just the process the other guys use.

In Mjølner we are not following principle 5 as it is worded in the SPI Manifesto but we believe that our value based approach gives us a result that is just as good as if we did as explained in the SPI Manifesto.

## **4 Conclusion**

SPI is a continuing activity that must always be further developed to be aligned with the company's general changes. With respect to both self-evaluating our SPI efforts at Mjølner until now and looking into the future, we have found that the SPI Manifesto has been helpful.

Regarding self-evaluation a key observation is that the SPI Manifesto has made it explicit that we have been successful in fostering an organisation that supports motivation and involvement, and that we have achieved to create a strong coupling between the process description and people's daily activities. Furthermore our approach to using models matches the recommendations of the SPI Manifesto.

Regarding looking into the future, we have identified two important issues to work with: A more quantified measurement of improvement results, and adding risk management to our improvement efforts.

We are linking SPI to business objectives in a quite different way that the SPI Manifesto suggests. But the value based approach we have taken matches our culture and has the same benefits as the approach described in the SPI Manifesto. Therefore we see no reason to change our approach to that of the SPI Manifesto.

Using the SPI Manifesto the way we have done is a good way to get important insights about the state of your SPI organisation and can be used to form a roadmap for future activities. But as the SPI Manifesto points out no model fits everything. The same is true for the SPI Manifesto. Not all principles can be used as is in every organisation; as it is said in the explanation to P6 in [SPI Manifesto], “use the models to improve your processes rather than as a checklist without sense”. In a similar fashion, we say: Use the SPI Manifesto to improve your processes rather than as a checklist without sense.

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