Software Process Improvement Case Study

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Smaller, Faster, Better

Overview

The path of many small software companies seeking their place in niches leads from individual projects, via various adjustments to the requirements of international clients and several re-designs, to a standard product. That path is a rocky one. Commercial success is not guaranteed even when you have reached your goal. Both the organisational structure and the development process must be adapted to new requirements, and must be re-thought and standardised. Regardless of whether one is working alone or in teams, documentation and a structured procedure become ever more important. In Austria – and probably around the world – very few manage to make this step from "innovative software tinkerers" to a commercially managed company. We have managed to take a further step along this path within the framework of the SPIRE programme, without compromising the efficiency of our team.

The Organisation and its Environment

GROS Software is typical of small regional software companies. We provide a standard programme for the ancillary building industry (painters, plumbers). In addition, we have projects with development requirements of several days to several months. We also sell hardware and, in the meantime, we have gained substantial know-how in respect of network technology (Novell and NT). Our newest business venture has been the establishment of an Internet server, and we are developing web sites.

We have been in business since 1989. We use products by the companies Borland, Microsoft and Centura as development tools. At the moment, we still only distribute our systems directly, but we hope that will change during the course of the coming year, and that we will find serious distribution partners for our new products.

Starting point

We have five permanent employees, but we are a **Team of Friends** rather than a classic company. At present we are working intensively on the successor to our standard programme. This development process has already lasted several years. The process was chaotic at the start of development. Not that this method did not work for our first programmes – after all, we already have a product on the market which is proving itself against the competition. However, the existing programme has been reworked several times, and owes its current functionality to the "spontaneous creativity" of **Mr. Gros**, an engineer, who, as Manager, deals with sales, organisation and specifications; as well as to the "brilliant" implementation by **Mr. Hlwaty**, the engineer who translated wishes into reality. Obviously, we have already heard of procedural models, cost estimates and waterfall models. It was always very theoretical and never seemed practicable to us. The start of development of our most recent major project, "Improve!", began in the following manner. We hired a new employee (whom we could not actually afford) and entrusted him with developing the new system. Thus, we not only expanded our development team, but were also simultaneously searching for new tools with which to implement these requirements. For a long time, **Mr. Bauer** struggled with various tools. Some were eventually used; others were rejected again. As before, we commenced actual programming by simply getting stuck in. Either **Mr. Gros** or **Mr. Hlawaty** would discuss with **Mr. Bauer** what the module was supposed to do; **Mr. Bauer** developed what he thought he had understood.

That possibly sounds more disorganised than it really was. The organisation of our company was being continuously improved. We developed plans for business sectors, installed an internal mail system with the option of generating open folders, developed data protection concepts and much more. Only the development process was left to the creativity of the individual. Difficulties were pre-programmed. **Mr. Gros** was responsible for the programme concept, while **Mr. Bauer** was responsible for the implementation. Completion of the programme became ever more delayed. Tensions also arose within the company. These often arose according to the following pattern: the completion deadline for one sector was exceeded. On enquiry, it turned out that the requirements often changed; that too many different priorities were set; or that the finished module simply did not correspond to **Mr. Gros'** ideas.

At this point we became aware of the SPIRE programme. Actually, we were really looking for money. We had already received one demand in respect of the development of "Improve!", and we wanted to tap into new sources of financing. Following the organisational steps, a "mentor" visited us, and we all sat down together to analyse our company. Of course, we knew where the problems lay – we were just made aware of the existing weak point again in a focused manner. Instead of the two hours which had been envisaged, this analysis lasted six hours in our case.

We were now faced with the offer of – with some administrative effort – improving our structure with an external consultant, and even being paid for it. Despite the normal time pressures, it was irresistible.

The Project

Definition of the Procedural Model (PM)

Following the strengths and weaknesses analysis in the context of the initial assessment, **Dr. Wolf**, our mentor, suggested standardising our development process by introducing a PM. At this point the concept no longer frightened us, since we had simply decided to ignore much of the theoretical superstructure and to develop a system adapted to our needs. This involved a very simple division of the development into individual phases. We defined the requirement analysis, specification, concept, implementation, test and installation as the sectors which were important for our products. There wasn't really much new in this, except for the explicit division and the fact that individual (short) forms were to be prepared for these sections. That was the small, but refined, intention with which we approached the project.

Development of Forms

The development of templates (Word documents) was shared out amongst the individual employees. Thus, everyone became familiar with the area where their responsibilities had, hitherto, largely lain. The task was to develop a system which would allow a new employee (one with a brain) to be initiated both into the development process and into already developed products in the shortest possible time. In this regard, we pre-supposed a fairly substantial amount of pre-existing knowledge. The documents were mainly addressed at ourselves. A specification written by **Mr. Gros** had to be comprehensible only to **Mr. Hlawaty**, who would prepare the **draft design**, or to **Mr. Bauer** who was responsible for implementation.

Ensuring that the documents were comprehensive proved significantly more difficult. Sensitive questions which hadn't been precisely considered were often left out of the written form, especially when it came to projection. This had also previously applied to "oral specifications", but now it became apparent much earlier on. By physically handing over the documentation, and confirming acceptance, the developer were now more concerned with receiving a detailed formulation . If a project which had been accepted is not completed in time, the projection can no longer be blamed. The documentation itself, which up to then had been very sparse, is an additional, positive aspect. We now have written detailed formulations which can thus be reproduced.

The Documents

With regard to the actual templates, instructions for filling them out were developed per phase, in order to meet the objective of quickly training new employees. In addition, for the purpose of the SPIRE programme we documented a small project using this system; this documentation was then set aside as a sample. A total of 18 documents were thus prepared during the course of the project. The scope of the templates is generally just two pages, while the instructions are three pages each. The effort involved in the actual development project depends largely on the complexity and size of the programme to be developed.

Using the Templates

The most important part of the project, however, is still largely ahead of us. The documents prepared are now actually to be used in the development process. In respect of our major programme, some sections have already been described and the advantages are already noticeable. The developers insist on complete specifications, and are thus putting the project management under pressure.

Unfortunately, at the time of writing the test sector has not yet been sufficiently tried; however, with regard to this sector we place great faith in this minimal necessary documentation.

The Results

The project management has improved significantly. We now have one. –

R. Bauer (Developer)

- The project led to serious discussions within the company which, finally, led to the resolution of burgeoning conflicts as well as to organisational adjustments.
- Processes are defined and responsibilities are clearly apportioned. Clear responsibilities are guaranteed even in the event of errors.
- By documenting entire projects the re-use of sections or whole systems has been significantly simplified.
- The extra effort involved can be kept very low.

Lessons Learned

Personally, I have shed many of my prejudices in respect of information-theoretical models. As Paracelsus already said, the dosage is what matters. The transfer of science to practice succeeds if you are familiar with the model, and if you take that which can be - on the one hand – implemented and which – on the other hand – will contribute to a product's success. I expect that improved goal orientation in respect of MY work will also lead to a significant reduction in development times. I also have the additional benefit of more precise project supervision –

Stefan Gros

Many of the problems we had up to now have fallen away due to the introduction of a standardised development process. We no longer have "… but we talked about that differently" or "… but that's not what was intended". Personally, I had serious reservations about procedural models, since they always seemed to me (at least in the form in which they were presented at university) impracticable for a company of our size. In our case, however, the practical implementation demonstrates that even "small" firms can benefit form the "paper war". –

Josef Hlawaty

One of the main insights was the improved assessment of our own situation compared to other companies which had participated in the project, an assessment also made through the statistical evaluations presented at the meetings. In view of this aspect, improved co-operation, or at least an expanded exchange of experience, between the SDDs is desirable. In addition to a uniform co-ordination in respect of exchanging knowledge, increased co-operation between serious suppliers would also be interesting, in order to increase the "hitting capacity" of the many small software producers. In a sector which is developing this quickly, it is very difficult to operate alone. We have learnt here that many other firms have the same problems as ourselves. Thus, the wheel is constantly being re-invented.

The co-operation with a research institute and external consultants was also new for us. Our university experience had prejudiced us: we were rather sceptical towards theoretical approaches. We remain sceptical, primarily with regard to cost estimates and metrics. However, we can profit a good deal, especially with regard to the implementation of theoretical models in our company's practical reality. We were actually able to separate the development process into individual sections, and – through a minimum of documentation – we were able to create the preconditions which allowed the processes shared amongst individual employees (a rather over-worked concept in respect of SPIRE) to be seamlessly interlocked. We still measure a developer's productivity using the LOC (Lines of Code), and we also do not yet estimate costs using function points. We have a system which seems practicable to us and which is tailored to the needs of our firm; and we have really been able to ascertain improvements in this respect.

To summarise, the project has significantly increased our company's "professionalism".

Without sacrificing flexibility, we have improved the quality of development (and thus certainly also the quality of the products developed by us). Unfortunately, there is still a long way to go towards translating this improvement into an active competitive advantage. It will probably never be possible to definitely attribute the results to this project. In addition, this can only ever be a beginning. In order to be the one tadpole amongst thousands which one day reaches maturity in the sea of the free market, ongoing improvement in **all** sectors must be the primary goal. Especially in the fast-moving EDP sector, it is important to always keep an eye on the long-term aspects in tandem with the daily routine.

Future Plans

The extent to which the system which has been developed results in an organisational change within the company will be of great significance. At the moment it still has the charm of all novelties and is being used. We will probably only be able to draw actual conclusions regarding its benefits in a year. Until then, the model will itself be subject to many changes in order to solve problems which are only detected in daily use.

However, we are all confident due to the high level of integration of all employees in the implementation process.

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