

Combining Predictability with Extreme Programming in Embedded Multimedia Project

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ABSTRACT

In response to difficulties encountered in an automotive multimedia project, several changes were introduced to help put the project back on track. It shows up that the new approach used in the project has many common features with the so-called agile methodologies. In the following paper, the project's history is retraced, describing the reasons for changing and the method introduced, that finally led to the project's success.

Keywords

Multimedia, embedded SW application, automotive, agile methodology

1 INTRODUCTION

The above mentioned project is constituted by the front-end (including graphics, video and audio processing) of a built-in car multimedia system. The project had to supply 2 clients at the same time, which had different delivery dates but closely related requirements, hence the initial decision to create a unique project team working on a 'platform'-based concept.

The project was launched end 1998, but both clients' requirements were extremely slow to take their definitive form: 1.5 years after they were still changing. Under the circumstances, the project was painfully out of control at the time, the SW development plan left in draft form because of its blurry requirements.

2 THE REASONS FOR CHANGING

In June 2000, after 1.5 years of development, and approximately 1 year before the mass production for one of the customers, the project lacked clear and complete specifications, and deliveries had currently 1 to 3 months delay, increasing with time. Team motivation was abruptly decreasing; turnover reached 60% in the last year, and knowledge loss became a very serious danger. Project management was covered as a part-time job and the Lead Engineer was a newcomer in the project.

Having successfully completed a project which allowed me to build a small but efficient team, I requested to take the project management responsibility for the ill multimedia project; the idea behind it was to integrate the project together with my whole team. Another argument in favor of that was that we knew the technical background well, since our freshly finished project constituted the communication interface to the multimedia system.

In July 2000 we officially joined the multimedia project. The first thing done was a global project status analysis. Here are the main findings:

- The project was lacking sufficient resources, and the team members had unclear and multiple roles
- The project team was divided and working in 2 separate rooms
- Integration and validation platforms were not sufficient
- The relationship with the customer (internal, represented by 2 other development organizations located in Germany) lacked mutual confidence
- A work schedule was existing, but project tracking and coordination was insufficiently performed
- Project risks were identified, but an action plan addressing risk mitigation was missing
- Project documentation had serious gaps, especially for the design part (mainly code was produced as output)
- Testing and validation activities were reduced to a minimum, no formal documents were used or produced

3 THE NEW DIRECTION

Starting from these findings, and from the fact that the client still defined its requests, several critical action fields were identified:

1. Create a work environment that favors maximum efficiency for the whole team
2. Put in place a project planning and tracking that will allow visibility to all stakeholders, including the customer
3. Install an efficient risk management process
4. Gain customer confidence and work in cooperation with him

To be noted that on the documentation aspects no actions were decided, unless of course to stop making the same mistakes and produce an acceptable documentation related to design.

It's mainly in the first listed domain, the work environment, that much energy was spent, because it was clear that without an efficient and motivated team nothing could be achieved. Several actions were started:

- Staff the team according to the work to be per-

formed and identify clear and complementary roles for everyone. The SW to be produced was divided in packages, and a responsible was appointed for each one. The Lead Engineer, Integrator, Validation Engineer roles were also appointed. The missing resources were found by recruiting both internal and external people.

- Share responsibilities with team members. To decide which work processes were best for us, team meetings were scheduled to address configuration management, error correction, validation and delivery processes. Also, technical issues were discussed with team members before approval by the Lead Engineer, and test and validation issues were addressed by the Validation Engineer.
- Appoint technical correspondents for each customer inside the team. Two of the most experienced people were given the mission to define together with the customer its needs, answer to customer's questions and check the product before delivery to the customer.
- Organize workspace. All team members were grouped in a single room dedicated entirely to design activities, while a 2-nd room was dedicated to integration and validation activities. This allowed full concentration on the difficult design activities, while leaving room for tests activities which require a looser attitude.
- Provide team members with the necessary tools and equipment. Several integration platforms were ordered to our workshops, and each team member had its debug toolset.

A project schedule was built for the following 3 months, based on negotiated delivery dates and contents. This allowed realistic commitments and the customer's confidence that these commitments will be met. In the process, several items were particularly observed:

- Estimate together with team members, in order to commit the involved people
- Identify and deal separately with parts of the SW which are stable from those still moving
- Schedule in the long term the stable parts and limit schedule to the next delivery for the moving ones

- Do not forget error correction activities
- Schedule deliveries at 2-3 weeks distance

Project status was regularly presented to the customer. A unique reporting document was distributed at the same time to the team, to internal management and to the customer.

To avoid inherent dangers in the project's evolution, a continuous risk management program was necessary. With the help of the team, a risk item list was created and actions were decided to address each one. The risks were tracked on a weekly basis. A similar approach regarding risks was used with the customer, which were tracked in the bi-weekly meetings.

4 THE RESULTS

The visibility given to the customer and the honest attitude made a big change in the customer's attitude. Very quickly, we set up a way of working involving both parts in getting at the same time a clear definition of what was expected and what was to be delivered. Communication and travel expenses rose, but the project progressed well and the encountered difficulties found quickly solutions.

After 3 months of working in the new organization, which saw the team growing to 18 people, the delivery delays lowered to a 3 days average. Rework generated by the lack of information or misunderstandings lowered also significantly. In spite of the difficulties, the morale was high and the project progressed well to reach the Start of Production (SOP) of both systems. When approaching the first SOP date, the team was reduced to 10 people, as foreseen by the project planning. This phase of the project was more difficult than expected because modifications were still requested by the customer but we had to keep the quality level of our deliveries.

It was with great satisfaction that we saw one of the multimedia systems awarded the "OEM Navigation System of the Year" by CONNECT magazine by the end of 2001. Our efforts were rewarded in an unexpected way.