⎢pdqm⎥

Development Quality Improvement

0. Business summary

0.1. About PDQM

PDQM supports clients in the software/hardware quality development, process optimization and quality management for many years. We are using international standards like CMMI, ISO26262, PMBOK but our major advantage is more than 20 years of experience from dozen of projects including real-time and safety-critical solutions. Our support is based on 3 major areas: process improvement, training and active involvement in projects.

Examples of the most relevant projects from our recent history:

- Responsibility for quality of the complete OSS solution for Vodafone (real-time software, telecommunication)
- Development of the quality management system for BRISK and project quality maintenance (safety-critical hardware solutions, automotive)
- Test manager mentoring and project testing observation (ČSAS, finance)
- Complete training programme for analysts and testers (SCIA Nemtetshek, technical solutions)

0.2. Our proposal

Our all projects start with the goals clarification. The proposal described in the next paragraphs is based on our common projects but we expect specification of your needs at the start of cooperation.

The process improvement should be based on current team communication practice as well as on the team and key personal skills. Thus, the first steps of the improvement should start with the review of current processes, their strong and weak points and definition of the optimal way how to make and promote changes.

During the whole process, the team should be partially involved in the changes development in order to accept the changes and be familiar with it.

The principal additional value that we bring to the improvement is in:

- Know-how of the quality management processes and procedures with the good knowledge what really works in practice
- Experience with the quality standards and norms that should be applied (e.g. ISO26262 for automotive system development, CMMI as a general standard)
- Capability to develop the software process development standards
- Good training and mentoring skills that significantly facilitate the changes

0.3. Expected results of our involvement

Our mission is to support the clients until the proposed changes really works and are integrated in the everyday operation. We are not leaving the project before the changes comes to the practice.

We expect the following results of our participation:

- Defined processes and procedures how the quality of the development ins managed since the early start of the project until the maintenance support of the produced solutions
- Defined templates and worksheets for critical tasks and output: Master test plan, Quality management plan, Risk plan, Metrics for the quality measurement

- Set up tasks how the quality tasks are integrated to the overall development process
- Set up responsibilities for all quality-related tasks
- Skilled staff (supported by the training and/or mentoring)

0.4. Expected scope of the project

The scope of the project is always scope-driven. We are able to develop the project plan after the entry analysis of the team situation. There are several aspects that significantly influence the scope of our involvement:

- How many teams will use the new processes and standards
- The scope of the training and mentoring included in the project
- The scope on the internal staff involved in the change process
- The level of formality of the internal processes (mostly driven by the size of the company and standards requirements)
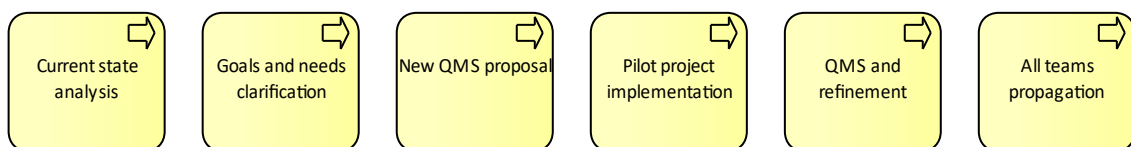
The most effective way of the improvement implementation process is its direct implementation to the running business project that manages the quality using the new standards. In this way, the PDQM quality manager is directly involved in the project, explains and trains people within the project tasks. This way is slower than then independent internal improvement project but it has several advantages:

- Since the tasks and their sense are directly presented in the project they are self-explained and more easily adopted by people
- The improvement is less-clogging because all tasks are related with the business project and the involved people do not have to switch the attention from the major project to the parallel internal software improvement project
- The probably of the success is much higher
- The total cost is lower since the tasks are necessary for the business project regardless of the improvement process.

We are ready to describe the way of the implementation on the meeting with your responsibles. We are looking forward for the next steps.

1. The improvement process

Any process improvement process consists of few general tasks presented at the diagram:

| Current state analysis | Goals and needs clarification | New QMS proposal | Pilot project implementation | QMS and refinement | All teams propagation |

1.1. The tasks

1.1.1. Current state analysis

The As-Is analysis is one of the most important tasks in the project. New proposals must grow-up from the current practice for many reasons:

- Total revolution is much more expensive than evolution and mostly fails

- The team should be able to fluently migrate from current practice to a new one. Migration is not only on the level of the tasks but also with the cooperation or quality task scope estimations
- Each type of the development has specific tasks and effective way of the team cooperation. It shal be considered in new processes.

The analysis consists of workshops with key team staff and output analysis.

The tasks output is brief process and task description of the current state as well as team and personal responsibilities for the quality tasks.

1.1.2. Goals and needs clarification and the project plan

The quality management does not have a single goal: "Bring a sufficient quality to the production". There are several aspects that should be clarified:

- The quality goals of the production (e.g. Real-Time, autonomous, Safety-Critical solutions have special quality needs)
- The standards that should be fulfilled (e.g. ISO2626 for safety-critical automotive items)
- Distribution of the quality assurance between the development tasks from the analysis till the autonomous monitoring mechanisms that operates during the product operation.
- The way how the quality is defined, observed and verified

The quality management process is far more than testing. It shall be closely related with the process tasks and we shall set up the cooperation model. E.g. it shall be negotiated if the automated unite tests are provided and who is responsible for them, or if they are provided in the embed environment or simulators.

Outputs of the task:

- Definition of the quality standards
- Principals how the quality is defined, monitored, and enforced in projects
- Responsibility of the improvement project
- Scope of the improvement project in relation to the responsibility

1.1.3. New QMS proposal

The new quality management system defines how the overall quality would be manages and enforced in projects. The quality management consists of several tasks and each task might have procedures, templates or relation with other project tasks. The QMS is proposed in several steps

- Definition of the process and its integration with other tasks in the development project
- Definition of the interaction between quality and development tasks (it encloses all productive tasks including analysis and design) in the projects
- Proposal of metrics and templates

If possible, ale tasks are joined with selected running project that uses the new QMS as its quality process. The PDQM consultant might be responsible for process implementation in the projects and directly cooperates with the project manager and the whole team.

Output of the task is the QMS definition:

- Process map
- Tasks description
- QMS Integration with the development process
- Tasks outputs and other process assets

1.1.4. Pilot project implementation

The QMS should be implemented in the pilot project in order to proof its usability and efficiency.

The PDQM consultant might be directly involved in the project or cooperates closely with people responsible for the quality management. He consults the QMS and provides necessary mentoring to the project members.

The output of the tasks is the verification of the process in the pilot projects and trained first QMS responsible.

1.1.5. QMS refinement

The first usage of new processes always brings drawbacks of the new model that should be adapted according the experience from the pilot project. Other process changes arise from the analysis of differences between types of projects that ComAp manages. The QMS should be universally usable for all projects and it requires more robust and universal project that could be used everywhere.

Task outputs are:

- Evaluation of the weak points from the pilot project
- Updates of the QMS process, tasks and related assets
- Tailoring criteria and recommendation for different types of processes

1.1.6. All teams propagation

QMS might be long-term successful only when it is widely adopted by all team members (not only the QMS responsible but also by the project managers and general managers). Our experience proved that the adoption is never "automatic". It needs explanation, propagation and support. The scope of the task depends on the scope of the changes size and complexity of the team and on the promotion of changes by the general management.

The propagation is not a time-isolated task and the end of the process but shall be provided continuously during the whole improvement process. The optimal way is a continuous communication of the proposal with the advisors (advocators) of changes in each team. These advisors informally spread news about the changes and could bring back a feedback that can be used for further process refinement.

Task outputs:

- Set of workshops that discuss the changes with the broad audience
- E-Learning course for all people explaining new procedures and standards. The course could be lately used for new people.
- Possibly other communication tools, if necessary (e.g. posters)
- Marketing information for clients. (It might look superfluous but the internal staff understands necessity of the quality easier when it is a value that is sold and requested by clients. Quality is not an internal interest but a business value.)

1.2. Scope of the tasks

The scope of the task has 3 dimensions:

- Level of involvement of the internal staff
- Involvement of the general management
- Support from the PDQM (the consulant)

We strongly recommend an involvement of the higher management responsible. He should be in regular contact with the project and people should see that the proposed changes are not something external (from PDQM) without direct connection with the internal tasks and duties. Although PDQM is

prepared for the complete QMS development and propagation, it MUST HAVE active support from the higher management. Then people understand that the changes is one of the company interest.

When the higher management is involved in the changes, they see the complexity of tasks and the scope of involvement. They can also easily manage the PDQM workload and cost.

The mentioned 3 dimensions are also interlinked in the total amount. The scope of the work should be split among all three groups (PDQM, project team and partially the management). If there is higher internal involvement, there would be lower PDQM allocation and vice versa.

2. The outputs

Outputs of the principal tasks are noted within the tasks descriptions. In general, there are outputs:

- **Process and procedures:** We are developing process model that describes the way how people work including responsibilities and outputs
- **Process assets:** The procedures are supported by templates of working materials and outputs, e.g. excel sheet for monitoring and evaluation of the testing progress
- **Training:** Both personal and e-Learning courses that describes the whole QMS. We are developing the courses in a way to promote the changes during the project but with aim to bring knowledge to a new staff after the project change and without our personal involvement. We recommend using e-Learning courses that describes the processes
- **Intangible support:** An important output is mentoring and promotion to staff. Although there is not written material, it is necessary part of the project because it break the ice and open the interest for improvement

2.1. Languages

All materials shall be in the language of the team (probably Czech) but the processes should be communicated and shared among the whole company. That's why we propose:

- Processes including all process schemas are bi-lingual in the Czech and English language
- All documents have brief English summary
- Procedures and trainings for Czech team are in the Czech language
- The training might be provided in Czech or English language according to the involvement of non-Czech staff (e.g. people communicating products with clients)
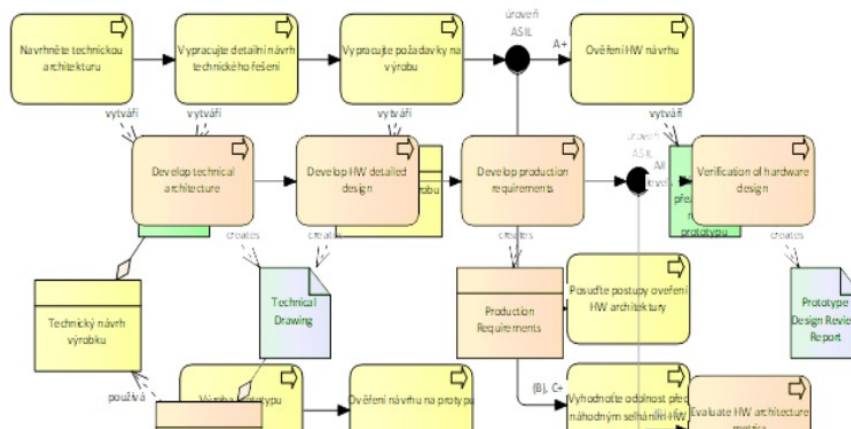

Illustration 1: Processes, roles and document names are bilingual

3. Known project risks

We have experience with several clients and the problems that occur with this type of projects. Most common risks are the following:

- **Loose focus on changes:** Although team starts with the interest for changes, it loose a time for changes and focus due to load of other work
- **Non-sufficient involvement of the higher level management:** The quality-focus and change of the processes should be in-hand the change of culture. There should be strong involvement of the higher-level of management. Without that the changes are like "guerrilla war" of few people without real interest of the team. After a while these advocators become tired and exhausted and the changes never significantly improves the overall quality
- **Resources:** The quality requires adequate resources, like good product documentation, tools for managing information, testing environment etc. If the resources are not provided, the processes cannot bring a significant improvement

All risks are well-managed if they are considered before the project start. Please, take focus on them since they are often success-blockers of an improvement project.