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COMMUNICATING ENGINEERING DESIGN - A CRITICAL SUCCESS FACTOR IN PROJECTS

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1. Introduction

Projects or designs fail frequently because they are not communicated well to the management of the company in which they are carried out. Communication of project proposals, project status and project results are vital to the success: the management takes the decision on whether to go ahead with a project or to take a finished design into production. The author believes based on own observations and previous research that the requirements on communication have increased - in terms of quality and the amount of data that has to be communicated. Mainly three factors are seen to be responsible:

- The necessity for designers to justify the own work during and at the end of a project has increased
- The management of engineering companies of today maintains less respective technical knowledge. This is due to the changed management duties and the increased complexity of engineering knowledge
- Designers have less time to present their work since the management has to absorb more information from more sources

This leads to situations in which the quality of communication of designers` work is more decisive than the quality of the work itself. Hence, supporting the designer to communicate well is as important.

2. Context of this research

In order to be as specific and helpful as possible to engineers as possible, this research focuses only on one type of communication: the official board-room presentation to top management. This is felt to be the most important one for success of projects and where recommendations can help most. Some principles explained inhere can, however, be applied to other frequently occurring communication such as memos, corridor communication, or across-the-table presentations to various groups such as colleagues or other people from other departments.

2.1 Related research

Much research has focused on success factors in designers' work itself [Dylla 1990], [Blessing 1994] but have omitted poor communication of the work as potential source of failure. Some publications [Pugh 1990] touch the problem by mentioning that only 60% of the projects that make it to the level of product specification go into production. However, in his research the reasons that lead to this are not identified. In some management literature [Minto 1987] partly applicable discussions on effective ways of communicating and presenting can be found, nevertheless, they are not addressing the specific challenges that designer face when presenting to top management.

2.2 Research data

The results so far base on various projects that were observed during a research project, own experience as a project engineer and two case studies. In both the author was asked to support designers preparing a presentation of their work to the top-management of their respective companies. In both the author could compare designers' ideas of communication and what management expected because he (i) he saw what the designers wanted to present initially, (ii) he was participating in modifying this to what was presented to the management, and (iii) he was present during the management presentations.

2.3 Types of top management presentations during a project

In the course of a project, there can be several management presentation that can be classified into three general groups according to their topics and goals as shown in figure 1 .

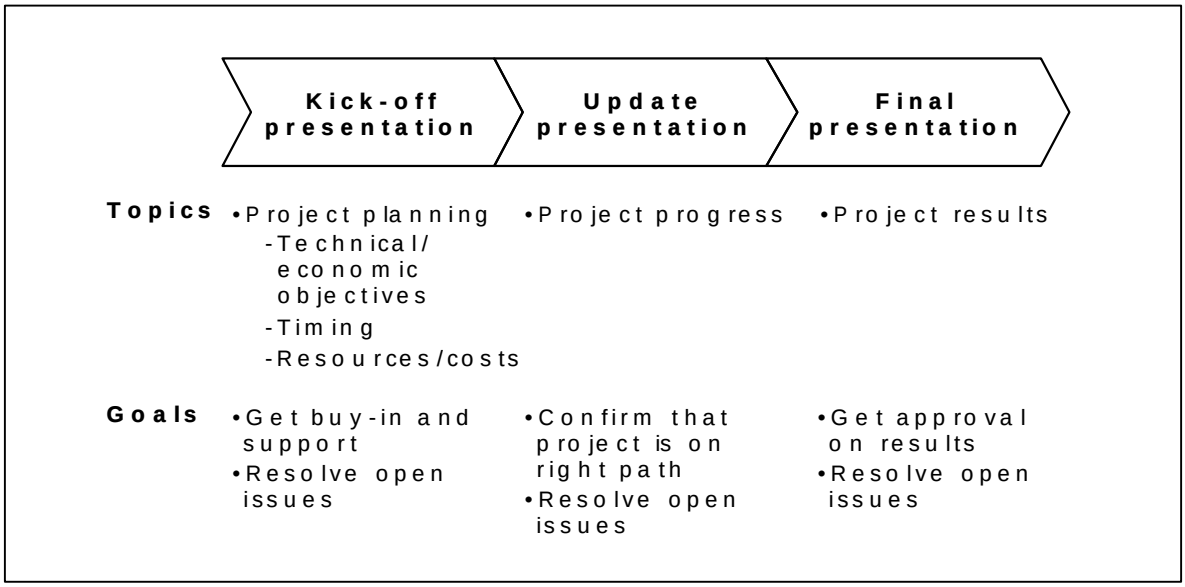

Figure 1. Three types of top management presentations

3. Observed communication obstacles in presentations held by engineers

The main goals that may engineers pursue with management presentations depends on the state of the project (as shown in figure 1): To get buy-in, to resolve open issues through a management decision, to confirm that the project in on the right paths, or to get approval on the project results. In order to achieve any of the goals, however, the management has to be informed clearly and efficiently on the issues that matter to them. This is rarely the case. The reasons why can be divided into four types as follows.

- **The storyline and content of the presentation is unfocused** – usually - if the engineers tell facts according to how they occurred during their work
- **No resonance is created by the given information** if the messages from engineers are not translated into the system in which the top management thinks: usually this is investment, revenue and profit at an overall business level
  Example: An engineer presented the idea for a new product line for a niche market to the management. He used as main argument to convince the management the profitability that such a product would promised. The management did not buy-in because they main goal of the company was to have a rounded product portfolio. They did not look for investment opportunities but stabilization of the current core business. This example shows that the goals of top management are not necessarily profit and have to be understood on a detail level.
- **The argument is not convincing** if the engineers discuss minor problems they had or will encounter on their way to the technical solution. If problems are brought up, the management

tends to believe these a major obstacles to the project success or need to be resolved by the top management.
Example: A project engineer discussed during an update presentation extensively the difficulties that he encountered during th project so far and how he could overcome all of them due to his technical expertise and capabilities of managing projects. In the following discussion the management showed strong concerns, whether the project is not too risky due to the fact so many difficult problems occur that until now could be solved but might jeopardize the project's overall success. The managemt's impression was incorrect: the difficulties that were discussed were the common ones that every designer has experienced during any design project.

- **The detail level is to high** if the engineers do not force themselves to focus on the few decision-relevant issues
Example: In an update meeting, the status of the project was presented to the management on 6 different dimensions. Some of these related to a assemnly group of the design, others to the work status of the collaboration partners. The management asked afterwards for an overall statement of the project status, although the given information beforehand was complete.

4. Recommendations for engineers

Seven recommendations have been developed, based on the research data, discussions and literature, in order to guide designers and project engineers when preparing and holding board room presentations to top management.

4.1 Framework for sequence of presentations of one project

Usually the engineer will not only have one presentation in a project but several ones during the course of the project as can be seen by the different types of presentation types in figure 1. Although these presentations have different topics and goals, the engineer should aim already in the first presentation to define a common framework around which all presentations are designed. To use the goals as general framework is easiest: In the first presentation, when the go-ahead-decision is taken, the goals will be defined or agreed on: usually they relate to the project objectives, the timeframe and required project resources. At the update-presentations during the course of the project, all project progress should be mapped against these original goals. At the final presentation the project outcome should again be mapped against the original goals. This way the top management can easily judge whether the project is critical or uncritical and whether the progress was sufficient and will feel more confident that the project is well on track.

4.2 Definition of goals of each presentation upfront

In order to focus the presentation preparation, the engineer should define for him/herself on a detail level what the goal of the presentation is and which reactions from top management should be triggered. This can be – dependent on the state of the project – very different as shown in figure 1. What the presentation should achieve, is of paramount important to decide the question what should be presented. Best way to do this is to formalize this goal definition process and to list (i) the decision that shall be taken, (ii) the information that top management shall take away from the presentation, and if known (iii) the information in which the top management is interested in additionally and will ask for if not provided (the last point is one that is specific to the preferences or styles of top management and can vary widely). Generally, the goal should not be to surprise (although, this is often the intention of engineers) but to conform to expectations . These 3 issues define the content and guide the preparation throughout. Surprisingly, such a presentation goal definition process has hardly been observed in preparations for project.

4.3 Structuring and story-lining of presentations

Two structuring principles have been found to help in presentations: (i) an executive summary upfront and (ii) the use of maximum five agenda points. Firstly, in the executive summary the main statements

of the following presentation are described. This helps the audience to follow the arguments within the presentation. Minto [Minto1987] calls this “top-down” structuring (to give the main statement upfront) and states that this is the single most important issue to clear presentation. This helps the audience to interprete the single points that follow in the way that was intended by the presenter. She states that without being told in advance the relationship between arguments, the audience hardly finds a right interpretation of the stated points. Secondly, the presentation should be structured by a set of simple agenda items. This paper proposes one exemplary structure that can always be used as a starting point (see figure 2) and be modified according to the situation: After the executive summary, a re-capitulation helps to remind the audience of the last presentation and the decisions that have already been taken (obviously, only if applicable). The main point of the meeting should follow the re-capitulation: relating the project status to the overall goals (or in the first presentation: defining the project goals). In an typical update meeting, it would include the activities since the last meeting followed by the current situation. If the need for discussion is anticipated or decisions have to be taken, this can be in separate item. The separate agenda item for discussion helps to avoid discussion during the other agenda points. A final (usually short) agenda item looking forward concludes the presentation and gives the management a feeling of comfort.

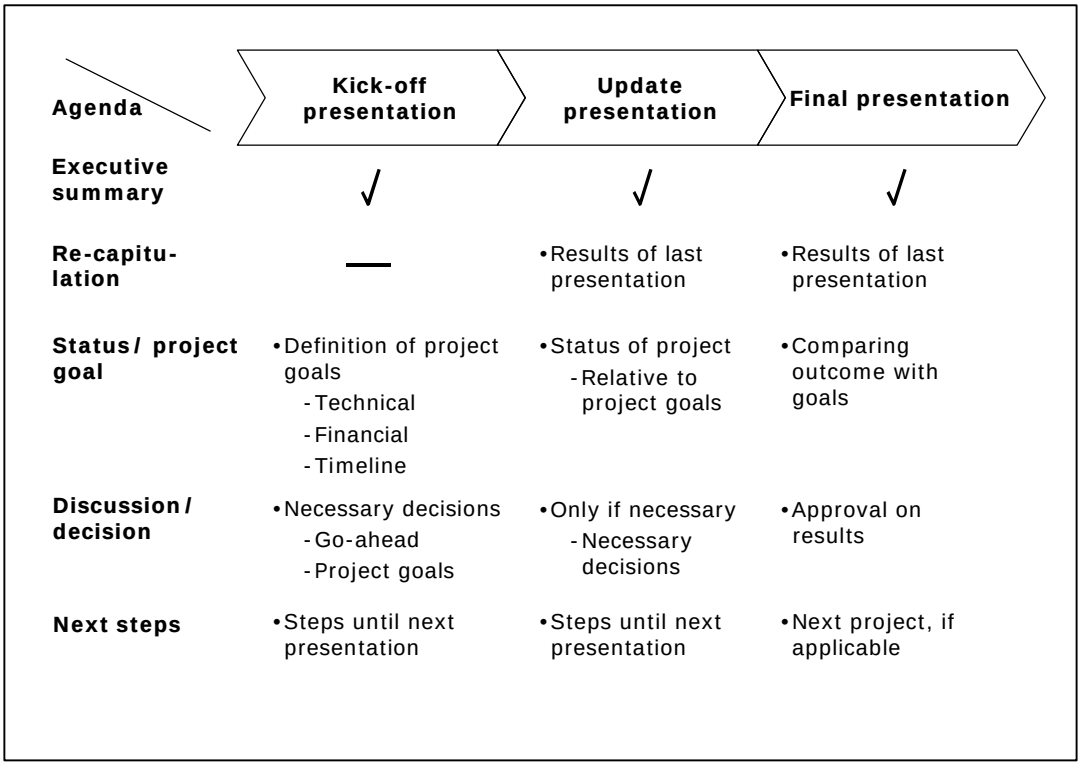

Figure 2. Proposed standard structure for presentations

4.4 Simplicity and consistency

In order to achieve the defined goals of the presentation, the engineer should aim to keep the presentation as simple as possible and ensure that all statements are consistent and plausible. Simplicity should be driven from two sides: the level of granularity and the selection of facts. The author’s observation and experience is that the right granularity level tends to be rougher than the one the engineer feels right. A good check can be to use the goals that have been defined before and to ask the question: Which information detail has to be provided to achieve the goals? The selection of presented facts should similarly be driven by their relevance for the top management and to the project goals. The top management will assume that each presented fact is meaningful to their judgment. E.g. a technical problem that has occurred but was solved or can be solved should only be discussed, if potentially influencing the project goals. The management would rationalize that the presented

problem has implication for the project, although there might be none.

4.5 Expect plausibility checks

The presentation and the status should be able to withhold plausibility checks. Since, top management will have difficulties to validate the statements in the presentation through detail understanding, plausibility checks are common. These can either be (i) checks on whether numbers or statements are consistent throughout the presentation e.g. do the parts sum up to the total, (ii) simple checks on functionality of the product (if possible), or (iii) relate statements in the presentation to facts that they know with certainty (e.g. “how can our company target with our product a market share of 30% one year after entering the market, if the current marketleader has a share of 18%?”). These checks are often for the top management main criteria whether to feel confidence and trust in the presented contents, especially when there is no working relationship between top management and the person responsible for the project.

4.6 Pre-discussion of presentation

In order to avoid discussions during the main presentation, the engineers should pre-discuss the presentation individually with the people who will be at the presentation. This helps in three ways: (i) important input that improves the presentation can be included upfront, (ii) people will not need to carry out their plausibility checks during the presentation – sometimes they will point out lack of plausibility to the engineer that otherwise would not have been identified upfront, and (iii) this gives the presenter a better standing against the potential opponents because their arguments are already known to the presenter. Pre-discussions of presentation is good in any case but particularly in cases of presentation dates that are supposed to be difficult.

4.7 Targeting audience to create resonance

In order to achieve the desired reaction from the audience (see goal of presentation), the presentation has to address what according to the audience is important and relates to their system of thinking. This means first of all, achieving an understanding of the system in which top management thinks [Luhmann1996]. Usually, the top management’s own goals are of financial nature such as revenue and profit, strategic nature such as market shares. The top management will judge implicitly or explicitly according to these issues or according to the project goals agreed at the beginning of the project. A presentation that is already relating to the thinking system of the top management will create resonance. E.g. the quality of the product should be translated in potential sales volume and this in margin contribution, similarly, the expenses and manhours that go into the project should be translated into costs and investment. The way of calculating depends much on the accounting practice of the company and should therefore be done in collaboration with accountants, otherwise this might create more confusion than resonance.

5. Conclusion

The research on which this paper bases has identified the need for better communication skill of engineers: (i) the success of designs and projects is dependent on this – often more than on the quality of the product, and (ii) in the current situation the skills of engineers have often not kept up with the increasing demand on communication quality. This paper gives some recommendations for supporting engineers in their communication, however, this can only be a start: (i) the recommendations relate only to a small area of the wide range of communication that engineers have to manage – board presentations to top management, and (ii) only a few, general principles have been discussed. Therefore, more research should go into further research in order to come finally up with frameworks and recommendation that can be used by engineers in industry and be used at university to teach engineering students.

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