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# Project Communication Between Designers and Engineers

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## **1 Abstract**

Why is it so hard for different occupational groups to communicate effectively with each other? One of the causes is that they have different educations, interests and work tasks. Something has to change, though. It is not acceptable that different departments are having severe problems communicating with each other. In accordance with the Swedish car manufacturer, where the dissertation was performed, the research was formed and planned. The current problem is that the engineering departments and the design department are having problems communicating and projects are stretching time limits. If the extended project duration is an effect of the deficient communication or not, cannot be measured, but can however be discussed and the views are widely spread. The aim of this master thesis was to define the current communication and to state proposals for improvements. The research was carried through by observations, a literature study of project communication, interviews with both project managers and project members, a web survey and spontaneous discussions with employees and colleagues. The result showed that some respondents consider the communication problems to be quite serious and therefore should be taken care of immediately while others do not consider it to be a problem, but believe there are other more serious problems in the organisation and in the management. The statistics from the web survey showed that most of the respondents trust each other, which is an important building brick when establishing a good communication. The researcher has, in the discussion and conclusion chapters, proposed actions for improvement. The proposals may seem simple in theory, but the hard part is to get everyone on board and willing to put an effort into the change process.

## **2 Introduction**

This master thesis from Northumbria University, Newcastle, and Chalmers Technical University College, Gothenburg, concerns the communication processes and techniques which depend on project management.

The author's interest for the current subject grew during the first university years when studying design and engineering. When working as a design engineer one can look from both the designer's view and the engineer's view, which makes one able to see differences and possibilities much easier. The author found early an understanding for the communication problems between the two sides, due to the different work languages. It is an interesting subject and hopefully will this research make difference for the company.

The importance of good communication within projects is significant and affects all project members, their work and the end product of the project. Deficient communication can lead to irritation among project members, conflicts, additional costs, misunderstandings, and the work environment feels less inviting. Project managers spend most of their time at work communicating and it is therefore important for all people involved that the manager is a good communicator.

It is a common problem that people in different departments at a company experience difficulties in communicating. Since most projects involve several departments it is crucial that they can communicate easily and effectively to avoid project failure or extended project duration with additional costs as a consequence. Pritchard (2004) states that communicative difficulties are cited as one of the main reasons why projects fail.

This study handles project communication between engineers and designers within a car manufacturing company in Sweden. This report highlights where and what kind the communication problems are in the organisation, how extensive the problems are, and proposals for improvements. The company is one of the leading car manufacturers in Sweden with a long history and a deep-seated work manner. The company desires to deliver a safe product in time to the customer and in order to accomplish that it is important to make a good start and also finish the projects in time. In former days, the organisational structure was slightly different with more obvious project divisions where it was more common to sit together with the people involved in the same project. Today, aggravations occur; project members are spread out at different departments and buildings. The current way of communicating occurs mainly at meetings and by filling in charts and lists of who does what and how far they have come in the process. All the administrative work, as well as the meetings, are very time consuming.

The aim of this master thesis is to act as a base for the company when starting the process of improving communication.

This dissertation has a purpose to investigate the current situation and propose actions for improvements. The research will hopefully act as a guide for the company and be a starting point towards a better communication.

### 3 Theoretical framework

#### 3.1 General communication

When looking up the word *communication* in a dictionary the definition is “the exchange, transmission, or sending and receiving of thoughts and messages. To communicate is to have an interchange, to express yourself so that you are clearly and readily understood”. The definition of communication is culturally relative. It also depends on if the person believes that he or she communicates a message or thought to another, or whether, through communication, he or she creates or discovers meaning (Hofner, Mikk, & De Vries, 2005).

Communication is an outstanding facilitator of relationship development and effectiveness. The frequency of the communication is what makes a successful relationship differ from an average relationship. It is difficult for relationship participants to think in terms of inter-firm relationships without thinking of interpersonal relationships, as they daily are working closely with individuals (Kasouf, Celuch, & Bantham, 2006).

The possibility to receive excellent communication skills involves everyone in a project and makes the project members interested in the subject. The purpose of communication is to get a message across to others. The person who speaks is the sender and the listening person is the receiver. A message is successful only when both the sender and the receiver perceive it in the same way. To send the message, the sender must understand what the message tells and what audience it is sent to, and how it will be perceived. The situation makes a difference, such as cultural and situational context (Fowler, 2006).

According to Kasouf et al. (2006) there are different aspects of communication: frequency, information flow, quality, and specific behaviours. The specific communication behaviors are usually four:

- *Non-defensive listening*: Focusing attention on what a person says and at the same time trying to really understand their view. Requires self-restraint to not interrupt or dispute the other’s perceptions.
- *Active listening*: Attention and interest are totally conveyed to the partner. Signs of interest and listening are given, such as eye contact, nodding, and verbal prompts. With this communication behaviour the listener summarizes what the partner has said and validates the partner’s viewpoint.
- *Self-disclosure*: An open and honest form of communication that can create deeper relationships. With this communication behaviour a relationship’s needs and expectations can be surfaced but it requires courage and trust.
- *Editing*: Contains courtesy and politeness and makes the communication actively managed to selectively minimize negative exchanges.

Hofner et al. (2005) claim that communication includes many components, depending on the model used for analysis, but has generally four:

1. The medium or channel (face-to-face, telephone, television, mail, e-mail, and language).
2. The communicators (sender and receiver, speaker and listener, writer and reader, performer and audience, or group of people discussing).
3. The message (content). The message people receive is often not the message that was sent.
4. Filters of interference, mechanisms that distort intended and perceived meaning. It is a marked difference between perceiving meaning in what is actually said, the *words*, or perceiving meaning in the body language, the intonation, the place, or who is present, the *context*. When stating these different ways of thinking the difference between communication and communication style becomes indistinct.

There are many different ways of communicating and how to deliver a message.

According to Strider (2002) all communication is delivered on five levels:

- *Cliché*. This level of communication is the most superficial and least revealing of the communicating person. At this level small talk, breaking the ice and chit-chat occurs. Clichés permit people to be social but not too personal.
- *Information*. At this level people communicate by conveying a message that is more substantial than platitudes. People give information without revealing too much of themselves and can filter information, giving only the total truth. This kind of communication occurs only to a small number of people and comes from deep down inside the person. Some people may not communicate information that feels safe giving.
- *Opinions*. When people communicate at this level, giving opinions, they start to reveal more of themselves because opinions are personal. When sharing an opinion the receiver can find out things about the person sending the message.
- *Feelings*. Feelings are very personal, probably more than opinions because feelings describe the emotional state of a person.
- *Total truth*. The fifth level of communicating is telling total truth for fear that the truth might hurt someone or drive them away.

### 3.2 Interpretation

Misinterpretations are a big problem when communicating. When a project manager sends a message downwards it can have a whole different meaning when it reaches the bottom. Face-to-face communication is considered to be the best way of communicating but only if the message or conversation is interpreted as expected of the sender. According to Strider (2002) a powerful leader should continually work hard at being understood and at understanding others. Although, understanding does not automatically mean agreement or acceptance but it is a step in the right direction.

A lot of things can go wrong when talking to a group and the risk of being misunderstood or not understood at all is common. Strider (2002) means that the receiver can get your words wrong even if everyone speaks the same primary language - the imprecise use of words, not having the receiver's full attention; the influence of input and response filters can distort the message. It is important to be as precise as possible and make sure that the receiver pays attention. The receiver can also incorrectly interpret the words, which can show right away or much later and give odd results. To



avoid misinterpretation the sender can use *by that I mean*, and similar phrases, to clarify the message. Another issue is when the receiver does not know how significant the message is to the sender. The sender must communicate the significance of the message to be listened to with attention by the receiver. To avoid this, the sender should tell the significance the message has.

Alessandra and Hunsaker (2005) handle the subject Interpersonal Communication and mean that interpretation of words or phrases varies from person to person and that it is important to verify and clarify the message and avoid assuming to understand the intent of a message. Alessandra and Hunsaker give a few guidelines to facilitate the interpretation of a message. The first guideline is to use feedback, give and get definitions during the process of questioning and listening. A person should never assume when having interpersonal communication. The other person may have a totally different frame of reference and therefore thinks and feels different. If a person makes assumptions it is a big risk that he or she is being incorrect. When people are interacting it is useful to ask questions to test for feedback. Clarifying questions, expansion questions, direction questions, fact-finding questions, feeling-finding questions, and open questions can be used freely during conversation. Another important factor is to speak the same language. Language in this context can be technical terms and company jargon and it is easier for the other person to understand if the sender of the message simplifies the language and the terms. Alessandra and Hunsaker also recommend constantly being on the lookout for and recognising the nonverbal signals that indicate that the other person is uncomfortable and are losing interest. Another guideline is to give feedback on the behavior, not the person, but sometimes it is best to withhold feedback and wait until it is clear what the message really meant. The writers also explain that feedback can reduce interpersonal tension and create a sense of trust and credibility between co-workers. It is an important part of communication in the workplace and it is powerful to use feedback to improve the relationship by letting the other person know what is going on in the relationship.

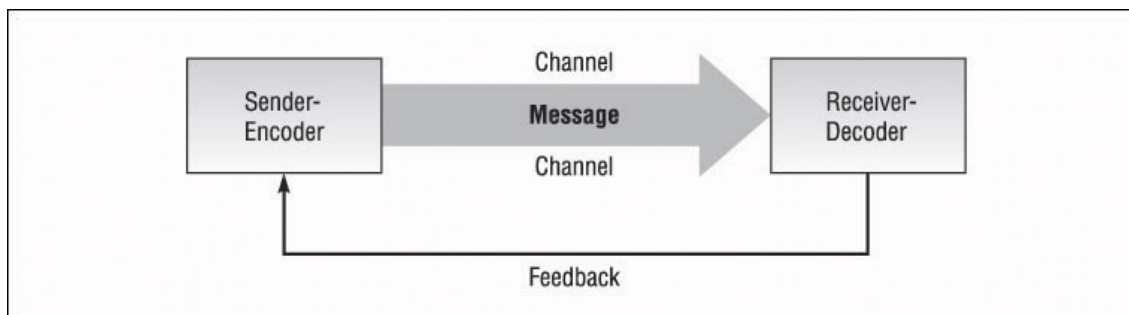


Figure 1. The Berlo model of interpersonal communication (Source: Lashley & Lee-Ross, 2003, online).

Through feedback, it can be determined which areas to spend more time on and which ones need less time. The increased sense of mutual understanding will lead to less interpersonal tension, increased trust and credibility, and higher productivity. Everyone wins when communications are clear and open.

### 3.3 Attitude

It is important to have a suitable and respectful attitude when entering a project or meeting. The attitude of a person shines through very clear and can be a sign of disrespect towards the management and project members or lack of interest of the subject. A positive attitude towards work and co-workers will make the work easier and a more meaningful cooperation will grow.

Biases can be a hard problem to tackle in the project team, but is still something that needs to be eliminated as good as possible. Thiederman (2003) means that the reason to why we are so vulnerable to acquiring biases is that deep down we believe they benefit us in some way. Thiederman also claims that we like to think that our biases enable us to predict the unpredictable and that we can predict the behaviour and character of people different from ourselves.

Respect is something that just needs to be present when working in groups. Without mutual respect for each other the collaborative work will get destructive. Why people at a workplace experience a lack of respect can depend on many different reasons, and some of them can be lack of understanding for another's work, differences in basics, and disagreements about how to perform a task or lead a group etcetera. Topchik (2001) means that everyone has reason to become negative about his or her work or his or her organization from time to time. When negativity becomes a routine attitude for you, your co-workers, and the entire company, it can begin to eliminate performance. Signs of negativity can be: work is constantly criticized by others, good work is seldom praised or recognized, individuals work in isolation from others, destructive conflicts exist between departments, stress levels are too high or too low, and departments are constantly being reorganized. Most of the cases of negativity depend on the following factors:

1. Lack or loss of competence.
2. Lack or loss of community.
3. Lack or loss of control.

An active plan towards a better project environment and a more respectful attitude in projects is crucial in order to have a sustainable and healthy co-operation with other departments. To show respect is often more valuable than to say the right words, when interacting with people.

### 3.4 Communication channels

The project members and managers at the company where the research was made communicate via e-mail, face-to-face interaction, and telephone. Meetings are the most common way of gathering everyone and this is when decisions and discussions are handled.

Smith and Mounter (2005) refer to Russel Grossman, the BBC's head of the internal communication function, who means that the most successful internal communication team is one with a diverse set of skills. These should include marketing, organizational development, journalism, public relations, change management and more. Grossman

also means that diversity in terms of life stage is important – some is passing through and some is making a life-long career.

Flannes and Levin (2001) claim that the communication facilities used in today's work environment gives the opportunity to rapidly share information to a large number of people. Such efficiency is required today, given the scope and complexity of projects and also since many project members can be placed at different locations. A negative effect of e-mails is that it can be hard to address the importance of the information. Some people may prefer receiving a phone call or having a face-to-face conversation where they can read the body language and see face expressions.

Face-to-face interaction and conversations seem to be the most effective way of communicating, since the risk for misunderstandings and misinterpretations decrease and the persons involved are able to see the body language of the senders and receivers of the messages.

### 3.5 Cultural diversity and bridging

Cultural diversity in projects can sometimes be a high obstacle to get past. Language, ethics, habits and work procedures can differ and make it hard to work together. Religion is also a sensitive issue that can split a group if the project members are intolerant or cannot respect religious diversity. It is important for a project manager to be aware of and understand the cultural biases of the group members. Cultural diversity is becoming more common and especially at large companies. Verma (1997) means that cultural diversity poses special project management and team-building challenges.

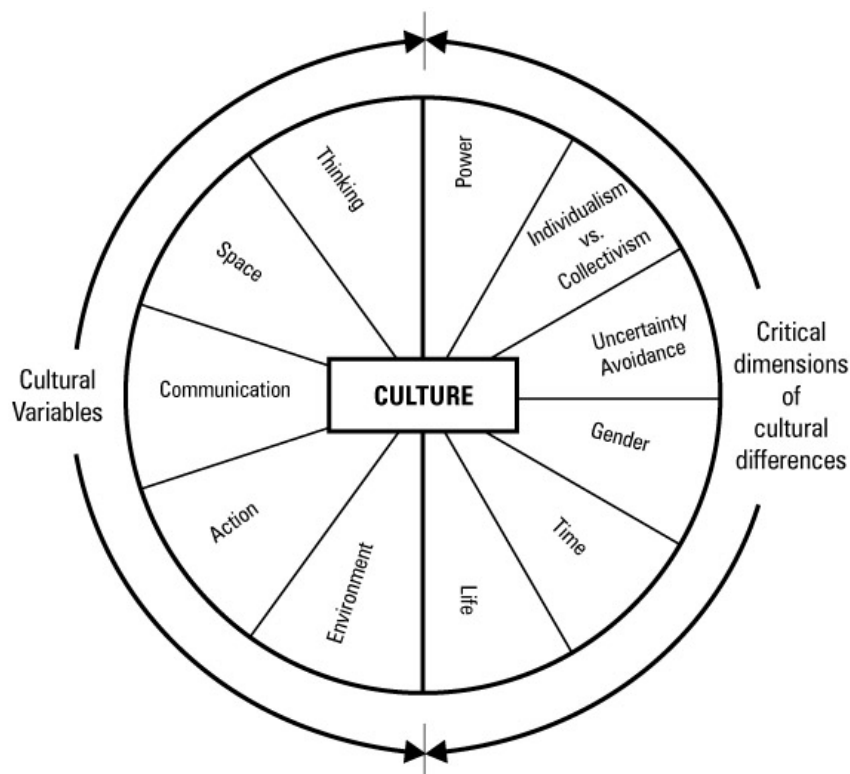


Figure 2. Critical dimensions of cultural differences (Source: Verma, 1997, online)

### 3.5.1 Bridging

Gerzon (2006) brings up the same problem that exists at the company where the research was made. It is important to have a “*we*-mentality” in the company, it is critical in the bridging process. A part of *they* and *us* in the conflict must turn into *we*. It must be clear to everyone in the project that they are striving for the same goal with the same resources, otherwise it will not be easy to co-operate or maybe even reach the goal. Gerzon means that when this *we* emerge, the bridging leaders can form a “third side” to the conflict that can take steps in the direction toward spanning the divides. The chances of succeeding will increase drastically if two or more leaders are able to bridge differences between them into opportunities. When *us and they* shift to *we* the tension between the two parts turns into energy directed toward the problem. A factor that can make this shift happen is when a person or a team says “*we* have a problem” or “*we* have to achieve a solution”. According to Gerzon (2006), science shows that bridging helps companies to function effectively.

### 3.6 Distances

Large distances between project members who communicate often can be a problem that is hard to resolve. The distance between departments within the same building can be as difficult as if they were in another country. The car manufacturer in this research is a big company and has large distances between buildings and departments.

Hinds and Kiesler (2002) mean that research from the fifties shows that close proximity among people affects the work process positively. The idea that work groups can be designed and distributed to take advantage of changing resources and opportunities, including social network relationships, is embraced.

Face-to-face conversation and direct observation are difficult or impossible when people are of larger distance from each other. Difficulties making decisions or working together can arise when there is a lack of face-to-face conversation. On the other hand, when alone it can be easier to work if no interruptions occur and some people value privacy and personal space more than others. People tend to feel more comfortable in private than public spaces.

The second major response to greater distance occurs when people move or are placed sufficiently far away that the costs of getting together are markedly increased. When employees work at locations more than approximately 30 meters apart, they have much reduced daily contact and less frequent informal communication. Physical separation from other employees in daily life and work drastically reduces the likelihood of voluntary work collaboration.

Table 1. Concepts and research findings related to proximity

<b>Concept</b>	<b>Psychological effects</b>	<b>Behavioral and group effects</b>	<b>Effects on work</b>	<b>Related factors</b>
Mere presence of others	Evaluation apprehension ↑ Sense of privacy ↓	Stress ↑ Distraction ↑ Effort ↑	Performance of automated tasks ↑ Performance of difficult tasks ↓	Work complexity
	Observation of and attention to those present ↑ Social pressure ↑	Involvement ↑ Imitation ↑ Social influence ↑ Conformity ↑	Urgency of proximate task, time spent on proximate group's work ↑	Competing tasks and deadlines
	Familiarity ↑ (mere exposure effect)	Liking, positive responding ↑ Group identity ↑	Contributions to group ↑	Time spent in presence of others
Face-to-face communication	Felt social contract (commitment) ↑	Cooperation ↑ Conflict ↓	Agreements ↑ Contributions to group ↑	
	Interpersonal attraction ↑	Group identity ↑	Agreements ↑ Contributions to group ↑	
	Information exchange, mutual observation, and backchannel and direct feedback ↑	Task adjustments, decision ↑	Coordination ↑ Learning and overlapping expertise ↑	Type of task
	Perceived participation ↑ Social pressure ↑ Persuasion ↑	Participation ↑ Group identity ↑	Conformity ↑ Consensus ↑ Work satisfaction ↑	Decision rules (e.g., majority)

Table 1. Concepts and research findings related to proximity

Concept	Psychological effects	Behavioral and group effects	Effects on work	Related factors
Shared social setting	Shared expectations and norms ↑	Roles and behaviors matched to situation ↑	Enactment of expected work behavior and roles ↑	Cues that demark situations and territories
	Territoriality ↑ Group identity ↑	Demarcation and protection of territory ↑  Interaction ↑	Control of work and access within the territory ↑  Work satisfaction ↑	
Spontaneous communication	Information exchange, mutual observation, and backchannel and direct feedback ↑	Group meetings and decisions ↑	Task adjustments ↑	Work interdependence
		Creation of interdependent tasks ↑	Know-how and overlapping expertise ↑	
	Interpersonal attraction ↑	Mutual understanding ↑	Social support ↑	
		Group identity ↑	Likelihood of collaboration ↑	
		Close ties ↑		
		Intentional contact ↑		

Note. Adjacent cells along the same row represent relationships shown in the research literature. (See the text for discussion and citations).

Arrow up = more of this quality increase the proximity effect.

Arrows down = more for this quality reduces the proximity effect.

When people are in the presence of an audience, co-workers or even others doing unrelated tasks, their performance changes. When they are working on easy tasks, the presence of others increases their alertness, motivation, and speed. On the other hand, when people are working on difficult tasks, the presence of others can be distracting, reduce accuracy, and increase feelings of stress (Hinds & Kiesler, 2002).

### 3.7 Project management

Heron (1999) means that when working in a project it is crucial to have a dedicated and experienced manager. The dimensions of management play a role at the workplace. The Six Dimensions of Management are presented below:

1. *The operating dimension.* The operational aspect of management – implementation of the plan, supervising work, structuring activities. The question to ask is: How can the work-in-progress of the team be supervised and managed?

2. *The planning dimension.* The power aspect of management – decision-making, work goals, and a programme to highlight the goals. The question to ask is: How can decisions about the objectives and work-plan of the team be made?

3. *The confronting dimension.* The confronting aspect of management – raising team members' consciousness about distorted behavior that is disturbing job satisfaction, work effectiveness or both together. The question to ask is: How shall the team's consciousness be raised about these matters?

4. *The meaning dimension.* The meaning aspect of management – five interrelated aspects of the meaning of work:

- The knowledge required to do the task.
- The learning acquired in doing it.
- Knowledge of the effects of doing it.
- The meaning the work has by virtue of its nature and how it is put together as an intelligent whole.
- The meaning the work has because of its wider moral and social significance in the world.

The question to ask is: How shall all five kinds of meaning be given to and found in the task of the team?

5. *The valuing dimension.* The intuitive, moral aspect of management – creating a work culture with core values, with an ethos of respect for persons and for their planet, one in which team members can be genuine, fulfilling their rights, duties and interests as human beings in their ecological context. The question to ask is: How can a work culture with core values, and a climate of respect and integrity, be created?

6. *The feeling dimension.* The concern for the affective aspect of management, which includes:

- Managing the fulfilment of human needs and interests in and through work - job satisfaction.
- Dealing with emotions and interpersonal relationships within the team where these are involved in or influence the task.
- Attending to empathy, participation, resonance, rapport of people in their total setting.

The question to ask is: How shall job satisfaction, emotions, relationships and resonance within teamwork be handled?

These six dimensions must be used together for effective management, and not separate. They have best effect when people are working together. The question to ask under each dimension includes two issues: what method will be put forward in any decision made, and who will make that decision.

### **3.7.1 The Three Modes of Management**

Heron (1999) presents The Three Modes of Management: The six dimensions of management can be handled by the manager in three different modes. Each mode provides a different answer to the question as to who should make decisions on strategies for each dimension.

### The Three Modes of Management:

1. *The hierarchical mode.* The manager directs the work of the team and decides the issues for them. The manager supervises work by direction, decides on the programme of work, confronts resistances, gives meaning to the work, manages satisfaction in the group, and chooses values for and inspire the in the work force. The manager exercises power over the team.
2. *The co-operative mode.* The manager shares authority and decides issues with the team. The team is more involved in the management process and the manager supervises work with the team through negotiation and creates a climate of mutual respect. The manager lead from within the team, generating, sustaining and guiding a working collective and shares power with the team.
3. *The autonomous mode.* The manager delegates authority to the team members; decisions on issues are made by them. The manager creates a climate of peer respect and the team is a self-directed peer group. The manager affirms the power that is exercised autonomously by the team.

### 3.8 Poor communication

Poor communication can lead to the following trouble areas (Project KickStart, 2003):

- Differences in expectations. Project managers need to ensure that everyone involved in the project have a common set of expectations in terms of what is to be delivered, when and at what cost.
- People are surprised. If people are not kept informed as to what is going on, they will be surprised when changes occur.
- No one knows what the state of the project is. Sometimes, people are not sure what the status is because the communication is brief and does not give directions of what is going on.
- People are impacted by the project at the last minute. The project managers have not communicated proactively with other people about things that will impact them.
- Team members do not know what is expected of them. Poor communication from the project manager to the team members about what they are expected to do.

The solution to this problem is to focus on the receiver, not the sender. It is not always a matter of lack of skills, but a lack of focus. Training can be necessary to be a good communicator.



### 3.8.1 Barriers behind poor communication

"Leadership and communication styles" presents a list of the most common barriers that is behind poor communication (National School Boards Association, 2006):

- Sender has poor knowledge of the subject or is inadequately prepared.
- Sender does not believe in the message or support the policy behind it.
- Receiver has poor knowledge of subject or is inadequately prepared.
- Receiver is not interested in the subject.
- Sender or receiver is temporarily preoccupied.
- People unintentionally fail to say what they mean.
- Sender and receiver have different vocabularies.
- Cultural differences exist between communicators.
- Professional differences exist between communicators.
- Communicators have different assumptions.
- Status differences (leader-member) exist between communicators.
- One of the communicators has negative or hostile reactions to the other.
- One or both parties are unintentionally miscommunicating.
- Outside interference or distractions have occurred.
- Pressure of time does not allow effective communications to occur.

According to GrandView Project and Team Management (2000), poor communication is the reason to late projects, over budget problems, short of goals or cancelled projects. They also claim that no matter how well you plan a project, the team will have to overcome unexpected challenges to succeed and the reason to project failures is the inability to identify and resolve issues as a group because of poor communications. Some of the factors to project failure can be: uncertainty about project responsibilities; team members are unaware of significant changes in status, scope, budget or deadlines; issues are undetected until they become problems; and problems are buried until they turn into disasters.

GrandView Project and Team Management (2000) also claim that the three most common project communication problems are:

- Lack of a communication plan.
- An inadequate information distribution and verification system.
- Failing to encourage early management of bad news.

### 3.8.2 Communication plan

A solution to the problem can be to provide the team with a communications plan; implement an information distribution system and promote an open and trusting environment. The only way to successful communication within projects is by planning. With careful planning the most difficult problems can be avoided and the smaller problems are easier to handle.

There are some basic questions that need to be answered when planning communication in all projects:

- What information is required?
- Who needs it?
- When do they need it?

- How will information be formatted and distributed?
- Who will provide it?

A very important aspect is to centralize communications. To have a joint database makes it easier for everyone to find what they need faster and they have access to whatever they might have to use to fulfill their tasks. Capture discussions, performance reports, action items, forecasts, changes, corrective actions, schedules and documents in one place. GrandView Project and Team Management (2000) recommend to communicate often and to face problems as early as possible to have enough time to handle it and solve the problem. They also highlight the importance of trust when dealing with a problem.

### 3.9 Ideal communication and project manager skills

The best way to successful communication within a project is to create a communication plan. The plan determines who needs what information, how they need it, and when it will be delivered. The plan also specifies team meetings, reports, expectations for reports, and expectations of communication among team members (Phillips, 2003). The importance of good leadership is crucial for a successful project. Leadership communication is about building trust and is an important part to receive credibility. To establish trust and credibility there are four main rules: *Speak the truth* – be straight, tell the facts; *Do not hide bad news* – let them see inside the organisation; *Never overpromise* – make sure you can keep the promises; and *Do what you say you will do* – maintain trust by filling your promises (Baltoni, 2003). There can be differences between professionals in communicating. Katz (1982) claims that engineering professionals collect and transfer important information into their project group primarily through interpersonal communications, rather than technical reports, publications, or other written documentation. However, some departments use terms and expressions that only they and their closest colleagues can understand. This can confuse and create irritation among other project members and departments. The information can be hard to transfer to other organisations, projects, or project members. A solution to the problem can be to rely on special boundary-spanning project members. With the help of these individuals, external information is channelled into project groups by means of a two-step communication process. At first the external information is gathered and understood and then they translate it into terms that are more meaningful and useful to their project colleagues.

Different ways of managing R&D project groups for effective communication is important due to their different ways of functioning. The type of work the group achieves is what makes a great deal of difference. Engineers assigned to more research-oriented projects have very different information needs and behave differently from engineers concerned with product and process development projects. These are quite different from groups involved in product modification and adaptation (Katz, 1982).

A study performed by Garcia, Kunz and Fischer (2004) showed that engineering project meetings can be shortened considerably with the right planning of meeting agenda. Meetings are important tools but they are still considered as a waste of time and effort. According to Fischer et al., the agenda itself is the reason for meetings inefficiency. A

case study showed the potential improvement on meeting effectiveness, efficiency and participation value, when applying the agenda planning method to engineering project meetings. The results showed an improvement of 30% in meeting quality and the meetings were reduced from three hours to one hour. The agenda planning is performed with help from the VCG planning mechanism. VCG was originally implemented to improve the revenue of sellers in auctions and the mechanism is used today for improving meeting effectiveness, efficiency and participation-added value by constraining the amount of irrelevant topics that go into a meeting.

### **3.9.1 Project manager skills**

In order to have a pleasant work place and motivated team members, encouragement and support need to be given by everyone but especially by the project manager. People need to be praised for their work; otherwise they will soon get tired of their work tasks and feel a lack of passion about what they create. It is often the passion for the job that makes employees go on, begin with new projects and continue even when it feels tough.

Other qualities that a project manager needs to possess are the ability to keep relationships healthy and updated, and to be clear and concise and explain when something is unclear to the project members. A supportive manager encourages the project members to come to the manager with questions and it creates a more relaxed environment in the group.

Flannes and Levin (2001) mean that it is important to have a well chosen team that can communicate in a project. Exchanging views, thoughts, information, and feelings help facilitate the formation of a team. This exchange needs to cover all channels – verbal messages, written documents describing project goals and specifications, e-mail updates, chats in the corridor or at lunch, and voice mail messages.

The communication skill of a person can be crucial for a message to be delivered to the receiver and also be understood correctly. Some situations require better developed communication skills than other situations. When negotiating in a serious situation it is extremely important to be a good communicator or else it could mean the loss of money or business. Effective communication is crucial for success for project managers (Taylor, 2006).

According to Taylor (2006), project managers spend most of their time communicating. They hold meetings; report to the team, customer, or senior management; listen to problems; solve problems; and constantly negotiate with functional managers for resources.

In the project management environment, there are four types of communication (Taylor, 2006):

1. Formal written (project charter, status reports)
2. Informal written (project notes, memos)
3. Formal oral (presentations)
4. Informal oral (conversations, team meetings)

Which one, or more, of these types of communication is preferred by the team members are very different depending on the company structure and culture and also on the team members and what they are used to. It is common that one way of communicating often is used at the company, even though it is not the most effective one, but people are used to it and continues therefore communicating with the chosen tools.

### **3.10 Difficulties with communication**

It is a common problem that information is not interpreted as expected and misunderstandings arise with following confusion. Clarity is the only way out of the confusion and patience is an important skill to have. Pritchard (2004) claims that difficulties with communication are cited as one of the main reasons why projects fail. According to studies by Blake and Mouton (referred to in *Mastering strategy* by Rigsby & Greco, 2002), when management is effective and relationships are sound, problems of communication tend not to occur. It is when relationships among members of an organisation are unsound with unspoken tensions that poor communication occurs. The quality of relationships within an organisation may depend to some extent on the level of communication effectiveness (Rigsby & Greco, 2002). Just as too much content can prevent communication, so can too little. Concise and clear is good. Opinions are also a part of communication and everyone expresses their opinions in their own way. This can be interpreted differently by people and be taken more seriously and harsh by some (Doar, 2005).

The sender of a message should send it in a language that is acceptable to the receiver. There can be problems identifying which language is acceptable and this is often based on perceptions. Designer's focus is on talking to clients in a language that they understand which will be different from the language used to communicate with other consultants, contractors and building users. A common language and shared values are wanted in the construction line (Emmit & Gorse, 2003).

A study with 50 R&D project groups that varied in terms of group longevity, as measured by the average length of time project members had worked together, showed that project groups became increasingly isolated from key information sources both within and outside their organisations, with increasing stability in project membership. The lack of communication affected the technical performance of project groups (Katz, 1982). Problems with communication can occur for projects working with development, due to their localised work. Katz also claims that they describe their solution approaches and limits very differently. The combination of interests and demands with such localised tasks and language schemes creates a communication boundary which makes it difficult for most development engineers to communicate with outside professionals and consultants about their project-related activities.

### **3.11 Conflict management**

A conflict arises when two or more interdependent people try to cope with incompatible ideas and goals. Conflicts due to incompatibility and disagreements are often inevitable, but can be turned to something useful if managed correctly. Gross, Guerrero, and Alberts (2004) claim that it is very important for individuals in a temporary task-

oriented group to manage conflicts competently, if they hope to be successful in reaching their goals. It can also increase trust, trigger positive emotion, decrease uncertainty, depersonalise disagreements, and lead to more successful problem solving.

If a group member is negative in his/her attitude it is needed to positively confront them.

- Give praise for what the person are doing well.
- Encourage the person if he/she feels outdated or do not have control over new tasks.
- Accept the negative attitude if it does not affect his/her work performance.
- The person may be a spokesperson for the group. Check to find out if the complaints are more widely held, and follow up to correct. (Phillips, 2002).

Frequent communication is associated with constructive conflict management according to Kasouf et al. (2006). Kasouf et al. refer to Helper (1991, 1994) who has found strong relationships between inter-organisational information flow and engineering-related problem solving. Poor communication is often the most important barrier to success in international purchasing relationships and early communication of specification changes was positively related to successful partnerships. According to Sharpe and Johnson (2002), The Centre for Creative Leadership (CCL) has developed a seven step process that could be helpful for managers and executives to become more strategic about managing conflict. There can be many problem-solving models found, but this process is different because it emphasizes the importance of self-exploration and discovery as part of the process.

The seven step process for managing conflicts:

1. Build personal awareness. Helps to understand why thinking/feeling in a certain way when reacting to a conflict.
2. Clarify the conflict view. Examine the own perception of the conflict.
3. Understand the perspective of others. The capacity to see things from another point of view is essential when managing conflict successfully.
4. Brainstorm solutions. Look for common ground and have a discussion with the boss.
5. Create an action plan. Make a plan to address the issues uncovered in step 4.
6. Implement the action plan. Update the boss on the progress according to the plan developed and discussed in step 5.
7. Evaluate the action plan. To learn how to better manage conflict in the future, review each conflict experience and record what have worked and what did not in managing the situation.

It is almost impossible to avoid conflicts with the boss, but successfully managed it can be a positive experience. Conflict, when handled right, can help to create a workplace that is rewarding and invigorating. Awareness of both the emotional (feeling) and rational (thinking) aspects gives you a more complete view of the conflict situation and persuasion can be a powerful tool. Three keys to persuasive communication:

1. Prepare the message. Clarify the ideas before sharing them and know where to take the message.

2. Focus the message. Consider the leadership style of the boss and review what have been learned about the boss's perspectives and expectations.
3. Seek feedback about the message. Ask for feedback from the boss and do not assume that the boss understands the message. Restate key points and work toward an agreed understanding of the message.

When members have a sense of their roles and the vision of the project, they often begin to engage in conflict and in fighting. Conflict emerges because the team members want to clarify their roles by showing their dominance or superiority. A conflict can also emerge because members disagree with each other and they often compete and act defensive, choose sides or factions, and sometimes even resist the need for collaboration with other team members (Flannes & Levin, 2001).

### 3.12 Trust

Trust has a critical role in influencing team effectiveness. The level of trust in project groups is crucial and the importance of it can in some cases be underestimated. Almost every form of teamwork involves interdependence – all team members must have trust in each other in order to reach the project goals. It is tight coupling that is the necessary ingredient for trust to be developed.

Lack of trust between project members is associated with added costs that are the result of decreased team effectiveness. If there is no trust present, the project members are likely to spend time and effort supervising one another, cheating, and documenting problems. Project members that spend time in monitoring and defensive behaviour have fewer resources to devote to the primary project task, which can result in productivity losses. The problem with lack of trust can hinder willingness to continue working in the project, they are unlikely to share information about problems, and decrease members' satisfaction with the team.

In a study performed by Knez (1996), it was presented that trust was highest among members that met face-to-face on a daily basis compared to those that met less often. Being able to detect and interpret behavioural clues that reveal intentions plays an important role in developing trust and cooperation (Wilson, Straus, & McEvily, 2002).

There are two key components of trust: risk and reliance. Risk involves that project members could experience negative outcomes, e.g. time loss, due to other members' behaviour. Reliance occurs when project members allow their fate to be determined by the other members. Their trust give them confidence to take risks to act without concern that other team members will take advantage of them (Wilson et al., 2002). Terry Mizrahi, director of Ecco (Education Center for Community Organisations), once said: "Trust is at the core of all meaningful relationships. Without trust there can be no giving, no bonding, or no risk-taking" (Berkun, 2005, p. 309). This shows how important it is with trust within projects, which contains a lot of meaningful and important relationships. However, trust must be earned. A project manager needs to be honest with the team to create trust. It is important to act like a judge, listening and viewing all sides and points o view. When the team trust their project manager they

provide him/her with crucial information that identifies problems before they become fires, thus creating an effective and efficient team (Rosen, 2004).

#### **4 Problem statement**

Time is money, especially in the car industry with the fierce competition. If the members of a project cannot communicate satisfactory they will spend unnecessary time that could be spend on important discussions related to issues concerning the project.

#### **5 Purpose statement**

As a student, the researcher takes the opportunity to contribute to enhance communication between designers and engineers within the car industry. By studying their communication it is possible to contribute with ideas and examples of improvements the project members might have missed before when considering the current communication.

The common communication problem within the industry must be decreased. This can lead to shorter project time, shorter development processes and improved work environment. The project members will feel more comfortable working with other departments if the communication is developed and improved and many misunderstandings and unnecessary issues will be eliminated. There are many designers and engineers working in Sweden today and there is a great possibility that they all have experienced bad communication sometime during their career.

#### **6 Research questions**

There are five main research questions which will act as a thread through this master thesis. The last one is the most conclusive.

- How do the respondents evaluate the communication between designers and engineers today concerning:
  - Efficiency
  - Cooperation
  
- Do the respondents trust each other or the project manager in terms of:
  - How work tasks are divided
  - Facilitating communication
  - Sharing and delivering information
  - Offering support
  - Delivering in time
  - Cooperation
  
- Does the communication encourage to:
  - Solidarity
  - Security

- Openness
  - Efficiency
  - Meaningfulness
- Are there any differences between project managers and not managers?
  - What actions need to be taken to improve communication between designers and engineers?

## **7 Method**

This chapter describes the methods used to conduct the research at the company. In order to get a good result, information must be gathered from different views. At first, a theoretical study of the subject was made including reading articles, searching for interesting books and websites on the Internet etc. The researcher also attended meetings to observe and listen to the current communication. Second, four interviews were carried through. The objective of the interviews was to get a good foundation for the questionnaire that was sent out later. During the interviews it was easier to achieve more of a discussion and an open dialogue than with the questionnaires or when attending meetings. The questionnaire, in form of a web survey, showed the mass' opinion about the current communication.

### **7.1 Design**

This research is of both qualitative and quantitative character, and the researcher chose to use both methods in order to get a good view of the problem and to cover all aspects of it. When performing both a qualitative and a quantitative research one receive both the overriding opinions of a large number of employees *and* the valuable and interesting deep-going opinions from a few employees.

The design of this research report is divided into three major parts. The first part is a theoretical study where literature is presented as a foundation for the following presented research. The second part handles the anonymous interviews – the questions asked and the summarised answers. The third part is about the questionnaire that was sent out to three departments. The results from the questionnaire were analysed, as well as the interview results, and conclusions were made.

### **7.2 Participants**

The following participants took part in the interviews or in the web survey.

#### **7.2.1 Interviews**

Four interviews were carried through and the selection of interviewees was made in consultation with a project manager at the company. The thought with the interviews was to get opinions from both project managers from the design department and the engineering department and project members from the same two departments. The



researcher got in touch with the selected interviewees and dates for the interviews was decided together.

The interviewees are anonymous in order to get honest opinions and eliminate the risk of missing out important information. If the interviewees would not have been anonymous they could feel frightened to share sensitive information or express opinions.

### **7.2.2 Questionnaire**

The selection of the people, whom the survey was sent out to, was made in consultation with a group leader at the company. The researcher wanted to reach three departments – Design, Interior, and Exterior. These departments work together frequently and are therefore a good target for the questionnaire. The survey was sent out via e-mail as a web link to about 750 persons at all levels in the three departments. Twohundred and two respondents answered the web survey. However, 25 individuals had not been involved in projects with the other department, resulting in 177 respondents. When about half the active time for the survey had passed, the survey was slightly changed to exclude project managers from answering question 9-15. Although, it did not matter if the questions were answered by project managers in the beginning of the survey, because most of them have project managers above themselves, which makes them able to answer the questions. In average, 27% of the respondents were project managers.

## **7.3 Instruments**

When attending and observing at meetings no instruments except a notebook and a pencil, were used. The researcher often attended the same weekly meetings and sometimes a separate meeting.

### **7.3.1 Interviews**

The interviews were digitally recorded in order to receive every word and eliminate the risk of missing something. The results were carefully listened to and analysed and then typed out on a computer. The interviews were semi-structured in order to have a more open and free conversation, but still planned with questions prepared in advance. The number of questions differs depending on the interviewee, but the average number was 34.

### **7.3.2 Questionnaire**

For the making of the questionnaire, Apsis Survey Pro was used. Apsis Survey Pro is a website, which the user need to be subscribed to in order to use the survey tool, where one can construct a web survey in a rather easy way. When the questionnaire was finished it was sent out via e-mail to three persons, at the three different departments, who forwarded it to the employees.

When the web survey was inactive, and no longer able to receive responses, the responses were exported to the statistics- and analysis software SPSS, where correlations etc were analysed.

The responses were registered as only an IP-address and can not be linked to any names.

## 7.4 Procedure

Primary data were gathered by four interviews and a web survey. The aim of the interviews was to further investigate the participants' view of the current communication with the other department. The interviews made a great impact on the result of the research and gave a deeper understanding of their work and the company's organisational structure and culture.

The interviews were performed separately together with each one of the interviewees, in order to avoid stress among them. The interviews took about one hour each and included employees from different departments at the company, including the engineering department, which is divided into two divisions; Exterior and Interior, and also the design department. The outcome of the interviews was assembled from the digital recording of the interview. The results from the interviews are displayed under the heading "Results".

Primary data were also received from the web survey. The first step was to analyse the interview questions and responses in order to formulate qualitative questions for the survey. The survey questions were more narrow and precise than the interview questions and it was important to formulate them so that no one would interpret them wrong and reply incorrect. The survey was active, and able to receive responses, for 15 work days, i.e. three calendar weeks. During the active period one reminder was sent out. The survey contained 27 questions for non-project manager and 20 questions for project managers. The results from the last question, which could be answered freely, were gathered and are displayed in Appendix C. The answers are also a foundation for the conclusion, where improvements and suggestions for further work for the company are presented.

When the activation period for the survey was over the responses were transferred to SPSS. The results from the web survey are displayed under the heading "Results" and in Appendix A, B and C.

Secondary data were gathered by reading articles and online books, and critically choose relevant topics and information for the research report. The secondary data acts as a foundation for the gathering of the primary data, and is a good introduction to the result in the report.

## **8 Results**

The results from the interviews and the questionnaire that was sent out are presented below. The interview material is summarized into a continuous text, to eliminate the risk of finding out who said what, even though the interviews were anonymous. The questionnaire results are presented as a correlations table and variance- and regression analysis.

### **8.1 Interview**

To find out what really lies behind possible communication problems at the company, four interviews were performed. The researcher met and interviewed a project manager from the engineering department, a project manager from the design department and a project member from each department.

#### **8.1.1 Project communication and project management**

The interviewees find the project communication relatively good and they believe that they have been lucky, concerning the issue, since many other projects have more serious communication problems. Some mean that there is always some kind of communication problems between departments. The main problems are lack of time and that the message often has got another meaning when it reaches the end receiver. It is hard to prioritise information and find out what is most important at the moment, which leads to the risk of prioritising wrong. The interviewees feel that there is a "we and them" mentality between the engineering department and the design department at the company, which is not helping at all to improve the collaboration or the communication.

The interviewees have the ambition to create openness, honesty, solidarity and security with their communication and they feel that it could be better than the current situation. It can be a bad thing to be too open as well because it invites other to pry in your areas. The individual affects and because of all the heavy demands and criterias in the project the project members' work gets affected negatively and therefore also the communication. There are a lot of factors that can destroy a dialogue in current work environment.

The interviewees think that the project managers are doing a good job concerning the communication, but it could get even better. It is not often conflicts are a problem at the company, but if a conflict arises at meetings etc, the project manager will have to interrupt and talk to them in private and try to solve the conflict. It often helps to get a perspective of the issue.

The interviewees think, with some uncertainty or exceptions, that their co-workers and project managers keep their promises and are trustworthy. Sometimes a delivery can be late, but it is often okay if the person who is responsible for the delivery or task, tells the manager at an early stage. The manager can then change the schedule for the following activities. It is certainly not appreciated if project members keep quiet about delays. Sometimes the members need to be reminded of deadlines and to keep track of tasks, responsibilities and deliveries. If there is not enough time to solve a problem or perform

a task it is important to let the manager know, so he or she is aware of it and can plan the rest of the time from it.

The interviewees have trust in their project managers and the information from them is generally clear and concise. Dialogues are the most common way of communicating, contrary to one-way-communication, but it can differ from one person to another and at what level or division in the company it applies.

### **8.1.2 Information flow and location**

Some think that the information flow is too large and that it takes too much time to go through all the administrative work and read all the e-mails that constantly are coming. The documentation is taking too much time - it needs to be done, but has to be limited. A project manager, or even a project member, can receive hundreds of e-mails in only one week. It is preferable to sit close to each other when working in a project and communicate face to face regularly and often, but the information flow needs to be of a more human character. Sitting closer together makes it easier to understand each other and the message cannot change along the way. It is very important to have respect for each other and also to have a constructive dialogue. The communication should be straight, open and honest and it should only be delivered relevant information to relevant people, which is easier when placed closer together. It is mentioned that the size of the company makes it more difficult to communicate efficient and it is suggested that everyone should be more integrated.

There are some obvious obstacles for optimal communication at the company. The interviewees emphasize that the distances are too large and some do not like that the design department is behind locked doors, because it makes them less integrated in the development process. It is also mentioned that the problem lies in the number of people involved in the project. The more people involved, the harder it is to communicate. Organisation is the key word. Another obstacle is the lack of time – the project members seldom have time to explain and show their results at meetings.

### **8.1.3 Knowing the co-workers**

When asking the question if the communication is affected of how long the group members have known each other the interviewees answered that communication depends on trust, and giving and taking. If a person is replaced by another person the process must start over and the newcomer needs to understand the history of the group and know about all the issues of the project. It is easier to work when group members know each other and feel comfortable working together. Sometimes it can require more discipline if the people know each other well, because the communication can not become a matter of routine. The communication also depends on the chemistry between the people involved. It is easier to get to know and work with some people and with others it can take much longer time, but in general it is easier to work with people you know well.

### **8.1.4 Attitude**

Factors that could facilitate the communication are more time, right people, mutual understanding and people being constructive. A change of attitude seems to be a step in the right direction. A lot of the people involved have the attitude “we and them”

which is very ineffective. It is important to focus on the product and realise that everyone are working toward the same goal. An attitude problem that has grown is that people only think of their own area and not for the car's or the company's best. The territory thinking needs to be eliminated.

There is sometimes a lack of respect in the projects. People tend to only focus on their own area and not their part of the whole picture. It is important to understand each other's work and interests. The "we and them" mentality that is a reality in some areas of the company is a strong indicator of that lack of respect exists. The design department can sometimes feel they are not allowed to make decisions on their own, but that the engineering department has to be present and state their opinion. This situation is experienced as very frustrating and it shows disrespect for decisions already made. When a decision is made, other departments might not accept or do not apprehend it as a decision.

### **8.1.5 Information access**

There seems to be different opinions and apprehensions whether both departments have access to a certain database or not. One of the interviewees claims that it is decided that the design department should not use the database, while another person says they have access to it but they are not interested in learning and using it. Although, all the interviewees seems to agree that it is a negative thing that the design department do not use the database. Reversely, engineering do not have access to designs' database, which some of the interviewees think is an irritating factor and that they do not in any way benefit from it in the development process. They all agree that a common database would be the best solution.

### **8.1.6 Success factors**

The interviewees were asked to answer the question what makes the communication work today and the answers were different. Some said that it was the passion for the work and others said that daily contact and regular meetings make it work. Another thought it was because everyone have a will to succeed and get over the obstacles they run into every day, while another person said that the project manager had a great part in making the communication work.

### **8.1.7 Planning**

Half of the interviewees feel that the meetings are too stressful and the other half feels that there are too many meetings. Some are scared to make a wrong decision because there is not enough time to think through the problem or issue. To prevent stress at meetings it is important to have an agenda and follow it carefully. A few paragraphs on the agenda are sometimes moved to the next meeting, to have time to discuss it and to have more time to get enough underlay to make a decision. It is also important that everyone attends the meeting and is a part of the discussions and delivers information and underlay - preparation is very important and needs to be done by everyone.

The project managers interviewed thinks that the agendas could be better planned, but there is not enough time or basis to complete or plan them very well to every meeting. It is easy to let a few extra paragraphs through, but it is mostly not a smart move because

it steals time from the other more important issues that needs to be discussed. It is preferable that the team comes to the project manager and asks for a few minutes on the agenda, but unfortunately that happens too seldom. It happens that people get disappointed because of the project manager's prioritations in the agenda.

### **8.1.8 Bad communication and how it affects the project**

The interviewees say what characterises bad communication is when people are not passionate about their work, have no respect for co-workers, are not concise, not enough prepared etc. Another characteristic is wrong information at the wrong moment to the wrong people. Bad communication can also cause people to walk out from a meeting frustrated. Not enough, or too much, communication is also not desirable.

The communication problems are most obvious when there is short of time and when the atmosphere is everything but pleasant. Sometimes it requires stopping communicating to get something done and be able to focus.

The interviewees were asked to what extent they think bad communication is the cause for extended project time, and the answers were widely different. One person believed that defective communication is one of the biggest reasons for extended project time whilst another did not believe that at all but that the cause is lack of preparations. A third person believed that the reason is superfluous- and circumstantial communication, which is on the other hand unavoidable. A fourth person interviewed cannot decide if the reason for extended project time is lack of- or bad communication, but claims that extended projects are getting more and more common at the company.

Lack of- or bad communication affects the project, its duration and its end product in many ways. It increases the cost – the worse communication and not enough preparations, the worse the end product gets. It is important to highlight the right questions and balance everything right. If vital information is not shared at the right moment it becomes like a wave on water, because it delays everything that follows, which costs money. The costs for extended project duration do not affect the team members personally, which is why some people might not care and that is a big problem. It affects the company and less cars are produced which means less cars to the clients and customers. Today's problem with less and less staff and more and more projects makes the problem even worse and the efficiency can only be improved to a certain limit. Time is money and extended project duration creates major costs for the company which they cannot afford in today's situation. A solution to the problem could be to prepare better before a project and decrease the distances between each other.

Sometimes a bad atmosphere can arise as an effect of bad communication and lively discussions. It happens that people get upset because someone has misunderstood when a task were supposed to be completed and are not finished when others are. It is important to not mix up personal issues with professional opinions and also to be able to let go of it when the meeting ends. A cause of discussion is also when someone were supposed to perform a task but has not been informed of it, which unfortunately happens quite often according to one of the interviewees. Mostly, people can get past the irritation or angry mood rather quickly.

### 8.1.9 Interpretation

Both departments use expressions and words that the other department might not understand, but the interviewees do not see it as an issue that needs to be taken care of. It is only natural that different expressions are used because there are large differences of the professions involved in a project at the company. If a person does not understand it is expected that he or she asks for an explanation. One of the interviewees mentioned that younger people are easier to work with and explains more. There is an expression guide to read for newly employed, but not many seem to know about it. It is the studio engineer's job to be a link between the two departments and interpret if needed, because the he or she often has knowledge in both areas. The interviewees think that the studio engineer performs the job well and another interpreter is not needed. The project managers also try to be a link and explain if something is not clear enough.

If misunderstandings occur, the causes are often that everyone does not look at issues with the same seriousness as others, which can happen with, for example, legal demands. Lack of knowledge, indistinctiveness, and too many persons involved are also reasons to why misunderstandings occur. One of the interviewees says that misunderstandings between designers and engineers are more common at this company than any other company the interviewee has worked for.

### 8.1.10 Evaluation

All projects are evaluated afterwards, where it is noted what has gone right and wrong, but the evaluation books are not really used for improvements in the next project. The interviewees claim that they get feedback when talking with co-workers and that experience helps a lot when running a project.

## 8.2 Results from the questionnaire

The results received from the questionnaire are here presented as a correlations table, a multiple regression analysis and variance analyses.

### 8.2.1 Correlations

Table 2 shows significant correlations (i.e.,  $p < .05$ ) and correlations with a high magnitude values (i.e.,  $r$  values  $> .30$ ), as follows:

- How people feel about the communication within project/s they are involved in is/are working today is related to how they experience the cooperation with the other department (design vs. engineering), and also related to to what extent the communication encourages to efficiency, solidarity, openness and meaningfulness.
- How people experience the co-operation with the other departments (design vs. engineering) is related to to what extent the communication encourages to solidarity, efficiency and openness.
- To what extent the communication encourages to efficiency is related to how clear and concise the information is from the project manager.

- To what extent the communication encourages to solidarity is related to how well people trust their co-workers in terms of offering support.
- To what extent the communication encourages to openness is related to to what extent it encourages to efficiency, security and meaningfulness, and vice versa.
- To what extent the communication encourages to meaningfulness is related to how well the agendas are planned and thought through.
- How people feel about the communication within project/s they are involved in is/are working today is related to how well the meeting agendas are planned and thought through.
- To what extent the project manager is doing his/her job concerning the communication is related to if the people involved in the project trust their project manager in terms of dividing work tasks, sharing and delivering information, and offering support, give praise and encourage the project members, and to what extent he/she is clear and concise.
- To what extent the project members trust their project manager in terms of dividing work tasks is related to to what extent they trust him/her in terms of sharing and delivering information, offering support, give praise and encourage, and to what extent he/she is clear and concise.
- To what extent people trust their co-workers in terms of co-operating is related to to what extent they trust their co-workers in terms of communicating if necessary and offering support.
- To what extent the communication encourages to openness is related to how well people trust their co-workers in terms of communicating if necessary.
- To what extent people trust their co-workers in terms of communicating if necessary is related to to what extent they trust their co-workers in terms of offering support.
- If the communication within the project is bad, to what extent people believe that it is the reason for extended project duration is related to how they feel it affects their work, and to what extent they believe it affects the project's end product.
- How people feel about the communication within project/s they are involved in is/are working today is related to to what extent they trust their project manager in terms of dividing work tasks, sharing and delivering information, offering support, give praise, and being clear and concise.
- How people feel about the communication within project/s they are involved in is/are working today is related to how well they think their project manager is



doing his/her job concerning communication, and if they trust their co-workers in terms of co-operating and communicating if necessary.

- What the respondents have answered on how well they trust their co-workers in terms of delivering in time is related to how well they trust them in terms of co-operating, communicating if necessary, offering support, and how well the meeting agenda are planned.
- To what extent people trust their co-workers in terms of offering support is related to if they think the meeting agendas are well planned.

**Table 2.** *Correlations between all the variables*

Variabel	M	s	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
1.	3,16	,86												
2.	2,96	,91	,51***											
3.	2,88	,91	,44***	,50***										
4.	3,34	,90	,15*	,23***	,47***									
5.	3,17	,95	,48***	,45***	,58***	,38***								
6.	2,64	,97	,55***	,54***	,45***	,31***	,57***							
7.	2,89	,96	,48***	,52***	,48***	,34***	,57***	,56***						
8.	1,27	,44	-,04	,01	,05	,05	-,03	-,02	-,06					
9.	3,38	,91	,41***	,24**	,28***	,24**	,29***	,23**	,22**	,09				
10.	3,40	,96	,31***	,06	,28***	,24**	,23**	,24**	,18*	-,02	,65***			
11.	3,50	,89	,31***	,11	,25***	,14	,21**	,16*	,19*	,10	,70***	,62***		
12.	3,40	1,03	,32***	,14	,27***	,27***	,22**	,21**	,20**	-,09	,66***	,68***	,61***	
13.	3,17	1,01	,29***	,08	,20*	,15	,15	,15	,20**	,03	,68***	,62***	,60***	,70***
14.	2,95	1,03	,33***	,14	,18*	,21**	,18*	,21**	,23**	-,01	,54***	,52***	,50***	,58***
15.	3,27	,87	,35***	,24**	,22**	,15	,22**	,30***	,16*	,06	,60***	,58***	,55***	,51***
16.	3,05	,92	,21**	,22**	,17*	,07	,21**	,22**	,18*	,07	,16*	,11	,11	,11
17.	3,58	,80	,30***	,23**	,27***	,03	,25***	,22**	,20**	,00	,04	,13	,13	,12
18.	3,40	,85	,36***	,28***	,28***	,07	,32***	,23**	,31***	,08	,23**	,17*	,27***	,17*
19.	3,38	,87	,22**	,27***	,32***	,08	,25***	,20*	,24**	,05	,06	,05	,10	,20*
20.	3,06	,98	,23**	,08	,15*	,15*	,17*	,11	,21**	-,06	,16*	,26***	,19*	,24**
21.	2,84	,90	,30**	,25***	,19*	,13	,24**	,24**	,35***	-,15*	,20*	,10	,23**	,24**
22.	3,43	,99	-,16*	-,13	-,12	,08	-,03	-,13	,01	-,12	-,05	,03	,01	,10
23.	3,94	,84	-,11	-,06	-,19*	-,05	,04	-,06	,07	-,13	,01	,01	,05	,05
24.	4,11	,85	-,10	-,06	-,08	,03	,03	-,01	,06	-,18*	-,07	-,03	-,05	,02
25.	3,05	1,10	-,26***	-,21**	-,14	-,12	-,17*	-,24**	-,20**	,03	-,24**	-,31***	-,03**	-,39***
26.	2,82	1,21	-,04	,03	,01	,16*	-,01	,06	,07	-,06	,03	-,07	-,04	0

\* $p < 0,05$ ; \*\* $p < 0,01$ ; \*\*\* $p < 0,001$  Note. Variables in Appendix A.

**Continued correlations**

Variable	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.	25.
1.													
2.													
3.													
4.													
5.													
6.													
7.													
8.													
9.													
10.													
11.													
12.													
13.													
14.	,73***												
15.	,56***	,50***											
16.	,16*	,11	,14										
17.	,14	,06	,08	,47***									
18.	,23**	,19*	,21**	,32***	,53***								
19.	,19*	,15	,08	,45***	,64***	,55***							
20.	,08	,15	,20*	,09	,05	,20***	,09						
21.	,24**	,28***	,26***	,32***	,22**	,27***	,30***	,26***					
22.	,07	,05	-,08	-,09	-,13	-,10	-,08	-,04	-,06				
23.	-,01	-,04	-,11	-,05	-0,1	-,05	-,01	-,05	-,02	,48***			
24.	,01	-,02	-,09	,04	,15*	-,09	,11	-,14	-,02	,59***	,37***		
25.	-,33**	-,27***	-,26***	-,16*	-,12	-,12	-,11	-,18*	-,15*	,04	,05	,08	
26.	-,05	-,02	-,05	,04	-,03	-,07	-,10	-,12	,00	,05	-,07	,12	,19*

\* $p < 0,05$ ; \*\* $p < 0,01$ ; \*\*\* $p < 0,001$  Note. Variables in Appendix A.

### 8.2.2 Multiple regression analysis

A multiple regression analysis was used to investigate which independent variables were most significant in explaining the variance in the respondents' replies to the question of "How they feel the communication within the project/projects they are involved in is working today". In fact, thirty-nine percent of the variance was explained by the equation, with an overall  $F$ -value of 4.95,  $p < .001$ . The most significant independent variable was: "Communication encourages to efficient work" (see Table 3).

Table 3. *Multiple regression analysis: Independent variables; communication encourages to efficiency, project manager is doing her/his job; dependent variable: how effective the communication is today.*

Index	Mean	SD	Std.Beta	$t$	$p$
1. Communication encourages to efficient work	2.64	.97	.24	2.58	< .02
2. Project manager is doing his/her job	3.38	.91	.23	1.96	< .06

Note.  $Adjusted R^2 = .387$ . ANOVA  $F(25, 156) = 4.95, p < .001$ . The scales ranged from 1 to 5, where 1 = Not at all, and 5 = Completely/Very much

### 8.2.3 Variance analysis

To answer the research question: "Are there any differences between project managers and not project managers?", an oneway ANOVA analysis was conducted. There were only three statistically significant differences between project managers and not project managers: "Are the meeting agendas well planned and thought through?", "In case of bad communication, to what extent does it effect your work?", and a tendency to significant difference for "If the project communication is defective, to what extent does it effect the project's end product?" (see Table 4). Table 4 shows the significant differences in the answers of project manager and not project managers concerning the two significancies. The first variance analysis shows that the respondents who are not project managers think that the agendas are better planned and thought through than the project managers do. The second variance analysis shows that project managers to a smaller extent, than the respondents who are not project managers, stated that bad communication has an effect on their work.

Table 4. *Oneway ANOVA difference between Not project manager and Project manager*

Index	Mean	SD	df	F	p
1. Are the meeting agendas well planned and thought through			1/171	4.02	.047
Not project manager	2.92	.87			
Project manager	2.62	.92			
2. In case of bad communication, to what extent does it effect your work			1/170	5.51	.02
Not project manager	4.21	.72			
Project manager	3.87	1.09			

*Note.* The scales ranged from 1 to 5, where 1 = Not at all, and 5 = Completely/Very much

Fifty six percent of the variance in the replies on question; “To what extent do you trust your project manager in terms of dividing work tasks?”, can be explained by the replies on the following questions; “How do you experience the co-operation with the other department (design or engineering)?”, “To what extent is your project manager doing his/her job, concerning communication?”, “To what extent do you trust your project manager in terms of offering support?”, “To what extent is the information from your project manager clear and concise?”, “To what extent do you trust your co-workers in terms of co-operating?”, “To what extent do you trust your co-workers in terms of offering support?”, and “Are the meeting agendas well planned and thought through?”.

Thirty seven percent of the variance in the replies on the question “How do you feel the communication within the project/projects you are involved in are working today?”, can be explained by the replies on “Does the communication within the project encourage to efficiency?”, and “To what extent is your project manager doing his/her job concerning communication?”.

The respondents who experience the meetings as too stressful differentiates from the respondents who replied that they do not think the meetings are too stressful, in other questions, with significance on how they experience the communication within the projects today, if they think the communication encourages to meaningfulness and security, how well they trust their project manager concerning dividing work tasks, sharing and delivering information, and offering support. They also differentiates with significance on how well they trust their co-workers in terms of communicating if necessary, if they think the meeting agendas are well planned, how they experience the affect on project duration if the communication is bad, how much they experience a lack of respect in the projects, and how much it disturbs them if the other profession (design or engineering) uses expressions they do not understand.

The respondents who do not get any praise from their project manager differentiates from the respondents who get praise, in other questions, with significance on how they experience the communication within the projects today, to what extent they feel the communication encourages to solidarity and security, how well they think their project manager is doing his/her job concerning the communication, to what extent they trust

him/her in terms of dividing work tasks, offering support and sharing and delivering information. They also differentiates with significance on how much their project manager encourages them, how clear and concise they experience the information from their project manager, how well they think the meeting agendas are planned, and to what extent they experience a lack of respect in the projects.

The respondents who think that the meeting agendas are not planned or thought through at all differentiates from the respondents who think the opposite on the same issue, in other questions, with significance on how they experience the communication within the projects today and the co-operation with the other department, to what extent the communication encourages to solidarity, openness, efficiency and meaningfulness, how well they think their project manager is doing his/her job concerning communication. They also differentiates in to what extent they trust their project manager in terms of offering support, how much he/she encourages and praises the project members, and how clear and concise they experience the information from him/her. Other significant differences worth mentioning are how well they trust their co-workers in terms of co-operating, delivering in time, communicating if necessary and offering support, how stressful they experience the meetings and how much it affects their work if the communication is bad.

## **9 Discussion**

The respons of the web survey was 24 %, which is a quite good number, so the outcome is interesting because it reflects a large number of people's opinions. Although, the communication is very different and of widely different quality in different projects. It would be wrong to state that there are serious communication problems within the company, because it can be very different depending on which project your in. This can possibly be the reason to why the opinions are so different and the apprehension of the current communication so divided – two percent think the communication is terrible and 5 % think it is very good. The majority, 43 %, answered in between, a three on a five graded scale.

When projects stretches time limits and durations, additional costs are added and deficient communication can be the cause. The communication in the company occurs at meetings and in the end it becomes a cost for lost work hours because everyone have to sit in meetings for several hours per day.

### **9.1 How the current communication is experienced**

When analysing the results from the interviews and the web survey it seems like half the respondents think that the communication problems between the two departments depend on the attitude, *we* and *them*, whilst the other half of the respondents do not think there are any communication problems between the departments, but that the problem is elsewhere in the organisation and caused by other issues. This ambivalence confuses the researcher and starts a long thought process about what can cause the communication problems and where the problems really are located. It is a common fact

that employees at a workplace have different opinions about how things should be organised and run, and how well or not well the communication works. It depends on preferences, habits and earlier experience. When the researcher faces this kind of two-faced work place it is hard to come to a conclusion and propose actions for improvements.

Some respondents mean that the issue with short of time and lack of money affects the whole organisation in general, and the cooperation between design and engineering in particular. It taxes everyone's energy to always make work more effective, on less time and with a smaller amount of money and it is probably only a matter of time when the limit is reached.

The researcher can, to some extent, recognise and understand the "*we and them*" issue, however, it is a high obstacle to get over. The company will not solve the problems if they continue as they have done so far. It is not enough if only one person are ready to make something about it, but everyone has to be ready to make an effort and perhaps give something up and maybe even move his or her desk to another location. Everybody have to be willing to improve communication. It is also very important for the departments to start think in terms of working towards the *same* goal and not as today, working for him- or herself or only for the own department.

Six percent think the cooperation between exterior, interior and design does not work, while only 1 % thinks it is working fine. The majority, 39 %, answered a three on a five graded scale. The cooperation between design and engineering seem to function narrowly, but only because they know they *have* to cooperate in order to construct and design a car. Whether or not the cooperation and communication is efficient, it is up to the people involved to decide. The researcher can however state that the communication can be improved drastically.

## 9.2 Trust

There does not seem to be any problems with trust in projects or within the company. On the other hand, a lack of respect is experienced by the majority of the respondents. When respect is not present at a work place it can cause serious consequences. The attitude issue is something emergent and needs to be dealt with as soon as possible in order to improve communication. Where absence of trust really exists, the cause is probably lack of respect, or the other way round. Disrespect can cause many sorts of communication problems and it is hard to cooperate with people one does not trust. It is just as important to trust the project manager as it is to trust co-workers. One has to rely on the manager that he or she divides the work tasks fairly, to the people who deserve it and have the knowledge to perform the task professionally and make a good result.

When analysing the results from the research it seems like the communication quality is very different in different projects. That might be the explanation why there are so different opinions and ideas about the current communication – some say it is ok but that the problems are to be found elsewhere in the organisation and some say that the communication is catastrophic. It is interesting that the opinions are so different about

the same issues – are some employees just not interested in the problems of the organisation and therefore do not notice them or do they really not think there are any? Or why do they not experience the difficulties as others do?

### **9.3 Communication encouragement and engagement**

The communication within the projects does not encourage to efficiency; although, it generates a feeling of meaningfulness and security to some extent. It is important to feel secure when working and to consider work as meaningful, but it is even more important to be encouraged to work efficient – especially with the short project duration and narrow budgets that exists today. When walking out from a meeting everyone should feel loaded with new energy and perhaps with new ideas – not as today, when people sometimes are feeling frustrated or not satisfied. It happens quite often that people are not given time to show their work or ask their questions due to lack of time and the number of paragraphs on the agenda, if such is used.

A feeling of openness is also desirable. Everyone should feel free to state their opinion, make a comment or ask their questions. Why the respondents do not feel encouraged by the communication, concerning solidarity, security, openness, efficiency and meaningfulness, can be explained by the lack of respect. When the attitudes have changed and the communication has improved the project members will hopefully feel more encouraged regarding the above mentioned areas. The size of the company and the large number of people involved, makes it harder to communicate and even harder to deal with the problems.

The engagement of people has an important role in the way the communication works and how it affects. People who are not engaged in making the communication work, has clearly no interest in creating an optimal work environment or get the best out of people. The level of engagement also has an affect on the change process which the company will go through when it is decided to improve communication. If people are not engaged in improving the work environment, including communication, the way to success will get even longer and rougher. Obstacles of people who will not cooperate probably do not realise or see the great improvements and the things to be won by making this change process a reality.

### **9.4 Differences between project managers and not managers**

Why do the project members think that the meeting agenda is better planned than the project managers? It might be explained by the fact that project managers feel there is not enough time to plan the agendas enough, but the project members might not see the difference between today's agendas and an agenda that is well planned and thought through. The project managers believe they can do a better job with the agendas. The outcome of the research also shows that bad communication affects project members more than it affects project managers. This might be explained by the project managers who deliver information to the project members while the members receive it, handles it and uses it. So, if the "users" of the information receive it in a less desirable way, they



get more affected than the sender. It is also the project members who communicate actively and effectively while the project manager is at the top of the chain. However, the statistical difference is rather small which shows that the situation affects managers as well.

The differences between the answers from project managers and not managers are quite similar, but the difference was more significant in the question to what extent the project's end product gets affected by bad communication. Project managers believe the product gets less affected than the other respondents do. What causes this difference can be many things, but one could be that the people who are not managers work more closely to the product and are in to it for a longer period, whilst the manager works more administratively and puts energy and work hours on leading the project and the group.

## **10 Delimitation**

There are many interesting aspects to focus on when performing a research of this topic and at the actual company. A lot of the company's communication problems and obstacles need to be examined and improved in greater detail and with more time, but the size of this research and the time limit forces the researcher to limit the research to current proportion. This report focuses mostly on communication problems between different professions, i.e. departments, concerning distances, different experience, different educations etc. Only four interviews were carried through and the questionnaire was only sent out to the concerned departments, i.e. Exterior, Interior, and Design.

### **10.1 Validity and reliability**

This research is based on the research questions presented in a previous section in this report. The aim was to answer the research questions with help from the theories presented in the theory section, and by analysing the results from the interviews and the questionnaire. The validity is therefore considered to be high. The questionnaire generates statistically significant results and the reliability of the research is therefore considered to be high. The researcher has been totally objective when observing meetings and interviewing employees, so the risk of affecting the environment or the employees is therefore eliminated.

Since the researcher has no earlier experience from this type of research methods or research work place, the findings can be seen as indications or important speculations but however the results showed statistically significant outcomes.

### **10.2 Methodological critique**

There is a risk that the questions during the interview have been misunderstood, but the researcher have tried to be as clear as possible and if the interviewee did not understand a question an explanation was given. Concerning the questionnaire, the context hopefully gave the respondents a hint of the meaning of the question if it was unclear or not obvious. If a few respondents have misunderstood a question or two, it should not

make a significant difference for the final result and certainly not for the conclusion of this research, since the number of respondents was quite high.

A heavier weight could have been put on the interview results if the number of interviews were more. The result from the current four interviews gave good insights and useful data, but could have been more reliable and useful if more interviews were carried through.

### **10.3 Source critique**

Considerations were given to whether or not the respondents answered honestly to the interview questions, or withhold some part of the truth. The interviews were published anonymously to make the interviewees more talkative. There is no reason to believe that respondents, interviewees or the literature study is incorrect in any way. There is no reason why the researcher should not trust the people involved in the research. Also the respondents of the web survey were anonymous, which hopefully made them reply honestly and give their true opinion at the last question of the survey.

A few respondents skipped a question or two in the web survey, which can indicate that they did not understand the question, were not able to answer it because they were not in the right target group, did not recognize the problem posed in the question or could not relate to it in any way.

Even though some of the information in the articles used in the theoretical study was from the eighties or nineties, they are still considered to be reliable.

## **11 Future research**

An even more detailed and careful research can be performed at the company by observing the communication more closely. For instance, one can investigate how they write their e-mails, how they share information on common databases, how they communicate on the phone and how they solve conflicts. The researcher did not have time to do this and chose to limit the research and exclude this kind of detailed observations.

The statistical results from the questionnaire can be analysed further and a new web survey can be sent out to cover the missing areas and get to the bottom with the cause of the existing communication problems. Preferable, more interviews could be performed with a number of persons from each profession and department.

## **12 Conclusion**

The company is in need of change in order to improve their communication and cooperation between the departments, mainly concerning engineering and design.

The researcher believes that the people involved in the projects experiences and suffers more of the communication problems than what shows. When observing at meetings there are no particular or obvious problems, but it might happen more during other periods or with other people.

Since this car manufacturer is such a fresh thinking and modern company, even though it has a long history, it would not in theory be any problem to implement an organisational change. Although, if it will work in practice is uncertain. It is a common problem for companies which has a long history and deep rooted work manners that the employees are scared of changes. The researcher believes and hopes that this problem will not occur at this company. A large number of the employees are young and new people are constantly employed, which is a fresh breeze and supplies new thoughts and engaged manpower.

## 12.1 Recommendations of improvement actions

It is not strange or surprising that these two departments have trouble cooperating or communicating, because they are so different - they work with different tasks and tools and they have different educations and experience. The designers have a totally artistic education, and maybe some of them have a technical understanding as well but is used secondary. The engineers have a totally technical education which makes them less understanding of the designer's work – even though they are working together and are communicating daily or weekly. What is strange is the resistance or reluctance against trying harder to communicate better. It is as if they do not want to be mixed together or get involved in each others work – as if they were thinking “you do yours and I do mine”. Although, this kind of attitude is destructive and it seems like, if not everyone but a part of the company, have realised it. Serious actions need to be carried through and everyone has to be a part of it, be engaged and most important of all: have a *will* to improve the current situation.

- A mutual understanding for each other's job is the first step towards a better communication and cooperation. With understanding comes respect, and with respect comes a more positive attitude. These three factors are the most important ones that need to be worked on in order to improve the communication between the two departments at the company. These factors would probably improve the communication between other departments who also have problems. These three factors are the foundation of the rest of the issues. If attitude, respect and understanding are improved the rest will probably get better automatically. It may sound simple to perform these changes, but it surely is not for a company as large as this one. The more people involved the harder it is. The change process might take several months or even years, but if it succeeds the result will be a better cooperation and communication and the employees will enjoy their work even more. In order to reach a better attitude and lighten up the atmosphere team building exercises and courses are needed. It is important and very efficient to create a better team spirit by socialising outside the work place and do exercises which will build trust and respect.
- A part of the change process should include to be closer located when working together in a project, if only for a period. It will make the cooperation run more smoothly and the communication gets more direct and misunderstandings will decrease. When communicating face to face the receiver of the message can read

the sender's body language, hear where emphasis is put, and see facial expressions. The sender can also see the receiver's reactions and get a hint of his or her opinion, even if he or she does not say anything.

- Another step in the change process is to have a well planned agenda and follow it strictly. The meetings need to be more controlled, so that everyone has a chance to deliver and ask the questions he or she wonders about. No one should be pushed down and then walk out of the meeting disappointed or irritated – it makes the whole idea with using an agenda worthless. Apply a certain time limit on each paragraph and make sure the most important messages are delivered in the beginning of the meeting.
- Evaluation meetings should occur regularly, concerning both the change process and projects. If it is discussed after a process or project how things went, how issues were experienced and taken care of, how the group worked together and how tasks were performed it is much easier to do it better the next time. Discussions start a thought process which can help improving and developing work processes.
- A matter of course is to use a common database which everyone has access to. By using *one* database the administrative work can be reduced if a better developed progress report is used. Today, heavy emphasis is put on progress documents, score cards and process charts. If one or two persons could develop *one* system for this kind of reports, and of course be used by everyone, it would increase the awareness and enhance the communication process. It is preferable to reduce the number information levels where misunderstandings can occur and information can get lost on the way.
- Planning is crucial for success. In a big company as this one, planning is of course done, but it must be done even more careful and better. A clear work routine need to be developed and no side tracks should be allowed during the project, in order to keep the time schedule and budget.
- A weekly responsible person could relieve pressure from or assist the group leader or project manager. This makes everyone regularly more integrated in the work process and gets a period of authorisation. This person can make sure that things happen, that decisions are made and that information are delivered to everyone or to the right people. If someone has a question, request or a comment he or she can give it to the weekly responsible. When someone in the team has done something good or in any way contributed with an extraordinary idea or job, the weekly responsible can give commendations to the person who deserves it. These activities create respect and team spirit.
- Focus on the company's core values, visions and goals when working together – not only on personal or the department's goals. Team spirit must permeate the whole organisation and the departments should focus on the same goal and realise that they are working for the same result. The departments are like a puzzle – without the other pieces there will not be a complete picture.

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## **Appendix A**

### **Survey questions**

The survey questions are presented below:

i. Are you working, or have you recently worked, in a project together with the design- or engineering department? Yes or No. If No, survey completed

1. How do you feel the communications within the project/projects you are involved in are working today? (1 to 5, 1=Not at all, 5=Very good)

2. How do you experience the co-operation with the other department (design or engineering)? (1 to 5, 1=Not so good, 5=Very good)

3. Does the communication within the project encourage to solidarity? (1 to 5, 1=Not at all, 5=Very much)

4. Does the communication within the project encourage to security? (1 to 5, 1=Not at all, 5=Very much)

5. Does the communication within the project encourage to openness? (1 to 5, 1=Not at all, 5=Very much)

6. Does the communication within the project encourage to efficiency? (1 to 5, 1=Not at all, 5=Very much)

7. Does the communication within the project encourage to meaningfulness? (1 to 5, 1=Not at all, 5=Very much)

8. Are you a project manager or similar? (Yes or No)

9. To what extent is your project manager doing his/her job, concerning communication? (1 to 5, 1=Not at all, 5=Completely)

10. To what extent do you trust your project manager in terms of dividing work tasks? (1 to 5, 1=Not at all, 5=Completely)

11. To what extent do you trust your project manager in terms of sharing and delivering information? (1 to 5, 1=Not at all, 5=Completely)

12. To what extent do you trust your project manager in terms of offering support? (1 to 5, 1=Not at all, 5=Completely)

13. To what extent does your project manager encourage you? (1 to 5, 1=Not at all, 5=Very much)



14. To what extent does your project manager praise you? (1 to 5, 1=Not at all, 5=Very much)
15. To what extent is the information from your project manager clear and concise? (1 to 5, 1=Not at all, 5=Very much)
16. To what extent do you trust your co-workers in terms of delivering in time? (1 to 5, 1=Not at all, 5= Completely)
17. To what extent do you trust your co-workers in terms of co-operating? (1 to 5, 1=Not at all, 5= Completely)
18. To what extent do you trust your co-workers in terms of communicating if necessary? (1 to 5, 1=Not at all, 5= Completely)
19. To what extent do you trust your co-workers in terms of offering support? (1 to 5, 1=Not at all, 5=Completely)
20. Are meetings often too stressful? (1 to 5, 1=Always, 5=Never)
21. Are the meeting agendas well planned and thought through? (1 to 5, 1=Not at all, 5=Completely)
22. If the communication within the project is bad, to what extent do you believe that it is the reason for extended project time? (1 to 5, 1=Not at all, 5=Completely)
23. If the project communication is defective, to what extent does it affect the project's end product? (1 to 5, 1=Not at all, 5=Very much)
24. In case of bad communication, to what extent does it affect your work? (1 to 5, 1=Not at all, 5=Very much)
25. To what extent do you experience a lack of respect in the project? (1 to 5, 1=Not at all, 5=Very much)
26. To what extent does it disturb you if the other profession (design or engineering) is using expressions that you possibly do not understand? (1 to 5, 1=Not at all, 5=Very much)

## Appendix B

### Descriptive Statistics:

The table below presents the descriptive statistics by mean, standard deviation and number of respondents.

	Mean	Std. Deviation	N
Question 1: How do you feel the communication within the project/projects you are involved in are working today?	3,16	,860	176
Question 2: How do you experience the co-operation with the other department (design or engineering)?	2,96	,912	175
Question 3: Does the communication within the project encourage to solidarity?	2,88	,907	174
Question 4: Does the communication within the project encourage to security?	3,34	,901	175
Question 5: Does the communication within the project encourage to openness?	3,17	,950	174
Question 6: Does the communication within the project encourage to efficiency?	2,64	,973	174
Question 7: Does the communication within the project encourage to meaningfulness?	2,89	,961	174
Question 8: Are you a project manager or similar?	1,27	,444	176
Question 9: To what extent is your project manager doing his/her job, concerning communication.	3,38	,907	168

Question 10: To what extent do you trust your project manager in terms of dividing work tasks?	3,40	,963	167
Question 11: To what extent do you trust your project manager in terms of sharing and delivering information?	3,50	,891	167
Question 12: To what extent do you trust your project manager in terms of offering support?	3,40	1,032	166
Question 13: To what extent does your project manager encourage you?	3,17	1,013	166
Question 14: To what extent does your project manager praise you?	2,95	1,032	165
Question 15: To what extent is the information from your project manager clear and concise?	3,27	,870	166
Question 16: To what extent do you trust your co-workers in terms of delivering in time?	3,05	,919	172
Question 17: To what extent do you trust your co-workers in terms of co-operating?	3,58	,802	172
Question 18: To what extent do you trust your co-workers in terms of communicating if necessary?	3,40	,849	172
Question 19: To what extent do you trust your co-workers in terms of offering support?	3,38	,867	172
Question 20: Are meetings often too stressful?	3,06	,978	174

Question 21: Are the meeting agendas well planned and thought through?	2,84	,896	174
Question 22: If the communication within the project is bad, to what extent do you believe that it is the reason for extended project time?	3,43	,993	174
Question 23: If the project communication is defective, to what extent does it affect the project's end product?	3,94	,838	174
Question 24: In case of bad communication, to what extent does it affect your work?	4,11	,845	173
Question 25: To what extent do you experience a lack of respect in the project?	3,05	1,100	171
Question 26: To what extent does it disturb you if the other profession (design or engineering) is using expressions that you possibly do not understand?	2,82	1,206	174

**Descriptive statistics**

The table below presents a variance analysis and shows the significant differences between project managers and not project managers.

		N	Mean	Std. Deviation
Question 1: How do you feel the communication within the project/projects you are involved in are working today?	1 no project manager	129	3,18	,814
	2 project manager	47	3,11	,983
	Total	176	3,16	,860
Question 2: How do you experience the co-operation with the other department (design or engineering)?	1 no project manager	128	2,95	,912
	2 project manager	47	2,98	,921
	Total	175	2,96	,912
Question 3: Does the communication within the project encourage to solidarity?	1 no project manager	127	2,85	,864
	2 project manager	47	2,96	1,021
	Total	174	2,88	,907
Question 4: Does the communication within the project encourage to security?	1 no project manager	128	3,31	,867
	2 project manager	47	3,40	,993
	Total	175	3,34	,901
Question 5: Does the communication within the project encourage to openness?	1 no project manager	127	3,18	,929
	2 project manager	47	3,13	1,013
	Total	174	3,17	,950
Question 6: Does the communication within the project encourage to efficiency?	1 no project manager	127	2,65	,954
	2 project manager	47	2,62	1,033

	Total	174	2,64	,973
Question 7: Does the communication within the project encourage to meaningfulness?	1 no project manager	127	2,92	,948
	2 project manager	47	2,79	,999
	Total	174	2,89	,961
Question 9: To what extent is your project manager doing his/her job, concerning communication.	1 no project manager	127	3,33	,943
	2 project manager	41	3,51	,779
	Total	168	3,38	,907
Question 10: To what extent do you trust your project manager in terms of dividing work tasks?	1 no project manager	126	3,40	1,005
	2 project manager	41	3,37	,829
	Total	167	3,40	,963
Question 11: To what extent do you trust your project manager in terms of sharing and delivering information?	1 no project manager	126	3,45	,900
	2 project manager	41	3,66	,855
	Total	167	3,50	,891
Question 12: To what extent do you trust your project manager in terms of offering support?	1 no project manager	125	3,45	1,081
	2 project manager	41	3,24	,860
	Total	166	3,40	1,032
Question 13: To what extent does your project manager encourage you?	1 no project manager	125	3,15	1,040
	2 project manager	41	3,22	,936
	Total	166	3,17	1,013
Question 14: To what extent does your project manager praise you?	1 no project manager	124	2,95	1,011
	2 project manager	41	2,93	1,104
	Total	165	2,95	1,032
Question 15: To what extent is the information from your project manager clear and concise?	1 no project manager	125	3,24	,856
	2 project manager	41	3,37	,915
	Total	166	3,27	,870

Question 16: To what extent do you trust your co-workers in terms of delivering in time?	1 no project manager	125	3,02	,907
	2 project manager	47	3,15	,955
	Total	172	3,05	,919
Question 17: To what extent do you trust your co-workers in terms of co-operating?	1 no project manager	125	3,58	,765
	2 project manager	47	3,57	,903
	Total	172	3,58	,802
Question 18: To what extent do you trust your co-workers in terms of communicating if necessary?	1 no project manager	125	3,35	,835
	2 project manager	47	3,51	,882
	Total	172	3,40	,849
Question 19: To what extent do you trust your co-workers in terms of offering support?	1 no project manager	125	3,36	,884
	2 project manager	47	3,45	,829
	Total	172	3,38	,867
Question 20: Are meetings often too stressful?	1 no project manager	126	3,10	,967
	2 project manager	47	2,96	1,021
	Total	173	3,06	,981
Question 21: Are the meeting agendas well planned and thought through?	1 no project manager	126	2,92	,873
	2 project manager	47	2,62	,922
	Total	173	2,84	,894
Question 22: If the communication within the project is bad, to what extent do you believe that it is the reason for extended project time?	1 no project manager	126	3,51	,892
	2 project manager	47	3,23	1,220
	Total	173	3,43	,996
Question 23: If the project communication is defective, to what extent does it affect the project's end product?	1 no project manager	126	4,02	,769

	2 project manager	47	3,77	,983
	Total	173	3,95	,837
Question 24: In case of bad communication, to what extent does it affect your work?	1 no project manager	126	4,21	,719
	2 project manager	46	3,87	1,087
	Total	172	4,12	,844
Question 25: To what extent do you experience a lack of respect in the project?	1 no project manager	124	3,02	1,119
	2 project manager	46	3,09	1,029
	Total	170	3,04	1,093
Question 26: To what extent does it disturb you if the other profession (design or engineering) is using expressions that you possibly do not understand?	1 no project manager	126	2,86	1,218
	2 project manager	47	2,70	1,178
	Total	173	2,82	1,206



## Appendix C

### Frequencies

The following tables show the frequencies and valid percent.

1. Are you working, or have you recently worked, in a project together with the design- or engineering department?

		Frequency	Valid Percent
Valid	No	25	12,4
	Yes	177	87,6
	Total	202	100,0

2. How do you feel the communications within the project/projects you are involved in are working today?

		Frequency	Valid Percent
Not at all	1	3	1,7
	2	36	20,5
	3	75	42,6
	4	54	30,7
Very good	5	8	4,5
	Total	176	100,0

3. How do you experience the co-operation with the other department (design or engineering)?

		Frequency	Valid Percent
Not so good	1	11	6,3
	2	41	23,4
	3	69	39,4
	4	52	29,7
Very good	5	2	1,1
	Total	175	100,0

## 4. Does the communication within the project encourage to solidarity?

		Frequency	Valid Percent
Not at all	1	9	5,2
	2	52	29,9
	3	68	39,1
	4	41	23,6
Vey much	5	4	2,3
	Total	174	100,0

## 5. Does the communication within the project encourage to security?

		Frequency	Valid Percent
Not at all	1	3	1,7
	2	29	16,6
	3	62	35,4
	4	68	38,9
Vey much	5	13	7,4
	Total	175	100,0

## 6. Does the communication within the project encourage to openness?

		Frequency	Valid Percent
Not at all	1	4	2,3
	2	38	21,8
	3	73	42,0
	4	43	24,7
Vey much	5	16	9,2
	Total	174	100,0

## 7. Does the communication within the project encourage to efficiency?

		Frequency	Valid Percent
Not at all	1	21	12,1
	2	55	31,6
	3	69	39,7
	4	23	13,2
Vey much	5	6	3,4
	Total	174	100,0

8. Does the communication within the project encourage to meaningfulness?

		Frequency	Valid Percent
Not at all	1	12	6,9
	2	49	28,2
	3	66	37,9
	4	41	23,6
Vey much	5	6	3,4
	Total	174	100,0

9. Are you a project manager or similar?

		Frequency	Valid Percent
Valid	No	129	73,3
	Yes	47	26,7
	Total	176	100,0

10. To what extent is your project manager doing his/her job, concerning communication.

		Frequency	Valid Percent
Not at all	1	5	3,0
	2	22	13,1
	3	58	34,5
	4	71	42,3
Completely	5	12	7,1
	Total	168	100,0

11. To what extent do you trust your project manager in terms of dividing work tasks?

		Frequency	Valid Percent
Not at all	1	6	3,6
	2	21	12,6
	3	59	35,3
	4	63	37,7
Completely	5	18	10,8
	Total	167	100,0

12. To what extent do you trust your project manager in terms of sharing and delivering information?

		Frequency	Valid Percent
Not at all	1	4	2,4
	2	15	9,0
	3	59	35,3
	4	71	42,5
Completely	5	18	10,8
	Total	167	100,0

13. To what extent do you trust your project manager in terms of offering support?

		Frequency	Valid Percent
Not at all	1	6	3,6
	2	26	15,7
	3	54	32,5
	4	56	33,7
Completely	5	24	14,5
	Total	166	100,0

14. To what extent does your project manager encourage you?

		Frequency	Valid Percent
Not at all	1	9	5,4
	2	33	19,9
	3	58	34,9
	4	53	31,9
Very much	5	13	7,8
	Total	166	100,0

15. To what extent does your project manager praise you?

		Frequency	Valid Percent
Not at all	1	16	9,7
	2	39	23,6
	3	53	32,1
	4	52	31,5
Very much	5	5	3,0
	Total	165	100,0

16. To what extent is the information from your project manager clear and concise?

		Frequency	Valid Percent
Not at all	1	3	1,8
	2	26	15,7
	3	71	42,8
	4	55	33,1
Very much	5	11	6,6
	Total	166	100,0

17. To what extent do you trust your co-workers in terms of delivering in time?

		Frequency	Valid Percent
Not at all	1	8	4,7
	2	39	22,7
	3	66	38,4
	4	54	31,4
Completely	5	5	2,9
	Total	172	100,0

18. To what extent do you trust your co-workers in terms of co-operating?

		Frequency	Valid Percent
Not at all	1	3	1,7
	2	10	5,8
	3	59	34,3
	4	85	49,4
Completely	5	15	8,7
	Total	172	100,0

19. To what extent do you trust your co-workers in terms of communicating if necessary?

		Frequency	Valid Percent
Not at all	1	2	1,2
	2	23	13,4
	3	64	37,2
	4	71	41,3
Completely	5	12	7,0
	Total	172	100,0

20. To what extent do you trust your co-workers in terms of offering support?

		Frequency	Valid Percent
Not at all	1	5	2,9
	2	20	11,6
	3	60	34,9
	4	78	45,3
Completely	5	9	5,2
	Total	172	100,0

21. Are meetings often too stressful?

		Frequency	Valid Percent
Always	1	7	4,0
	2	44	25,3
	3	68	39,1
	4	42	24,1
Never	5	13	7,5
	Total	174	100,0

22. Are the meeting agendas well planned and thought through?

		Frequency	Valid Percent
Not at all	1	5	2,9
	2	66	37,9
	3	58	33,3
	4	41	23,6
Completely	5	4	2,3
	Total	174	100,0

23. If the communication within the project is bad, to what extent do you believe that it is the reason for extended project time?

		Frequency	Valid Percent
Not at all	1	6	3,4
	2	25	14,4
	3	52	29,9
	4	70	40,2
Completely	5	21	12,1
	Total	174	100,0

24. If the project communication is defective, to what extent does it affect the project's end product?

		Frequency	Valid Percent
Not at all	1	2	1,1
	2	7	4,0
	3	33	19,0
	4	89	51,1
Completely	5	43	24,7
	Total	174	100,0

25. In case of bad communication, to what extent does it affect your work?

		Frequency	Valid Percent
Not at all	1	3	1,7
	2	5	2,9
	3	20	11,6
	4	87	50,3
Very much	5	58	33,5
	Total	173	100,0

26. To what extent do you experience a lack of respect in the project?

		Frequency	Valid Percent
Not at all	1	17	9,9
	2	33	19,3
	3	61	35,7
	4	45	26,3
Very much	5	15	8,8
	Total	171	100,0

27. To what extent does it disturb you if the other profession (design or engineering) is using expressions that you possibly do not understand?

		Frequency	Valid Percent
Not at all	1	28	16,1
	2	44	25,3
	3	49	28,2
	4	37	21,3
Very much	5	16	9,2
	Total	174	100,0

28. What actions need to be taken to improve communication between departments?

**Relations and better understanding**

- More understanding in the other department's job, timing and delivering processes. A better understanding enables people to have a more humble attitude and encourages the development of joint solutions.
- Let component supplier equally communicate with design and engineering and not as today, when all information between design and supplier goes via engineering.  
Arrange the databases so all softwares can share the data without transaction delays etc.
- Involve all co-workers to be a part of the project team and rely on the co-workers qualifications and professionalism.
- Encourage less competition and rivalry between departments.
- A well defined and agreed time plan before the project start is needed. Design needs to understand the meaning of approved and “frozen” design.
- The communication between the departments works just fine - that is not the problem. The problem is as soon as R&D has given input to styling, and the stylist follows, his model is “dead”. The most unfeasible model is chosen by default, or the model that has no input at all, which normally means even more unfeasible. I do not understand why R&D works with styling at all, before a model is chosen? All the work that R&D puts in is a complete waste and only strains relation between a lot of creative and dedicated people. Good communication can never help that. And not only is that work a waste, but then we have to start the time consuming way back to feasibility, and another recovery plan, and another delayed gate, and bad design quality because there is not time for taking care of the details. And do not mention the late changes; feel free to complete the list. Only the fact that you ask about communication is worrying. Does nobody ask for the root cause of the problem?
- One way to get a better understanding is to get educated in each others work. In the 80's there were a lot of trainee programs before you started working in your area, and you got a chance to see how other departments were working. This could be a way to achieve a better understanding, communication, and better teamwork. Maybe it would be better to have the trainee program when you feel more comfortable in your own work, instead of the beginning.
- Focus on *our* delivery, and not design's or engineering's deliveries. Skip “FTI” (final technical input) in its current form. Instead, introduce a deadline when design and engineering should be finished together. We have to stop talk about us and them and start to focus on our common goal, and start with much more direct and open communication, not meetings. If we should be fast and effective we also need to stop the over administration and get more "doers" and less "watchers".
- We need face-to-face meetings and personal relations between departments. Decisions should be made at management level and not as today, when everyone is passing the question forward to someone else.



### Visions and goals

- Honesty, an open mind and future visions is needed.
- A simple revelation that we all go for the same goal - to make great cars that people want to buy, and that we also make premium cars to high demanding customers. We have to be better listeners. It is also way too easy to fall into the everyday small issues and forget about the big picture, I think that is the reason for extended project time.
- Start with a *willingness* to improve communication.
- Realize that we are working on the same company and stop struggle. Solve the problem as a whole and not for what is best for the own department.
- Everyone has to understand that we are working for a common goal. Everyone has to make every decision based on what way is the best to reach that goal. Our core values should be used as a guide. If the decision can't be traced to one of our core values then why are we doing it? If we keep on looking out for what is best for ourselves or our departments and not the customer and the company, we will never succeed as a company.
- All departments need to talk about the same thing. As it are now, some people talk about "premium" and some people talk about cutting cost - at the same time!
- There is a need for a holistic view of the project where all gates, goals etc are aligned with the product that we are about to create. Today there is no common view and most project participants only see/understand their own function. This creates sub optimization where the strongest presenter can sell his or her view to the management thus creating a misalignment of available resources. Today the projects can not see the forest for all the trees...

### Information distribution

- I'm not so sure that I agree that the project manager should simplify the information. I have often got the feeling that this way of giving the "children" only the information they need for the moment leads to a feeling of detachment from the task and that it gives less possibilities to plan ahead and foresee coming problems.
- Act on information and distribute to people who need it. Do not sit and wait for a meeting forum to distribute information.
- Do not sit on onfo, act on it.
- Reduce the number of systems that handles information.
- Listen, understand, deliver in time, make plans together and act accordingly.
- Early understanding of the requirements and with early involvment.
- "Gates" needs to be followed strictly (red means stop), if not the reliability between the departments will be damaged.  
Reduce reports that are not giving surplus value for the customer/product. If doing so, the stress will decrease and the time for work with the product increases which results in better quality and a more fun time at work. It also recommended reducing the triple check on decisions/"TSU" (permission for special expense) etc.
- To some extent it is the individual's responsibility to ask if he or she does not understand. It is also in the individual's interest to make sure that the

information/delivery given to the project members can be understood by everyone. We need the guts to show humanity and be simple.

- Better distribution of who is doing what. Decisions need to be taken much earlier, limiting the number of mistakes. In order to achieve that it is extremely important that the pre-work is performed according to one template, not numerous as it is today. Clear guidelines for each meeting would increase the efficiency dramatically.
- All levels, i.e. from “TPL” (technical project leader) to “KU” (construction mission), must have recurrent meetings (weekly) booked in advance. This makes it easy to share information, plan and follow-up. It is also a key factor for creating a good team spirit and efficiency.
- A clear overall-planning process is needed.

### **Time and money issues**

- There is a big problem with the situation today when people are given less and less money both for the project work and less money to spend on the product. Compared to last generation, the new car should be half price, done with half the people and in half the time. That situation is ridiculous and makes people overstressed. They know from start that the result of their work will be of inferior quality; this takes away all lust for the task. This ends up in that your most important task all the time is to cover your own "rear end". All communication is then planned and executed so that you will not be stuck with the blame. You communicate in a way so that you play your cards of information in the way that is most favourable to yourself and your team and department.
- Lack of recourses creates a big risk of avoiding communication
- The major problem is to understand the “carry over” parts (parts which are the same as in the previous model) to a whole new car design. In most cases the new car is designed with too many “carry over” parts which do not fit into the car or demand. Low cost cars with shorter lead time to bring the project to start of production. It results in poor quality and a very costly car at the end of the project. The management are hard walls to break; high demands and with zero cash to support it. Root cause of the communication problems is at the top.

### **Management**

- A big problem is that no one is responsible for anything here at the company, good or bad. There is no personal gain to be won from pushing or trying really hard. I have seen how young managers that try really hard are told not to be helpful or rock the boat too much. When they have nothing to win they settle down after a while in the usual company numbness and keep their cards close to their chest so that nothing will be their fault at least. It seems very apparent that nothing is developed here at the company anymore. Best to stick to an old solution or maybe Audi or BMW, or else somebody will develop it with a supplier we also use so that we can have it one generation after them.
- People (leaders) with more automobile developing, and making experience in leading positions are needed.
- Prompt, clear and concise directions from management regarding project directions that are conveyed directly to engineering and design. Try to avoid too many side track studies which dilute resources.

- The communication problem is a very complex issue and needs to be analysed from several perspectives. Basic keys are respect, the will to listen and the will to work together. These may all be distorted by complex keys such as: power, prestige, knowledge, discipline, work load, product demands and many more...
- A strong leadership is needed - even a bad decision is better than no decision at all.
- It is not a problem between departments. The problem is from my point of view that project management does not believe in the "KUs". This is something that has been even worse in every new project. Decisions are made without the "KU's" involvement, who is the only one with detailed knowledge about product and process. Involve the "KU's" in the decision process and start to believe in investigations instead of ignoring them.
- It is the management outside the projects that cannot follow the working processes: Constantly changing the project frames and its content. The management *"do not need to follow agreed work procedures"*. Educate the management to follow guidelines and put emphasis to support projects when support is needed. Follow up and secure that the project is delivering according to previous set targets. Do not change the content or the targets when the project has started. Follow up projects and offer support where inconsistency to agreed target can be found.
- Weak leadership permeates the whole organisation. It affects everyone who works with the projects and the efficiency decreases catastrophically. An open and honest dialogue in all forums creates a vigorous organisation. The "yes men" destroys the development while the people who have the courage to question and be open, the people who come with new angles on issues, develop the organisation. We need team players because it is we together who are going to make a good product to reach our goals. Take care of experience; it is a commodity in short supply in the future. It is important to do the development work at the company and not at the subcontractor's, it is crucial if we should be updated on new techniques, costs and efficiency. We have too many meetings today, it is more important to focus on the activity.

### **Organisation and structure**

- The meeting and decision structure needs to be improved.
- Clearer project structure presentation in project start up.  
Better introduction to new co-workers.  
Don't use every abbreviation like they are obvious to everyone - they are not!
- Short status meetings monthly are needed
- Slim the project organisation; for example, look at the old module teams where we physically sat all together in one group. Help us escape all the double administration work to all departments, and have the same information in different programs. Go back to "The Company Development" instead of today's checking "Parent Company Development" which results in lost time because of the long way to decision ("many captains, few sea men") and fear of taken decisions. Today we have to make panic solutions. Why imitate systems from a company which obviously have big internal problems?

- Reduce the number of levels in projects and go back to “KU” (construction mission), “SU” (system mission), “TPL” (technical project leader), and “BPL” (business project leader). Decisions must be delegated to the right level immediately. Introduce cross functional work as a natural part of the day.
- The work procedures should not be changed during the project. Focus on a few important follow up tools, and be consistent to the end. People will know what to do and what to deliver. There is too much focus on way to many “scorecards”, and all this extra work with changing the scorecards, new systems to fill in etc. Everything falls down on a “KU”/”SU” level. It has to stop; the lowest level can not do everything. If it is clear what to do during the entire project, then it is capable of handling periods of poor communication and info. Focus on a few important follow up tools and a few decision meetings; there are too many meetings today.
- Cross functional teams should be used to a higher extent, not only when facing a project stopper.
- The project organisations should be strengthened. Co-location, which could be used during certain time periods, can be the answer to enhance communication and understanding within the projects.