Action towards time structures in product development processes – observations on the micro level

Sten Jönsson[1]

GRI, School of Economics and Commercial Law,
Göteborg university.
(Box 600,
SE-405 30 Göteborg
Sweden)
(sten.jonsson@gri.gu.se)

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Abstract

In product development processes conventional wisdom has it that structure is provided by strict specifications of product properties, budgets and time schedules that are followed up (Womack et al 1990, Clark & Fujimoto, 1991). This is especially applicable to the car industry, which has the longest history of large, complex development projects directed towards large consumer markets. I claim that such "models" are based on romantic assumptions that the planner commands the required specialised knowledge and that members of development teams are easy to discipline by unrealistic requirements.

In real life budgets are overrun and adjusted accordingly if the right arguments are given, specifications are surpassed as technical development and customer tastes progress, while time schedules are manipulated to fit the real situation. To do things according to plan is probably not always right. Still there is a disciplining dimension in these planning tools since they are used as bases for argumentation and as generators of crisis consciousness.

In this paper I will concentrate on the time factor as it is socially constructed in a so called "gate system" to control a car development project. One incident in a meeting of the project management team about halfway through the project is analysed against the background of the gate system, the alliance situation, relations to functional departments, production schedules, suppliers participating in development, and other complexifying background factors.

It is claimed that time is not a absolute, universal or even "shared" entity in any practical meaning. It is rather a social artefact that can be stretched, bent, manipulated and renegotiated. Still it is an actant in the sense that it sets agendas and provides arenas for argumentation in the general discourse on what constitutes a premium product (which develops into a narrative as nets of actions concord). A "shared" conception of time in the product development project will require a strong narrative as a sense-making device.

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Background

The Volvo Car Corporation had a worry since long about maintaining its exclusive car dealership network. In order for the car dealers to survive they needed a small car. The solution had been for Volvo to engage in Dutch DAF with its specific gearing system. The existing small car had been sold for a while under the name of Volvo 66, and later the DAF organisation had developed a larger small car, the Volvo 360 and later 400. Volvo engineers were of the opinion that the current Volvo 400 was not up to Volvo standards. By the late 1980s it was clear that something had to be done. Mitsubishi Motor Company (MMC) was approached at the Frankfurt Motor Show in 1989 and an agreement between MMC, VCC, and the Dutch government was reached. It meant that a new Volvo car was to be designed on the basis of an existing Mitsubishi platform (the Carisma) and the Carisma and Volvo S/V 40 would be produced on the same assembly line in the existing Volvo Car BV plant in Born not far from Maastricht in Holland. A small group of managers started their work on the V 40 project on January 1st 1992. First the product requirements for "job one," as it was called, were set to beat the Opel Vectra, but as the Renault/Volvo merger was terminated and the product portfolio was reviewed against the new strategic background the specification was upgraded to match BMW 3/Audi 4. The original plans to install Renault engines were changed to Volvo engines and more. There was a strong desire from both alliance partners to reduce cost by using as much common parts as possible. The joint assembly plant, was under strong pressure to rationalise production. Mitsubishi engineers, largely, designed the new assembly line. Volvo set up the paint shop. This meant a radical reduction in production employment, which went against the desires of the third alliance party, the Dutch State, who held the chairmanship of the board of directors of the joint venture company that run the

assembly plant. The "lean production" pressure on the production people would give them every incentive to negotiate payment for services rendered to the product development projects intended for production at the plant. The Purchasing department, Quality check of delivered parts, and Logistics were part of the production plant organisation. Besides negotiating solutions on components with the competing alliance partner (MMC), product development engineers were dependent upon negotiation with Production (the separate joint company) for information and cost estimates in their design decisions. It was in the interest of Production to limit the number of variants, above all they did not like late design changes, because it upset delivery schedules and might effect process investment. Furthermore each engineer has a functional speciality (engine, exterior design, transmission, electronics etc.) with a strong functional discipline coming from the functional departments at Head Quarters.

Even if the "job one" project soon became legendary for the heroic work done it had a host of difficulties that stemmed from the original platform not living up to Volvo standards on crash-worthiness, according to Volvo engineers. Also the project complained that they did not get full support from the Engine Department back home as late design changes in the drive line caused time loss concerning testing and a noise reduction problem.

The MMC lean production system that was installed in the existing assembly plant (while production of the old Volvo 400 cars continued - plenty of space the MMC people said) went well. The reductions in staff generated turbulence as expected. Also the learning of new ways of working under Japanese guidance was too difficult for many. The meaning of quality was different for the three parties in the alliance. But in the end production volume was doubled while staff was halved. This gives an idea of the state of the system where production of the new small Volvo was launched. Learning in all dimensions. It was unreasonable to expect a faultless car.

The white book summarising "job one" (all projects produce a white book) stressed the need for better stability for future projects. Beside the turbulence related to the

alliance with MMC getting started, there was the break-up with Renaul, CEO changes, and the practical difficulties of getting key development people settled to do their job at such a distance from Head Quarters and the specialist departments back home. "Job one" was localised on site in the Born facility. Still the project was spoken of with fondness by participants. It seems like the opportunities for innovation when translating the MMC platform into a Volvo solution were quite stimulating. Working closely with MMC colleagues provided for discoveries of "tacit" ways-of-working, some good some unsuitable for a European setting. There were a large number of "interface" committees and work parties for dealing with common parts (and suppliers), cost sharing in improvement projects etc.

Another thing that happened during the first years of the MMC alliance was an upgrading of Volvo's niche strategy. It illuminated how different conceptions of quality can be in their implications. For MMC, as Volvo engineers understood it, saw quality as the traditional statistical concept, "zero defects." Quality is high if there are few and small deviations from specification. Top management decides about specification and the task is to deliver a product according to specification with no variation. Design for "manufacturability" as it were (Womack et al., 1990; Clark & Fujimoto, 1991).

The Volvo conception of quality that was emerging at this time was based in market strategy. Quality is when the design matches customer needs (of course the product must be produced according to specification, but the customer value is in matching the market niche). In this conception of design quality it is essential to feel free to adopt improved solutions during the project if arguments for it are strong. With such a revenue oriented quality concept it is necessary to tie design arguments to brand values. The product strategy process related to life after Renault had identified the Volvo customer as "affluent progressives." The primary value dimension added to the traditional Volvo brand values (Safety, Quality, Environmental care) was "Joy-of-Driving." For practical purposes," joy-of-driving" can be translated to introduction of more powerful engines, which is contrary to "environmental care". The brand

values, conceived as articulations of a niche strategy, will force contradictions on the development engineer contemplating design solutions.

This background sketch can be summarised to a quite complex context for product development work:

- an alliance was being established (cooperation and competition at the same time) with mutual learning and determination to benefit from common solutions

- a strategy shift towards higher price segments with more "emotional" content in the product (joy-of-driving as criterion of design choice)

- the merger process with Renault was under dissolution and it was still more urgent to develop a small car to provide the dealer network with better survival options.

- The context was truly complex and strained by contradictions among brand values and among the interests of alliance partners.

The organisational complexity may be illustrated by the following map drawn by the project leaders of "job 2" the project that was charged to implement the new niche strategy by installing powerful engines and, at the same time rectify the faults found or problems unsolved in job 1. He was asked to indicate what other meetings or committees that have an impact on his project, beside the PMG (project management group) that we were observing. The project management group is the central team that runs the product development project. It meets every second week to take coordinating decisions, follow up the status of sub projects, and discuss priorities. (The figure he drew has been somewhat simplified by the author, who does not wish to enter into any detail on the missing links between units in the map):

Figure 1. The context of other meetings that have an impact on project management meeting (PMG).
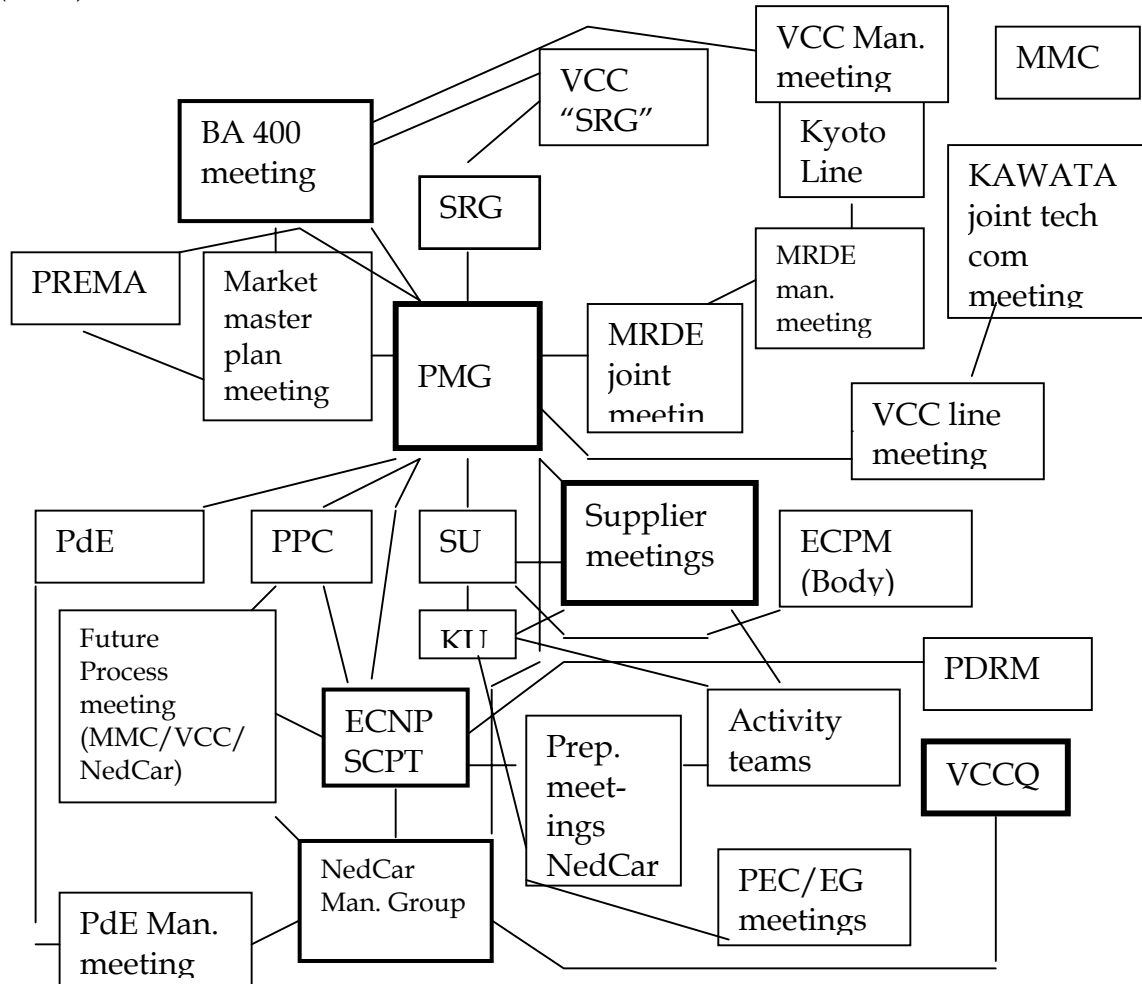
Counting "Suppliers" as one (even if there may be hundreds) we counted about 30 meetings outside the Project Management Group (PMG) that the project leader participated in regularly and where decisions could have direct effects on the project. It serves little purpose to explain what the different abbreviations and acronyms stand for. The point of the map is to show that there is a complex geographical dispersion of decision forums to manage. To illustrate this, think of the Electricity manager who is in charge of installing a new immobiliser system (so the engine cannot be started without the appropriate code). The supplier of the system is Bosch, but its development centre for this device is located in Australia. The encrypted signal from this device goes into the Engine Control System that is supplied by Siemens in Germany (a competitor to Bosch). Coordination will require travel costs.

This project (job 2) was an engine lead by "Engine Charlie" (to indicate his nick name). It was successful in the sense that it improved the car considerably and soon the car was doing much better in the European market than the competing model from MMC in spite of a higher price. Now the emphasis was on preparing the car for the US market with its specific requirements. The project leader in this (3d) year model project was more of a project manager than a specialist in any area. The tools for managing such a project are plentiful. An important vehicle for coordination is the PMG itself. It is designed as the main information forum for exchange of information. Presentations in the PMG serve to ensure colleagues that my part is on schedule, or warn them that it isn't. It is the arena where prestige is built and lost, and where support for solutions is mobilised. And there is the gate system.

This product development context – the technology

The first impression when we, as outside observers, were allowed to observe directly and with video recordings the product development work in the PMG was chaotic. The number of participants was surprisingly large, 20 – 25 persons, for an executive meeting (the point with this is that everybody is continuously updated). The

functional managers in the project dominate. The project is divided into functional areas like Engine, Transmission, Chassi, Exterior, Electricity, Testing etc. called SUs. The SU-managers report on the status in relation to plan of their SU every meeting. If a problem has been identified it is added as an Action Point to the agenda and it will remain there until it is declared solved. The agenda is very compact with a few minutes devoted to each point. The schedule is never kept. The meetings last 4 hours rather than the planned 2.5 because participants tend to start discussions when they are supposed to take decisions. Everybody seemed to agree that the meetings were ineffective (Is this an executive meeting or a seminar?). Our impression is after observing these meetings in two consecutive projects is that very much information is transacted during the meetings. In this sense they are effective. A meeting would start with the project leader giving general information, e.g., on the latest news on EU emission standards, or recent top management decisions. Then comes Action Points where the responsible member reports on progress (and a decision is taken to remove the point if problem solved), then all functional areas report. Sometimes an expert is invited to talk about, e.g., new materials for seats, or the results of the latest experiments on the effects of wheel size on metal fatigue in suspensions. For every point on the agenda the other participants will interpret whether the given information has implications for their SU and raise the appropriate questions. A good SU manager will see that his (one female SU manager observed in our three years of observation) proposal has effects on other areas (e.g., the configuration of processors in the electronic system) and will have discussed the matter beforehand with those concerned. The colleagues see surprises as signs of lacking professionalism. It is very easy to lose prestige in the group by reporting problems that demonstrate lack of control, and still worse, being discovered as not having reported problems earlier. Most participants are in a career towards project leadership, one can see how members gain and lose in standing inside the group. This is membership work (Munro, 1996) at work!

A car project is a very large project in terms of budget and people and the fact that this particular project was set in an alliance context with the production facilities

(including Purchasing, Logistics, and Production Control) in a jointly owned production company accounted for complexity. There is an extra demand for discipline because the partner can be counted on to progress according to plan in a parallel project. The "windows" opened in the current production schedule for test production of the new model are more difficult to change when Production Control is charged with starting up two new year models each year on the same line.

The Gate system (since 1991)

Project time is divided into a number of "Quality Gates" in VCC. At each Gate the project status is reviewed by headquarter representatives to see whether the objectives for that gate have been met. If the project passes the gate budget funds up to the next gate are released (the gate is "open"). What happens if the project is not living up to the gate criteria? Obviously one could not stop the whole project just because the work on, e.g., the immobiliser system is behind schedule! We have seen projects only partly past gates and with extra pressure to get the lagging parts in shape. None-the –less the work rhythm of the project gets its character from the gate system. Extra pressure is used to get the project on track in time for the up-coming "gate."

The character of the work also changes as Production Start approaches, because by then all problems, indicated in test production runs, have to be solved. There may be hundreds of remarks and problem indicators from production and from suppliers that have to be sorted out. When Production Start is passed without delays and with complete functioning cars coming out of Final Assembly the project team goes silly/happy. A great relief is felt after months of maximum effort.

The gate system has the following structure (over time a few "gates" preceding gate 0 have been applied in practice) (Ask 1998, p. 27):

Table 1: The gate system

Gate	Description	Main activity between gates
0	Start of pre-study	
		Pre-study
1	Start of project	
		Definition of project
2	Project book	
		Product and process development
3	Tool design	
		Tool manufacture
4	Verification of test series	
		Verification
5	Pre-try-out series	
		Verification
6	Try-out series	
		Verification
8	Start of production	
		Production
9	Product release	
		Production
10	End of project	
		Continuous production

Over time a couple of gates have been added before gate 0. The gate system prescribes several cost control activities and that cost requirements are to be established. All requirements are stated in one of the four status descriptions to be used in the identification of the current project status: "initiated, preliminary, finalised, verified". To each of these status corresponds a verb describing the activity that precedes it. When something is "initiated" the target is defined, plans worked

out, and action started, and then this task is "performed" (carried out, executed), upon which the task is ready but not yet ratified, the solution applies until further notice. This means that it is in status "Preliminary." When the solution has been evaluated and passed the checks it is "finalised" (ratified, "frozen") and then verified (confirmed, validated) and thus declared "Verified".

A program to improve cost control (PKS) had been going on since 1980 and further inspired by Renault experiences. It was generally resisted by the engineers but the accounting department had used a strategy of circumvention by establishing a cost engineering function manned by people with long-standing experience from product development and construction work. These engineers are specialised to functional systems of the car and play the main role during the early phases (Gate 0 – 2) when cost requirements are set. With this the resistance from the engineering profession could be overcome. Next; "cost management" during later phases in the project is supported by project controllers, who assist the project leader. They set up Cost Review Meetings (CRMs) to scrutinise how the project seems to live up to cost requirements and sound the alarm if too many engineering hours have been spent. These CRMs play the main role in cost control from Gate 2 to Gate 10. There are also "business controllers," located in the Business Area responsible for the marketing and sales of the new product. They are interested over the whole project period to keep costs low and customer value up. Many times when quality improvement is pitted against cost control it is up to the business controllers to argue the case to Business Area managers that it might be a good idea to expand the project budget for this specific addition of an attractive feature. A business area in Volvo Car consists, for instance, of all models in the 70 series. A CRM is like a court of law. The SU managers are called in one by one where they face a senior cost engineer armed with printouts of the last cost estimates for every part in 4 different dimensions. The current estimates are compared to target costs and for every deviance the gaze is turned onto the SU manager who has to explain and swear to sin no more. The exercise usually lasts for a day and a half.

One problem that is particular to the alliance setting in this case is that estimates of process cost effects of design solutions, e.g., new tools, or material handling equipment in production, are given by the joint venture company that can be expected to overestimate costs to improve its budget. The project must pay for such effects which, if not foreseen in the budget, can be used to ease the budget strain on the joint venture (lean production!). Project engineers seek good relations with Production Control engineers because they want to extract preliminary estimates about process consequences from them before they commit too many hours to working out a solution that is not viable anyway. The Production Control boss, who is a member of the PMG, on the other hand, wants his people to stop doing informal consulting for the projects and only do chargeable hours' work for them. He wants formal inquiries directed to him and backed up by properly documented designs. How could one do a professional evaluation otherwise? Project engineers who are new to the context in the alliance have to rely on formal channels and are likely to spend more engineering hours than colleagues who know their way around.

In sum I hope I have demonstrated that a project is a very complex undertaking with a myriad of decision points and with contradicting values and interests. This provides for extremely many strings to pull and short cuts to exploit. Many of the project engineers are keen on promoting a career towards project leadership. The work is hard and stressful. To keep it all under control there is a set of project management tools in operation. The global car industry is quite integrated, through acquisitions as well as alliances, which means that these tools are similar. Differences appear in strategies (mainly mass production or niche strategies), traditions and the emphases these give raise to.

In principle two main approaches to achieve concerted project action in such a complex and dynamic context can bee discerned. It seems unavoidable that the complexity of the process must be matched by a complex coordination regime. One approach would be to achieve coordination by a strong project narrative. The project itself is then considered to be so exciting that the opportunity to contribute will provide incentives to generate "submissions" that are in line with the "mission." The

project is self-organising as a inspiring quest. The other approach is to strengthen the hierarchical/professional control of inputs to the project by relying on line management (matrix or otherwise) to discipline actors. In the literature one can often see lack of creativity as a major problem. Our observations tell us that the abundance of creative action is the problem rather than lack of it. My claim is that the following evidence on action against time impositions on the project workers is an argument for the first coordination approach, a strong project narrative.

The evidence

First I want to present evidence of how time is emotionally charged in this project context and how it can become part of identity formation in the project team. To do this I will refer briefly to situations we have analysed more in detail elsewhere (Jönsson et al, 2001a, Jönsson et al., 2001b). Then I will analyse a video recorded discussion in a PMG meeting on the effects of a change in the time schedule for the project.

As to the first step consider a situation early on in a PMG meeting. The project leader (Adam), as usual, leads the meeting standing up at the head of the table working his way through the "action points" (outstanding, unresolved issues). The agenda is projected on the white board behind him. The responsible engineer, a young bright newcomer to the project team sitting at the far end of the table responds to his call:

> " Adam: Fire wall insulation!
> Bill: Yes, we would like to have a decision... You already know about the content ..,
> it is about X million SEK, approx.!
> Adam: Yes?
> Bill: ... and we would like to go on with the study for firewall ...   insulation.
> Adam: Designing it!?
> Bill: Designing it .... only the CATIA -work! And we would like to have acceptance
> to start up the supplier ....
> Adam: You have it .... you have it!"

Bill at the suggestion of one of his subordinate engineers has come up with the excellent idea to transfer a noise reducing fire wall solution worked out by the quality department for variants with diesel engines to all variants. Engine noise will

be reduced beyond specification at a very modest cost for the project. Bill needs the authorisation to spend the money on the supplier who is going to do the computer design work (CATIA). Adam takes the formal decision and moves to the next point. This appears to be a simple decision, but this is so only because there has been communication before the meeting. In fact the reason why this point was on the agenda as an "action point" was that it had been tabled at the previous meeting. Then Bill had failed to get the OK to go ahead. He told us, when looking at the video sequence from that event, that he was not prepared to answer questions on the matter then. One of his subordinates had given him a transparency with figures and asked him to present it to the PMG meeting for decision. It was a mere formality the matter had been cleared with the project leader. The problem was that the project leader was away that day and the deputy had lead the meeting. He was not briefed and as questions were posed that Bill could not respond properly to he decided to table the proposal. The interrogation of the proposal had started innocently enough, but it progressed as Bill stumbled. Bill's comments focused on Fred, the Production Control manager representing Production on the PMG. He described Fred as a "shark" – as soon as he sees a weakness he bites. The breaking point that provided the opportunity for Fred to teach the project to behave "professionally" was when Bill pleaded for a decision by claiming that if the PMG failed to take the decision today the project may suffer a delay (Blackmailing the PMG as it were). Fred did "bite" at that weakness (Jönsson et al, 2001b, p. 247):

> Fred: <breaking in>That is ... that is now the situation eeh?
>
> Bill: Yah!
>
> Fred: If we are forced with the back to the wall, now to say yes, I don't accept anything <expressive body language>

Even if it was not his formal task Fred had put an effective stop to the proposal. The PMG could not accept to be bullied by threats of time delay to take a decision on inadequate information. Everybody realised then and there that the firewall matter was dead for now. It was only a matter of finishing the point with a few phrases. Threatening with time delay is a dirty trick. Time is emotionally loaded.

Another incident from the same project and the same meeting but at a somewhat later stage shows another dimension of emotional engagement in time.

Among the information points at the beginning of the meeting the deputy project leader had informed the PMG that an agreement on a new time schedule for the project had finally been reached. It was not completely final yet but the effects on the project could be described. The agreement meant that the project would be divided into two phases. Phase 1, the main production start, would be moved to an earlier date, which meant that a number of outsourced components had to be renegotiated. Phase 2, the model version for the US market, would be postponed a number of weeks. The deputy project leader knew that this was a controversial resolution of the problem to negotiate slots for test production with MMC and the production company, so he allowed 45 minutes in the meeting for people to air their frustrations. Work schedules for the SUs would have to be rearranged, agreements with suppliers reopened ("I know I said it was a matter of life and death that this component should be delivered in week 28, but now it is a matter of life and death that it be delivered in week 35..."). SU managers would lose face before their personnel as well as with suppliers. Charlie, an Englishman, who as responsible for Chassi and Powertrain installation, was upset. He worked from Head Quarters and when he arrived last night, the day before the meeting, he had discussed the new time schedule with other PMG members at the hotel. Everybody was as upset as he was. He had decided to protest and when it was his turn on the agenda to present the status of his SU he started out by protesting against the change in the time schedule. He was very emotional about it. Although he was an native speaker he lost his English grammar and talked almost like the deputy project leader who also had difficulties putting sensible sentences together (Jönsson et al. 2001a, p. 87f.). The interesting thing about this incident is that as he talked Charlie tore up the sheets of paper on which the new plan was printed (Exclaiming: "Rubbish!"). When his colleagues saw the videotape of this occasion their comments were to the effect that he said what all of them felt. We also had occasion to witness, later on, how people used the gesture of tearing up

a piece of paper to protest without words. Everybody knew what they meant. Charlie had gained in prestige by loading a gesture with emotional meaning. Hopefully these two incidents have demonstrated how time is emotionally charged in these projects.

Next I want to illustrate how the emotional aspects of time get "narrativised" by analysing another incident from the next meeting relating to the change of time schedule. The general situation of the project is getting tense because a batch of test car will soon be produced. All the small and big problems that have not been solved by then will turn up in PIRFs (Product Improvement Request Forms) as the test series is scrutinized by Production people, Quality people, and Testing. Everything, from a certain design causing uncomfortable working positions for people on the assembly line or screws not fitting holes, to the safety of the customer or emission regulations in California, may generate a PIRF ticket. When they start coming in after the trial series are out the project goes into a hectic period clearing the desk of all these PIRFs. We have seen balances of a hundred or more "unsolved" PIRFs occupying large parts of PMG meetings.) This test production of, maybe, 20 cars, is fitted into "windows" in the production schedule opened by the production company in their annual plan and it is preceded by a Quality Gate (Gate 5 above) that will assure that the project is ready "to take the plunge." Both the Quality Gate and the upcoming testing of the trial cars have strong disciplining effects on everybody. The test engineers have high status and their reports are almost never questioned. You have to solve the problem, and if you know in advance that you have a problem you would rather postpone the testing for a while. But postponement is almost impossible since the production company negotiates these "windows" with two parties. It will not do to come to MMC (producing a competing car on the same line) and ask whether they could consider producing their test series a couple of weeks earlier so we could use their window some weeks later.

In this meeting the project leader and Quality are going through the consequences of the new time schedule for the preparations for the upcoming gate. Remember the commotion caused by the announcement at the last meeting that the time schedule

for the project had to be divided into two phases. Myriads of sub projects had to be checked to see if priorities had to be changed. The functional lead engineers still had difficulties accepting the change. The Volvo tradition had always been that the project sets its own time schedule based on the launch date etc. set by the business area. Now the project leadership had negotiated away a carefully laid plan, well, it looked carefully laid out, and in fact there had been a number of small changes. To tell the truth it was not even properly updated, but still it was the project's time schedule, and they had sworn to live by it.

We are 1.5 hours into the meeting. We are feeling a bit drowsy in the too small room with 20 people forgetting to take a break. John is up to present the current status of his area (Engine). He is relatively young, but he has moved down to Holland. This is an advantage to the project in comparison with his predecessor, a more senior engineer who tried to run his part from the Engine department. On the other hand John does not have the same clout with his department, and he does not know his way around the networks down here yet. Wonder if there is anything in the rumours that he is in trouble with some technical solution....

Legend:
John: Lead engineer Engine
Adam: Project Leader
Roy: Lead engineer Electricity
Karl: Testing (Complete Vehicle)
Liam: deputy project leader
Somebody: Unidentified speaker
Author's comments on non-verbal behaviour in pointed brackets.
Versals indicate emphasis

- Start of sequence -

John:
..now take care (?)... now that this is decided... changing of
production start and so on...there is a workload.. a hell of a workload to be
done.. I propose that we postpone the gate <downward movement with
straight hand to emphasise>....

Adam:
5....We discussed that this morning ..eeh...

John:
6....I mean we have to make a prioritasion (sic!) now. We have to work to re-plan
7....this now... because this is the main... purpose we have to do now.. the workload 8   has to be put r
9....time prioritasion here..

Adam:
10.. Looking into the prerequisites for the gate... that is to start the series 2.1...eeeh

Roy:
11.... for phase one?..

Adam:
12 .pardon?

Somebody:
13.. Yes!

Roy:
14..... for phase one, just? Now its not the verification series for phase two.. or?

Adam:
15..It is for part of it
<several speakers>
Karl:
It used to be.. because xxxx has disappeared..(Yeah,,) because it will never be
complete for phase two for sure..(yeah..)

Adam:
...and I propose that we...eeeh... Liam and I had a discussion this morning on
......how to treat it. ... If we focus on having permission to go on with the 2.1...
because we need the cars anyhow. They [the business area?] are more or less
facing what we are discussing here today..in a way...so.. <interrupted> I don't
like to...

John:
Yeah.. but from a time point of view we have to make a prioritasion which
...were do we put the work load ..

Adam:
24..As I see it there are only six different questions in the quality gate that is bound
25..to the SUs........it should be a pretty easy task to answer those at the quality gate
26..next week.

John.:
27..But there still is a lot of work!

Adam:
28..Yes! (upward intonation)

John:

29..YES!

Adam:
30..Yes, but will it be effected by this? <pointing to the overhead picture>

John:
31..No, but the purpose... we have to look upon the purpose! We have said that we
32..will have a quality gate, but what is the purpose, now we are changing, - we
have a total change of the plan - so what is the purpose of having the quality
gate there? <excited>

Adam:
35..<demonstrating calm by a sigh> to start series 2.1

Somebody:
36.. We don't change 2.1!

John:
37..Yeah, but for the phase 2! From the engine point of view I am not..eeeh

Somebody:
38..The purpose of the gate is to have the right prerequisites to build series 2.1...

John:
39..For phase 1!

Adam:
40..Yes!

John:
41.... but not for phase 2!... the xx we can delete?

Adam:
42..Yes

John:
Thank you!
- End of sequence -

What goes on here?

John, the engine man, proposes that the gate next week should be postponed so that
project members can devote all their time to re-planning in view of the new time
schedule with phase 1 and phase 2 to sort out priorities and check with suppliers.
Adam points out that the main purpose is to get permission to start the test series 2.1.
Roy steps in to make sure that verification only concerns phase 1 items. Adam
creates confusion by stating that also parts of phase 2 items will be verified. Then he

points out that the quality gate makes quite modest demands on SU time. John, finally, gets confirmation that he need not concern himself with the verification of the xx, which seems to reduce his worries.

Comments by participants

......On he gate system

The back bone of the project is the time plan and the time plan is given meaning by the "gate" system. The time plan is usually deduced from some significant market introduction event (e.g., one of the car shows). Then there are test production runs and batches of cars which must be produced for testing purposes. These project milestones are preceded by gates where the project collects itself and checks whether all the component delivery dates and quality requirements are met and, importantly, whether the project is within budget. It is in the gates that the project articulates how content develops towards the target. The interesting thing about these two plans is how they presuppose each other, time and quality of content. It is this mutual support that helps discipline the project. SU managers who are in trouble with their part of the project will try to bend rules and postpone meetings to gain time for their KU people to catch up or find solutions. Managers gain prestige by looking good in gates and they can use the plans to push their subordinates and suppliers. Changing schedules or gates upsets the order and generates anxiety.

Project members generally like the gate system. It serves a good purpose, but it also requires a fair amount of discipline. You cannot question the system which is supposed to control the dynamics of the project. But the emphasis of statements about the system differ:

> "You have to stand - we are always running - and at some moments you have to stand still and realise your own situation; targets, cost, the quality, and other people have other things." (Dutch quality engineer)

> "In my opinion (the project leader) should have said: 'We are not going to discuss the gate system. Everybody should know it. We are not going to discuss it!' over and out!..... If you don't agree come back to me after the meeting. This took ten minutes!" (Dutch cost engineer)

"... one could lie one's way through the gates almost at any length. Nobody will notice until the end... we have to treat them right...we have a strong focus on the gates and the gate documents in this project. They can do good if the people that work operatively treat them right..". (Swedish body engineer)

"Yes, the gate system is a fantastic tool that we use in Volvo.... Of course we misuse it quite often....... it should not be too rigid, especially in a small projects one should adapt to circumstances" (Swedish business area representative)

"...it is nice to know that you have reached certain requirements at a certain date....personally I find it important to know (a set gate schedule) because I do not want to come to my (KUs) and say 'this afternoon we have a 'running' gate where I want you to appear and give some answers."(Swedish interior engineer)

"....because there is no quality in the quality gate unless you have prepared properly" (British chassi engineer)

But circumstances may obscure the meaning of a gate procedure and this is patently the case when the underlying time schedule has been changed. There were deeper and more immediate explanations to the incident.

A further complicating aspect of this time schedule limbo was the lack of confirmation from the production company. This had recently caused a conflict with the Production window person. At a pre-gate meeting it was discovered that he was still thinking in terms of the old time plan. When the new time plan was explained to him he said, "No, if you see phase one and phase two that way, we have never agreed to that!" But this was exactly what the project officially had asked Production Control to consider and confirm some weeks earlier. In this way it was discovered, by accident, that Production had not yet paid attention to a crucial time plan issue. Some harsh words were exchanged after that pre-gate meeting. Sine the new time plan had not been confirmed by Production the basis for changing the gate schedule was non-existing, but the time plan was already a fact of life for the design teams...A lot of overtime had to be invested in working out the consequences of the shift in time. The value of time had literally increased and it is only reasonable to question whether it should be spent on preparations for a gate which had more or less lost its meaning, especially for the engine people who had most of their attention focused on

the problems relating to phase 2. Furthermore almost every component contains out-sourced parts, so a change in time plan involves re-scheduling with suppliers. All the pressure that had been put on suppliers to compress lead times would appear insincere to the suppliers and trust would decline. Those project members who have negotiated with suppliers hate to lose face, and the temptation to find somebody to blame is great.

.....On the video sequence

The project leader explains the exchange by stating that "we have not been clear enough about how we wanted to split up the different "tempi" between the gates. This should have been discussed in a TMG (Technical Management Group) before it was brought up in the PMG. In that case we would not have had this debate. It started kind of negatively but in the end it came out rather positively for him when we had had the opportunity to explain our intentions. This illustrates a case of inadequate communication.

The deputy project manager comments that John is right. The time schedule situation has not yet settled. A lot of questions are "still in the air" swerving around the time plan. After the PMG meeting we decided to split the gate in three and the discussion is now beginning to take shape, but that was later. What John wanted was to avoid the gate and devote his resources to better uses. He has a point but he is also trying to grab a role here by questioning the whole structure of the project. He should realise that it would be difficult for Adam to go for his proposal directly (after all it is Adam's plan). So he should have brought it up with him face to face. We thought the earlier discussion had settled the matter and then John brings it up – here we go again. We have a project time plan and a gate plan. The time plan is being reworked and if we were to unravel the gate plan as well – - the gate plan was the stable thing at that time. At week so-and-so we have to go through the criteria according to specifications. John is pleading his own case here since he has much content in the gate in terms of the XX engine package, but when he got off the hook he kind of relaxed. We have to have structure in our work otherwise we might get interference from top management. The purpose is to get the go ahead to build the verification

cars for a number of system solutions, so it is much broader than John supposes. We have rather few deviations from the Yellow book (manual on suggested project structures).

The quality manager, who was one of several speakers talking at the same time, and is the person who is responsible for the quality gates (with the project leader), says that the project was in unbalance at the time because there was no set time plan. The intention was that the time plan was to be finalised by week 45, but at the time of this meeting the partners had not come back with their approval, so the new time plan could not be settled and Quality refused to take a another decision (about changing the gate) on a not-yet-decided basis. So he had argued for keeping the quality gate based on the old time plan (still in force). The old time plan had two phases from the beginning, but the change that had been done meant that the project that had previously been split up into two phases from gate 6 would now be split from gate 5. According to the old plan the production of the verification series 2.1 was planned for just a week or so after this meeting (series 2.2 for phase 2 would come later). Now that the plan was going to be changed the confusion was about what was supposed to go into series 2.1. The irony of it is that John really has easy sailing in this gate. He could just say, "I am all right". But Quality guesses that he reacts to the short time and it is always good tactics to say that you have a hell of a lot of work. Quality says that he himself is really to blame here because he had not come out with a clear enough information about the requirements of the gate. The reason for that was that there was work going on changing the requirements due to the shifts in the content of phase 1 and 2. Experience tells us, and what John has achieved before, that there is a" hell of a workload" as he says. There was a general worry about the gates here. The discussion on the morning before the meeting with Adam resulted in the conclusion that the essential thing now was to make the new time plan settle with people so they get a firm basis to work from. The gate specifications is one thing and giving people a sense of where we stand today is the other. It is a moment 22-situation where the gates cannot be specified until we have confirmation of the new

time plan, which is still open. The gates are essentially ties to the production of try-out series, with one or two exceptions. (Lengthy explanation of the gate system).

Testing sees this as a conflict situation. There is a new proposed split-up between phase 1 and 2 and the production company has not yet accepted the main time plan. So there was no proper time plan to which the upcoming gate can relate. John's proposal was not to have this gate, since it made little sense. Those who wanted to have the meeting, testing was a member of that party, argued that it should focus on the phase 1 requirements. We needed those prototype cars but did not have that confirmation. In fact there was a full blown confrontation at a pregate meeting that came a week later where Production Control (of the production company) demonstrated clearly that they were still thinking in terms of the old gate specification. Their representative complained about some deviation and, when he was corrected, claimed that they had never agreed to this new split. The counter argument was that exactly this was what he was asked to investigate several weeks ago, so stop it. He and the project leader went outside for a "serious meeting."

Two lead engineers who are directly effected by what goes on in Engine are Electricity and Chassi + Installation. The one, because the wiring of all the electronic devices controlling the engine is Electricity's responsibility. The other, because engines and their appendices occupy space, e.g., in the engine bay.

Electricity "knows" that John is not at Gate 5 status (divergences on a lot of parts) with his area and with the new time plan he need not be, so he can change priorities and release some of the pressure from some of his people, and most of them are at head quarters so he has to be more formal in job assignments then we are down here. Ordering them to write a gate report for a gate that is not valid does not look good for the project.

There has been discussion about the real purpose of the gates. In this case it turned out all right in the end because we had a check of the materials status the week after (to start the try out series in production) and then the quality gate a couple of weeks

later, which was wrong in principle (the whole gate 5 must, of course, precede production start). It worked. We just changed the entry to the gate by focusing on phase 1 materials first and postpone the phase 2 materials to gate 5: phase 2. John was right to bring this up. On the other hand it became kind of fuzzy how we did the Engine part of it. What is it we can test in this version? There are a lot of tests ordered for these try-out cars. Some will be irrelevant now Electricity accounts for how he got a very intelligent report saying that the cruiser does not work on the series 2:1 – of course it doesn't. There is no cruiser on that version! These things happen when you change time plans. There is too much legalistic text in these gates "Plan 17.3 CB" what does that mean? Too much detail. We get lost and it tends to end up in "What do you think about this?" (subjective judgement). Often the decision is yes or no. When you split it up from functions and properties into nitty-gritty details one tends to lose track of the purpose of the gate anyway.

Chassi + Installation sees the sequence as an effort by John to reduce "our" workload. It is funny because the night before the meeting Chassi had talked about this with Electricity. They had said 'they call this a quality Gate but how can one do a quality job when one runs from one thing to another all the time (like a headless chicken). There will be no quality in the gate unless we are properly prepared. There is a loss of control as the gate approaches.

John behaves as he usually does and he was right except one percent where Chassi does not agree. John is let off the hook towards the end concerning the xx engine package. Why should chassi do a big job on the installation of that engine package if it is not yet approved? The cost of doing a good installation is about the same as the cost of re-designing the engine anyway! On Friday we have, what is it, the 4th or 5th meeting on gate 5, and we still have some stuff to get through gate 4 and then we have gate 5:2 and we still have not got confirmation that the production company can produce the car with the cycle times we have proposed..... These gates are to secure quality but we cannot secure the quality of our own process. We are too short on people and it looks like we will have three gates 5. It's too much. Sometimes you

feel confused… and there is interference from other projects we are working for. We have three launches in 18 months. We have this yellow book to help us. It is not rules. It is more like a handbook with recommendations on 3.4.5, but suddenly something pops up that is called 3.4.5.a, and then you have to go to Quality or Adam to find out.

John himself frames the sequence as follows: He reacted not so much to the re-planning as to the whole gate system. It has developed to something that is only formalities. We have the gate because we said so. "I question the point with it all – I mean with the pressure we are under, overtime and the whole situation. What does this gate do for us?" It would be more useful to use the time to sort out the consequences of the changes in the time plan, and John got the message through in a sense. That's why he says "Thank you" at the end. Well, one could certainly discuss whether this (the xxx engine package) should be in the first gate meeting. This heavy part for John is now postponed to the second gate meeting (5:2). This was supposed to be the series for verification but now, with the postponement of phase 2 we will have another series for verification in week Y so why not have it all in the week Y series? There is a formal specification of the purpose of every gate in the documentation, but that is in the formal sense. To a large extent it is really up to the individual lead engineer to choose what to account for - what cards to play. It is also guidance as to that choice John is asking for. What is the purpose of this gate? John gets some support from Electricity and Testing and is satisfied that he was the one that brought it up.

The controller explains about the change in time plan. He claims that John had not understood that already after gate 4, a couple of months ago, the gates had been split in two. He wanted to move everything to the second of the two gates, but he was not allowed to do that. When he understood that it was the verification for 5:1 we were talking about he calmed down. It was a good thing that this ambiguity on the part of John was sorted out in this meeting.

Body, a veteran since Job 1, sees the sequence as a typical misunderstanding. Adam kept in control nicely. Personally Body did not pay much attention since he was thinking about other things. He compares favourably how Adam lead this meeting with the previous meeting where Liam was chairing. John puts his finger on a key that Adam had not thought through but they agree in the end. John is not arguing his own cause really, Body would have backed him up had it been necessary. Body is of the opinion that there is no ambiguity about the content of the gates, but they become what you make of them. It is possible to lie your way through the gates straight to the end (and be found out then). This project has an emphasis on gates and gate documents and that can work all right if the operational people treat it right. The gate system is mostly for the outside (like project management at head quarters) anyway. It is a matter of responding to a number of questions and flagging up for one or two problems that you think the project leadership can help you with. If you don't feel they can help you keep it to yourself. It would only mess things up. The stated purpose of the gate and experience helps you select what can be brought up. The gates and the yellow book function as a kind of a support, but we don't use them for anything (we have our meetings every second week). It would break the rhythm of the project.

Product Planning gives a summary account of the sequence and then explains that John is under pressure because his team has not yet been under real scrutiny in a Quality gate and it would be difficult for him to achieve a good status and a good report on Engine in the short time left. He wants more time.

People were not terribly upset about this matter of reworking the time plan for the project. It had to come. The basic mistake was to start the project on a preliminary time plan while waiting for every partner to confirm his or her part of it. It has been slippery slope. The project should have issued confirmed parts of the time plan and not wait until all confirmations were in. You know, just state that this or that part is not yet confirmed but we are working on it. A lot of things happen with time plans and you have to update them so people have something to stick to. If there is a decision to postpone a try-out series you have to work it into the time plan, describe

the effects on the gates etc. There are too many memos, and changes in who is invited to answer at a gate, etc. Product Planning suggests that Quality should be responsible for continuous update and comment on the time plan, and more time should be devoted in preparing everybody for the gates (purpose, procedure, etc.). In this case John calmed down as soon as he was told that the xxx engine package was not to be included. The gate system is really a tremendous tool in VCC, and we often misuse it, of course, but it must not be applied inflexibly. If we outsource some part of development or testing the gate system must be adjusted accordingly. The gate system in itself is a project. It is essential to quality assure things on time. But there is a limit to how much you can mess it up. People have to be committed to the gate system if it is going to serve its purpose. The fine-tuning is up to Quality.

Technical Documentation points out that it is a good thing that you get this kind of signals to communicate. In this case the matter was resolved on the spot. The problem here was that the shift in the time plan (phase 1 and phase 2) made it necessary to move some components that were in phase 2 to phase 1 and vice versa, for the try-out series to serve their purpose. This caused the confusion. It shows that planning has not been perfect.

Representatives of Production, After Sales and Quality (all originally from the production company) represent different opinions as to what is proper procedure now that the gate 5 is out of step with the new time plan. From the project leader allowing John too much freedom (do not fiddle with gates) to the pointing out the elegant solution to divide gate 5 into two sessions. The comments are framed in a planning vocabulary and do not include persons other than the project leader and John ("He is trying to sneak around the gate"). One of these commentators pointed out, in hindsight, that when Testing came to the point when the xxx engine package was tested he was disappointed (so there was a reason for John's behaviour?). This was really the first signal of a disappointing performance for this package.

Interior points out that Quality is not too experienced with the gate system. That is why information has been lagging behind on the updates. Quality has told him

himself that he feels a bit uncomfortable with the system. Interior, who is for the first time lead engineer for a functional area, sees the sequence as an illustration of how you must be persistent to get a decision in the PMG. He claims that people are pleased that the gates are fixed now so you know what you have to do. He feels the pressure from other areas when they report ready for a gate well ahead of time. It is kind of embarrassing to come running with the last report at the last moment (like his predecessor on the job used to do.)

Summary of comments and discussion

The participants were highly stimulated by the video sequence to comment and, in doing so, displayed a patterned interpretation. First the reasoning kept close to the concrete event, but soon there were generalizations, to a phenomenon or a system in general (but never as general as to refer to customer or market). The perspective applied in this generalisation seems to be generated from functional aspects as well as from aspects of the role of the individual in the team. (Interviews where participants describe the roles of their colleagues in the team provide background material.). Quite often respondents oscillate between contradictory positions without showing concern for logic. This could possibly have to do with a need to accommodate the emotional load of the argument in the sequence. This claim is clearly speculative, but if it is accepted it seems to support (or be supported by) Munro (1996) on membership work which he sees as consisting of" identity" and "alignment". These two aspects of membership in the team appear in the articulations of the sense members make of the sequence in a collage form. The sense, or meaning, that results seems to be at least partly determined by the role the speaker has in the team (or outside it).

How does the respondent go about making sense of the sequence then? We can only analyse how he (all speakers are male in this study) constructs his account of the sequence (not the cognitive processes that may lay behind it). If the account has a narrative form we will find traces of the canonical form of a narrative schema (Cooren, 2000, referring to Greimas, 1987 and Propp, 1968).

Figure 2 Canonical form of a narrative schema (Cooren 2000

Manipulation	Competence	Performance	Sanction
- wanting to do	- being able to do	- doing	Recognition of
- having to do	- knowing how to do		performance

1. There is something that sets the narrative in motion (manipulation), somebody wants to do something or has to do something. In our case there are two levels of analysis in the accounts. The first is that John wants to gain time because his part of the project is not at gate 5 status. The other starting mechanism is the gap between the time plan for the project (that has been changed) and the corresponding time schedule (and content) of the gate system that has to be adjusted accordingly.

2. The resource John needs to get hold of in order to be able to perform the task given to him is time. At present John describes the time resource as compressed (overtime) and the allotted engineering hours require "prioritising." He can free resources (create competence) if he need not devote his scarce engineer hours to preparation for a gate that will not help his performance (or the project). Some commentators claim that the discipline of keeping to the time plan is a very important resource and John should not be let off the hook that easy. Others claim that discipline will suffer if the project is kept senselessly (what is the purpose?) to the invalidated gate schedule. The project leadership has broken the ice anyway by shifting components from phase 1 to phase 2 and vice versa.

3. Adam confirms that John does not have to report on the status of the xxx engine package until the second part of gate 5. John is relieved.

4. Adam is doing the right thing (recognition) in letting John off the hook and confirming that the xxx engine package is not up for scrutiny until phase 2. John was right in bringing the matter up and he would have had backing from senior members had the matter gone any further. But John is still under suspicion that he is not in complete control of his part of the project. Does he really have the backing required from the engine department? Chassi is disturbed by the effect on his part since he has to devote engineering hours to report on an engine bay – power train

solution for an engine package that is not finalised yet. Why hasn't he got a chance to adjust his time use accordingly?

The narrative casts time as a resource (engineering hours) that comes into conflict with deadlines that become visible when the dual time structure (time plan and gate schedule) come out of step. The narrativising of the time factor is done on two planes. The first one traces the origin of the trouble to the fact that the project has been running until now on a preliminary time plan that has not yet been confirmed by all parties. (The project leader should have put more energy into assuring confirmation from those who have let the matter sit on their desk.) In the meantime he could have issued parts of the plan as being confirmed. Quality admits that he should have been communicating better and earlier on the requirements of gate 5, but no colleague mentioned this.

On a more abstract level the "problem" to be solved was seen as the lack of coordination between the project time plan and the gate system (content of the gates as well as their timing). What should take precedence? It seems like the two structures on the same activity net are interdependent and support each other. Keeping to one of them while the other is being changed can be used to bridge over periods of indeterminacy as this one.

Time is articulated as the resource in these comments. At no time did any respondent refer to the difficulty of a problem as interfering with time. It was, however, implied by one or two respondents that John's competence/experience was a factor, but part of this is bantering between members. When one or two respondents interpret John's action as an effort to "sneak around" the gate the metaphor is spatial "around" rather than temporal (gaining time).

The performance to be judged in this case is also divided depending on perspective. One view is that it is getting past the gate 5 (What is the purpose?) by getting permission to start production of try-out cars. The other view is linked to finishing the project according to plan, and whether the gate system is of any help. Sense

making and judgement of performance is linked to either of the two time structures overlaid on the project.

Performance is sanctioned by members gaining or losing in status (or centrality) in the team. John, for instance, gains by speaking up against the change in time schedules, which is not liked by any member. But he also loses in status because his effort to "sneak around" the gate is interpreted by some as indicating that he is not in full control of his part of the project. He generates a disturbance, e.g., for chassi. The project leader gains authority for solving the situation rather elegantly without raising his voice. Quality lost in self-esteem but probably remained "on probation" as a new member.

It should be noted that the simple narrative schema presented in figure 2 allows multiple interpretations/narrativations of the same incident, which testifies to the complexity and propensity for misunderstanding that social interaction carries with it.

References

Ask, Urban, (1998), *Cost Control in Product design and Development – The Volvo Car Corporation Experience*. Working Paper. Gothenburg Research Institute, Göteborg University.

Clark, Kim and Fujimoto, Takahiro, (1991), *Product Development Performance: Strategy, Organization and Management in the World Auto industry*. Cambridge, Mass.: Harvard Business School Press.

Cooren, Francois, (2000), *The Organizing Property of Communication*. Amsterdam: Benjamins.

Dorriots, Beatriz (eds.) *Intercultural Communication – Business and the Internet*. Department of Linguistics, Göteborg University

Greimas, Algirdas Julien, (1987*), On Meaning. Selected Writings in Semiotic Theory*. London: Frances Pinter.

Jönsson, Sten, Edström, Anders, Ask, Urban, (2001a), Communication in Product Development in an Alliance Setting. In Allwood, Jens &. Dorriots, Beatriz (eds.), Intercultural Communication – Business and the Internet. *Papers in Anthropological Lingustics* 27, Göteborg University.

Jönsson, Sten, Edström, Anders, and Ask, Urban, (2001b), Discipline and Creative work – designing nexrt year's car model. in Allwood, C.M. and Selart, M. (eds*.), Decision Making: Social and Creative Dimensions.* Doordrecht: Kluwer.

Munro, Rolland, (1996), Alignment and identity work: the study of accounts and accountability. in Munro, Rolland and Mouritsen, Jan (eds.), *Accountability- Power, Ethos & the Technologies of Managing.* London: Thompson Business Press.

Propp. Vladimir J., (1968), *Morphology of the Folktale* (2d ed.). Austin: University of Texas Press.

Womack, J.P., Jones, D.T., and Roos, D., (1990), *The machine that changed the world.* New York: Macmillan.