Communication in Project Management

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This article discusses the project management process and reasons for the success or failure of a project. Case studies are included to illustrate the importance of communication. The word "project" is defined in the dictionary as "an individual or collaborative enterprise that is *carefully planned* and designed *to achieve a particular aim*." The topics and selected case studies presented here are either from my own experience or general knowledge and limited research. These case studies could be extrapolated by the reader to be applicable to any "project" in any discipline. I encourage and welcome any feedback and sharing any similar case studies related to communication success or failure (from your own experience or general knowledge). Please share by e-mailing me to skhudeira@yahoo.com. Thank you

The Five Phases of Project Management - General Case

There are five phase of project management:

1. Phase 1 - Initiating. This phase include identifying: benefits, need analysis, feasibility, stakeholders, constraints, and assumptions

2. Phase 2 - Planning. This phase include: scope definition statement, objectives, deliverables, exclusions, work Breakdown Structure, effort estimates, cost estimate, sequence tasks, schedule, and, resources needed

3. Phase 3 - Controlling. This phase include: progress reporting, change control, cost control, quality control, and risk control

4. Phase 4 - Executing. This phase include: executing the plan, developing the team, communicating, obtaining resources, and administering contracts

5. Phase 5 - Closing. This phase include: scope verification, administrative closure, contract closure, follow up, and lessons learned

The Project Management Process

A successful project management, for large or small project, follows the following process:

1. Agree on precise specification for the project (called Terms of Reference)
2. Plan the project: time, team, activities, resources, and financials.
3. Communicate the project plan to your project team - and to any other interested people and groups.
4. Agree and delegate project actions.
5. Manage and motivate, communicated, inform, encourage, and enable the project team.
6. Check, measure, monitor, review project progress - adjust project plans, and inform the project team and others.
7. Complete project - review and report on project performance, and
8. Project follow-up - train, support, measure and report results and benefits.

Improving Communication, Quality, and Safety - The Toyota Production System (TPS)

Companies in various fields (including engineering, medical, etc.) are adopting the Toyota Production System, also known as lean manufacturing. The Toyota Production System empowers all employees on the assembly line to stop the production line for any reason. Empowering all employees to freely communicate (in this case stop the production) will result in drastic improvement to safety and will certainly help promote employee acceptance and participation

Figure 1. The Toyota production system, where all employees are empowered to stop the production line for any reason

Liftable Bridge - Method of Lifting

Figure 2 shows a bridge in Chicago that is normally designed as a fixed bridge. The vertical clearance under the bridge is not sufficient for a large barge to pass underneath. Therefore, the permitting agencies determined that a potentially liftable bridge is needed. The lifting would occur only if the need arises in the future..

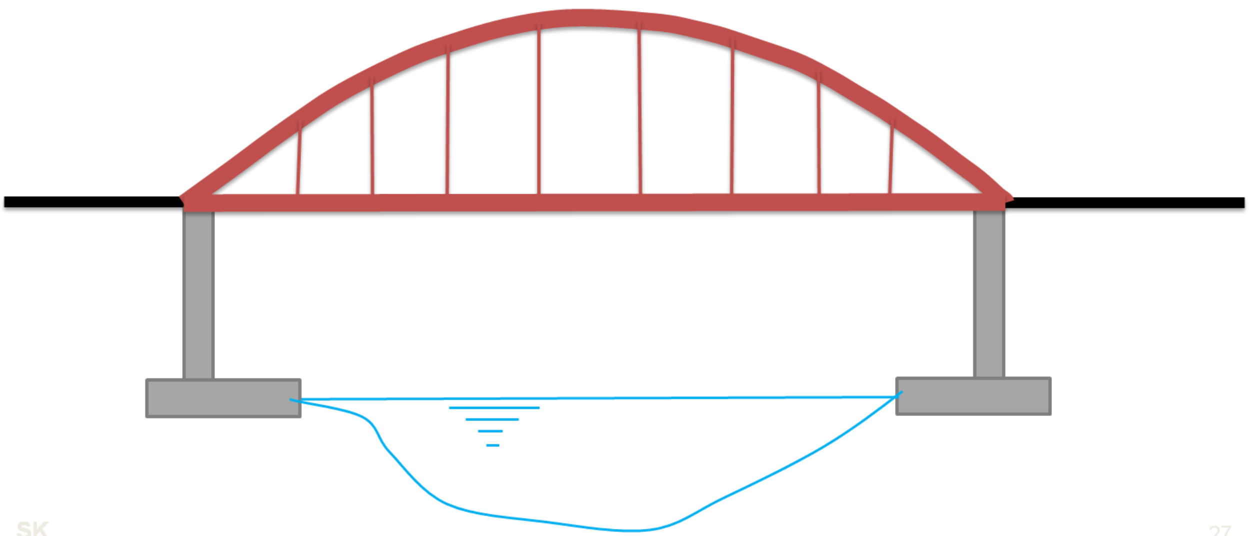

Figure 2. Elevation of the new bridge over the Chicago River

Lifting towers needed to be designed. The owner has intended for the lifting towers to be designed and installed at the bottom of the bridge (figure 3). This design would allow the bridge to be lifted, the barge passes underneath, the bridge is lowered, and then the road is opened to traffic. The lifting tower can remain in place, until the next need arises.

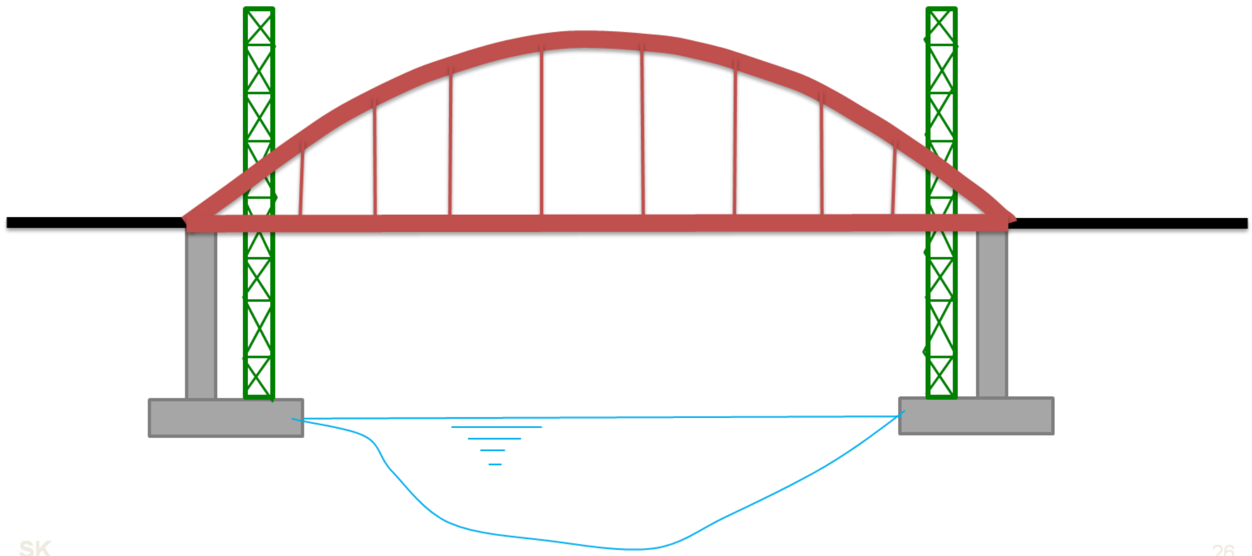

Figure 3. Elevation of the new bridge over the Chicago River showing the lifting towers, as intended by the owner

The designer did not communicate this critical information (i.e., the lifting towers need to remain in-place) to the rest of the visiting design team. The team preliminarily designed lifting towers to be removed immediately after the badge passes.

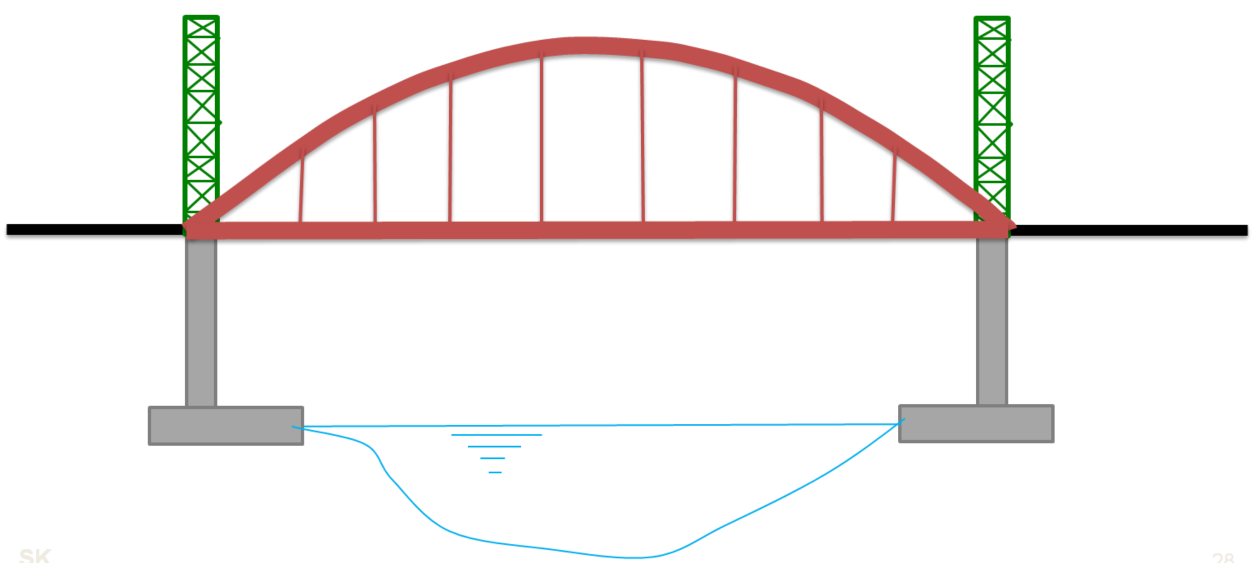

Figure 4. Elevation of the new bridge over the Chicago River showing the lifting towers, as designed by the consulting engineer

The lifting tower design as shown in figure 4 did not meet the functionality requirement and, therefore, had to be rejected and redesigned. Fortunately, this communication error was identified early in the project design phase, and corrected without major redesign effort.

Phase of Transportation Projects

There are five specific phases of transportation projects:

1. Feasibility study phase: is Initiated to develop the project Purpose and Needs. Also to investigate if the project is technically and economically feasible and prepare a preliminary project cost. Final deliverable is a preliminary project report

2. Phase I - preliminary engineering: in this phase investigation include project scope, assessment of the required land acquisition, environmental impact, define the type, size and location (TS&L) of the roadway and structures, identify alternatives, coordination with stakeholders, conduct public hearing(s), and prepare estimate of project cost. Final deliverables is a more detailed project report (compared to feasibility study) called PDR (Project Development Report)

3. Phase II - final engineering: in this phase a detailed engineering plans, specifications, and engineer's estimate (PS&E) is prepared. At the end of this phase, the project is ready for bidding by contractors. For a complex project, this phase could be divided into more than one contract Final deliverables is the PS&E.

4. Phase III - construction: This phase include: advertise the project for construction bids and award the contract to the lowest responsive bidder

5. Maintenance phase: maintenance is a continuous process throughout the life span of the facility. As an example: the average life span of a bridge is 75 to 100 years, for concrete pavement it is 20 years, and for asphalt pavement it is 10 years.

Miscommunication Between Design and Construction Engineers

A construction engineer was in charge of constucting a project in the mid eighties, where intrnet, e-mail, .pdf, and other tools we talk today for granted today were all non-existnace. The project scope eas the consturction of townhouses (also called row-houses). Figure 5 shows the the completed project (photo courtesy of Google).

Figure 5. Completed Construction

The design engineer designed the shape of the townhouses to be simple strraigt box (in the plan veiw) without any offsets between the houses (figure 6). The figure beow shows one townhous box, as designed by the design engineer

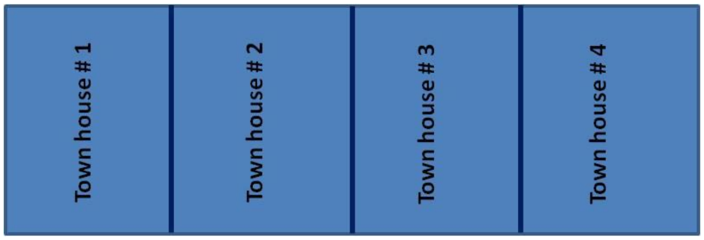

Figure 6. Plan view of as-designed town houses, which is a simple box-like shape

For better aesthetics, the city engineer recommended a set-back between the houses, as shown in the figure 7

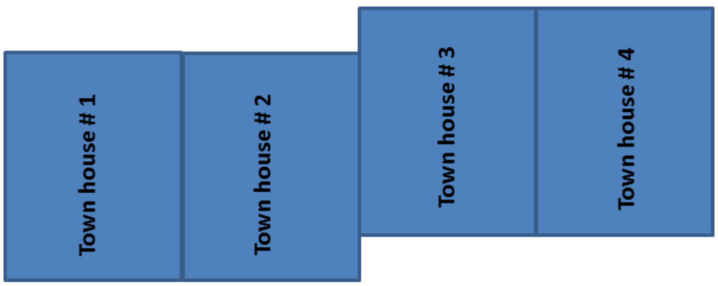

Figure 7. Plan view of the town houses layouts, as understood by the construction engineer, and the foundation were constructed accordingly

The construction engineer understood the recommendation from the city engineer as shown in the figure 8. He communicated this new request to the design engineer via the telephone, and the construction proceeded.

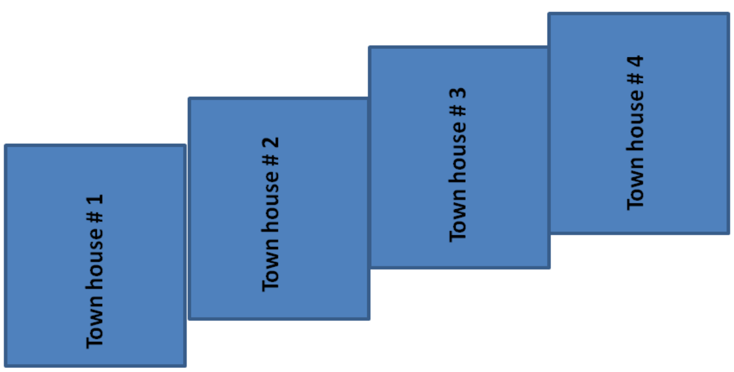

Figure 8. Plan view of the revised town houses layouts (as intended by the city engineer and the design engineer)

To correct this costly mistake, the foundation were demolished, and rebuilt as shown on figure 7. A simple double check and better communication between the design engineer and the construction engineers could have easily prevented this costly mistake, which also delayed the project completion.

Best Practices for Successful Project Management

Planning, monitoring, and controlling can make the difference in completing a project on time, on budget, and with high quality results. The following guidelines will help you plan the work and work the plan:

1. Plan the work by utilizing a project definition document. This should include: Project overview, objectives, scope, assumptions, risks, approach, organization, signature page (to be signed by the sponsor and key stakeholders, cost, and project duration
2. Create a detail work plan. The work plan provides the step-by-step instructions for constructing project deliverables and managing the project.
3. Define project management procedures. This will include sections on how the team will manage issues, scope change, risk, quality, communication, etc.
4. Review the work plan on regular bases, and monitor the schedule and budget
5. Look for warning signs.
6. Ensure that the sponsor approves scope-change requests
7. Guard against scope creep. Most project managers know how to invoke scope-change management procedures if they are asked to add a major new function or a major new deliverable to their project. However, sometimes the project manager doesn't recognize the small scope changes that get added over time. Scope creep is a term used to define a series of small scope changes that are added to the project (without scope-change management procedures being used). With scope creep, a series of small changes, none of which appear to affect the project individually, can accumulate and have a significant overall impact on the project. Many projects fail because of scope creep and the project manager needs to be diligent in guarding against it.
8. Identify all known risks, the probability of occurrence of each risk, and potential impact on the project. This need to be done in the beginning of the project. The project team also should continue to assess potential risks throughout the project
9. Resolve issues as quickly as possible

The Space Shuttle Challenger Disaster

The Space Shuttle Challenger disaster occurred on January 28, 1986, when Space Shuttle Challenger broke apart 73 seconds into its flight, leading to the deaths of its seven crew members. The spacecraft disintegrated over the Atlantic Ocean. Disintegration of the vehicle began after an O-ring seal in one of the solid rocket booster (SRB) failed at liftoff. The O-ring failure caused a breach in the SRB joint it sealed, allowing pressurized hot gas from within the solid rocket motor to reach the outside and intrude upon the adjacent SRB attachment hardware and external fuel tank. This led to the separation of the right-hand SRB's attachment and the structural failure of the external tank. Aerodynamic forces broke up the orbiter. The O-rings were not tested at temperatures below 50 °F, while the temperature at the time of the launch was below 29 °F

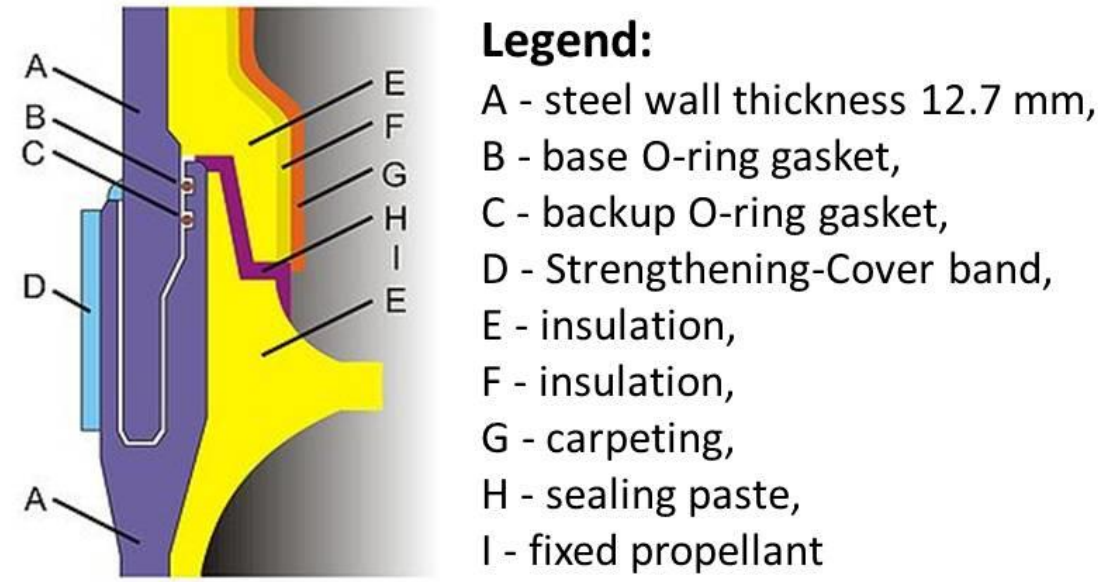

Figure 9. Cross section of the joint between rocket segments showing the O-rings.

The Challenger accident has been used as a case study in the study of engineering safety, the ethics of whistle-blowing, communications, group decision-making, and the dangers of groupthink (the phenomenon in which everyone in a group goes along with a decision without critical evaluation of alternatives or consequences). It is part of the required readings for engineers seeking a professional license in Canada and other countries.

Roger Boisjoly, the engineer who had warned about the effect of cold weather on the O-rings, left his job at Morton Thiokol and became a speaker on workplace ethics. He argues that the caucus called by Morton Thiokol managers, which resulted in a recommendation to launch, "constituted the unethical decision-making forum resulting from intense customer intimidation." For his honesty and integrity leading up to and directly following the shuttle disaster, Roger Boisjoly was awarded the Prize for Scientific Freedom and Responsibility from the American Association for the Advancement of Science.

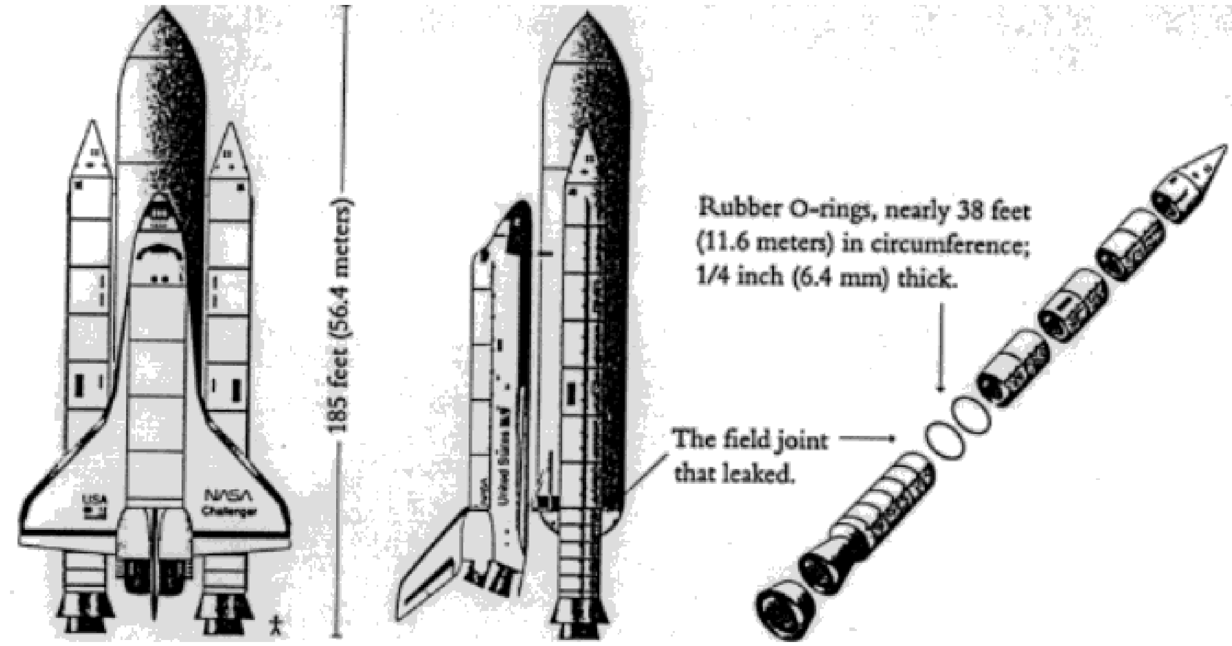

Figure 10. Rubber O-ring which failed after only 73 seconds into flight

Information designer Edward Tufte claimed that the *Challenger* accident is an example lack of communication and clarity in the presentation of information. He argues that if Morton Thiokol engineers had more clearly presented the data that they had on the relationship between low temperatures and burn-through in the solid rocket booster joints, they might have succeeded in persuading NASA managers to cancel the launch. To demonstrate this, he took all of the data he claimed the engineers had presented during the briefing, and reformatted it onto a single graph of O-ring damage versus external launch temperature, showing the effects of cold on the degree of O-ring damage. Tufte then placed the proposed launch of *Challenger* on the graph according to its predicted temperature at launch. According to Tufte, the launch temperature of *Challenger* was so far beyond from the coldest launch with the worst damage ever seen to date, that even a casual observer could have determined that the risk of disaster was severe.

Communication is art and science. Figure 11 is what was presented to NASA to convince them not to launch. Figure 11 is confusing and very clear. It looked like crayons in a box, and when the engineers and managers finished looking at them, they didn't know any more than they had before. The launch was made and seven people died.

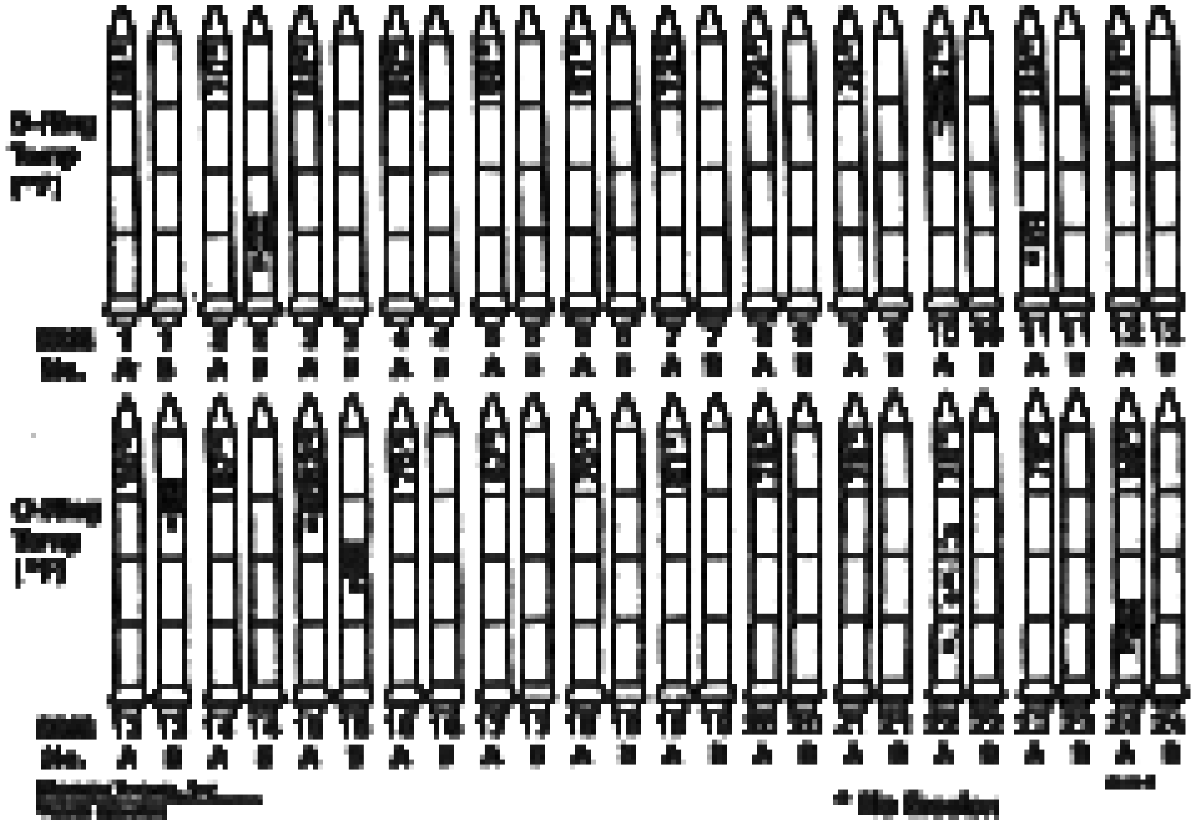

Figure 11. History of O-ring damage (as presented to NASA managers) which is clearly a confusing and not clear graph

If Figure 12 (courtesy of Edward Tufte) is presented instead of figure 11, the disaster might have been avoid, since Figure 12 (which has same info as figure 11) is very clear and clearly shows that the O-rings will be most certainly damaged for a temperature below 30º F.

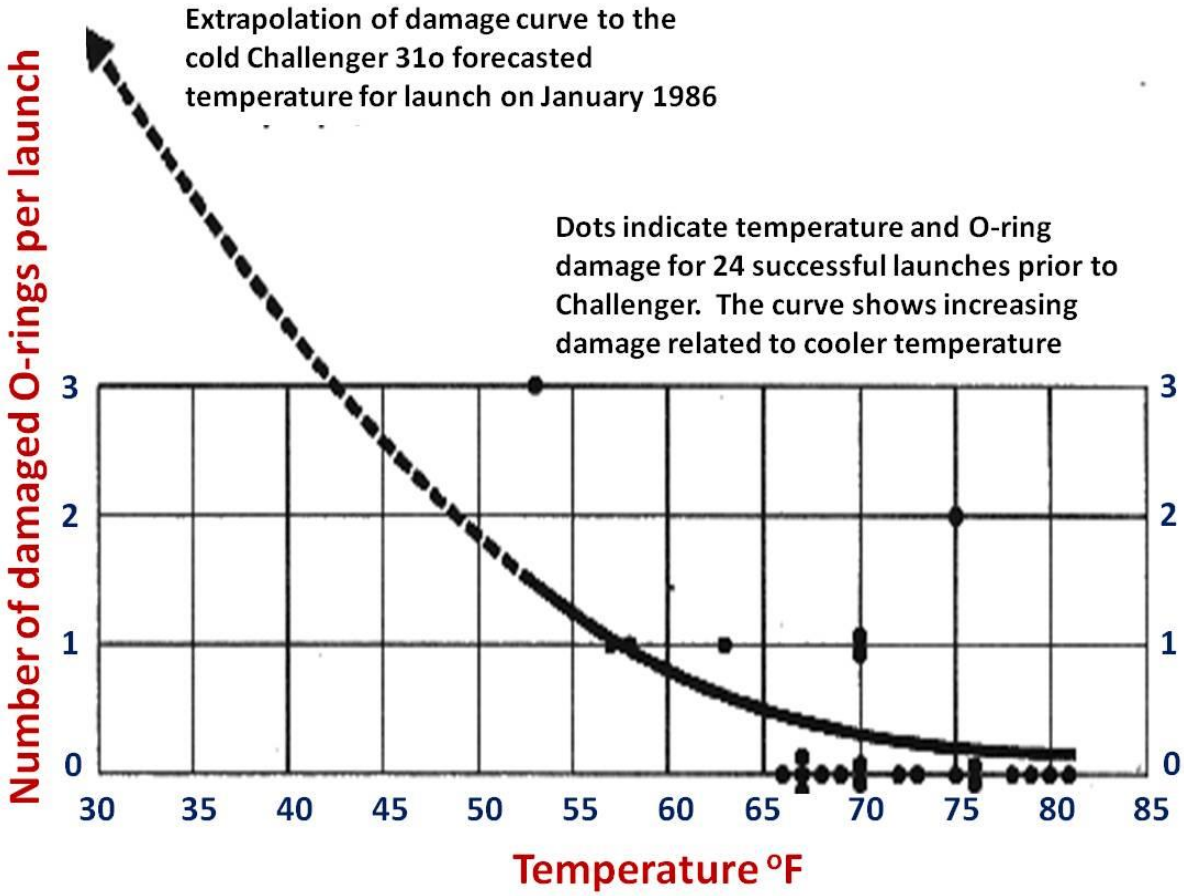

Figure 12. History of O-Ring damage (this should have been presented to NASA managers) which is clear and easily understood graph (compared to Figure 11)

<u>Failure of Communication in Project Delivery</u>

This is a theoretical and exaggerated case study to illustrate the importance of communication in project management for a successful project delivery. See figure 13 (courtesy of Generoche in Project Management)

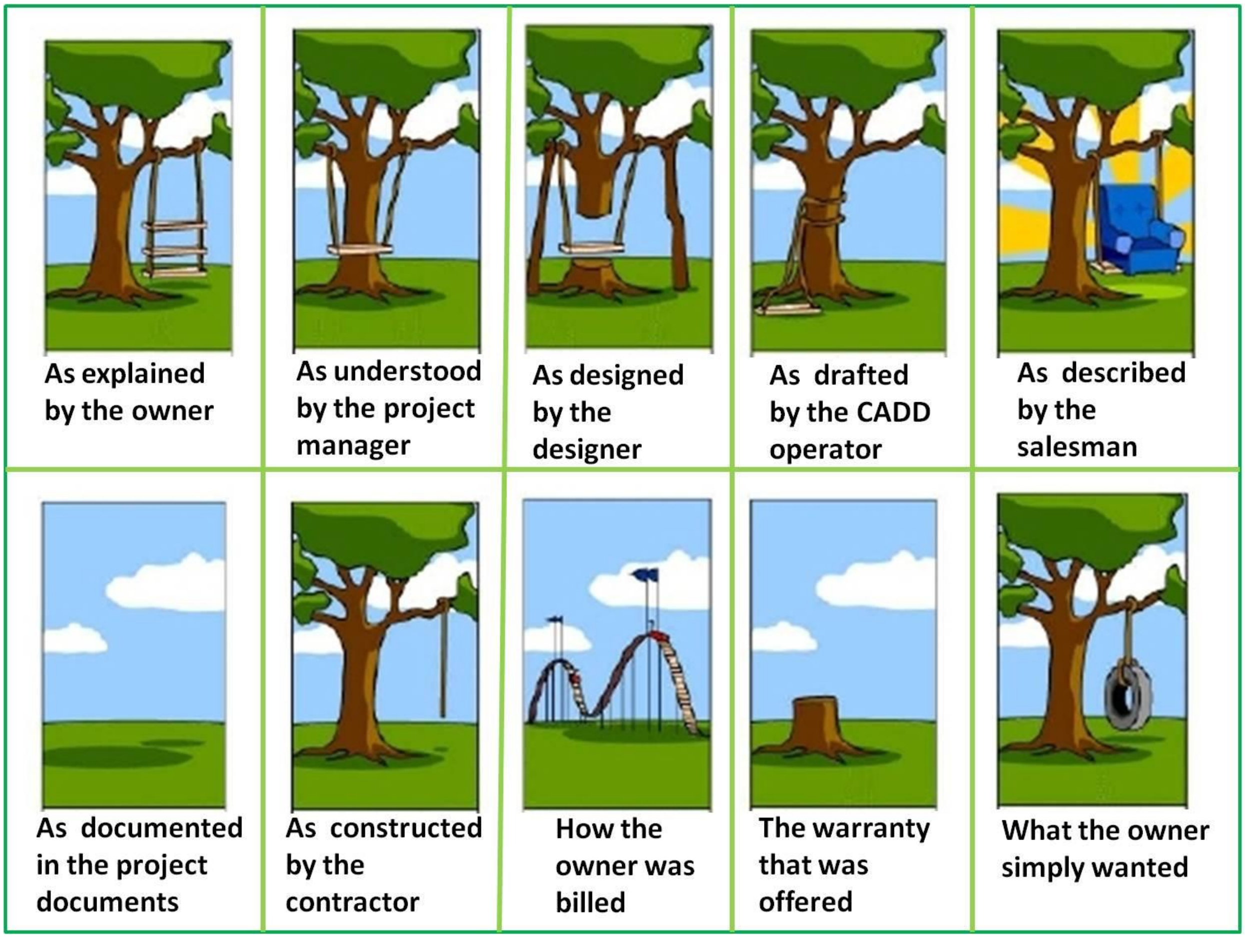

Figure 13. Illustrative example of the importance of clear communications

Causes of Failure of a Project

The following are key management and communication issues that can greatly diminish any projects chances of success:

1. Incomplete requirements: Need to capture and document the project requirements during the planning phase
2. Poor communication with the customer: In order to maintain effective and efficient communication with the stakeholders, the project manager should: Layout how communication on the project is going to happen, and create a project communication plan document
3. Irregular meeting schedules: Keep everything on a regular schedule: meetings, communications, status reporting, etc.
4. A budget left unattended: Manage the budget weekly.
5. Poor risk management: Identify risks at the beginning of the project, plan for risk mitigation and avoidance, and then track those risks throughout the engagement.
6. Differences in expectations. Project managers need to strive to ensure that everyone associated with the project has a common set of expectations in terms of what is to be delivered, when and at what cost.
7. People are surprised. If people are not kept informed as to what is going on, they will be surprised when changes occur.

8. People are impacted by the project at the last-minute. This is a prime cause of problems. In this situation, the project manager does not communicate proactively with other people about things that will impact them.
9. Team members don't know what is expected of them.

Hurricane Katrina

When Hurricane Katrina hit New Orleans in 2005, it became one of the most devastating and complex disasters in U.S. history.

Figure 14. Flooded houses due to hurricane Katrina and poor communication

The Hurricane Protection System (HPS) proved ineffective in New Orleans, but not because of one specific design flaw. Rather, a series of technical and other problems surfaced together, resulting in catastrophic flooding of parts of New Orleans. The failure is attributed to poor communication and coordination among engineering companies who designed the different parts of the HPS, and also to the poor communication among the different government agencies.

Summary:

Top reasons for project failure:

1. Poor communication among all stakeholders
2. Poor definition of the requirements
3. Inadequate risk management
4. poor scope control (scope creep)
5. Poor budget control

6. Lack of adequate resources

Top reasons for project success:

1. Plan the work
2. Define project management procedures.
3. Review the work plan on regular bases
4. Look for warning signs.
5. Ensure that the sponsor approves scope-change requests
6. Guard against scope creep.
7. Identify risks up front.
8. Continue to asses project variable throughout the project duration
9. Resolve issues as quickly as possible