Organization Structure: First of all, we know from the material that there are many projects going on at the same time in Teradyne, so I think its structure is that each project will be done by a different project team.

Interestingly, Teradyne's manufacturing facilities outsource all the parts and subsystems of the new product to other companies, and they just focus on the final assembly and testing equipment. I think that's because Teradyne's focus is on R&D(Research and Development), and they don't want to spend most of their energy on sales or marketing. For example, from the material, we can get that Teradyne has many smaller sales and engineering organizations in Japan, China and Germany.

Organization Culture：Teradyne's traditional culture is very informal and casual, based on Teradyne's values of equality, hard work, etc.

Project Selection: As we can see from the material, Teradyne’s projects continued to be late and over-budget before 1996, sometimes even more than double the total. The engineering organizations of the whole company were seriously overloaded on projects, and the capacity utilization was estimated to be as high as 300%. In addition, from the subsequent Aggregate Project Planning (APP) plans, we can find that in the traditional strategies, some of projects that had no direct impact on the company's strategic objectives were being selected, in other words, some of the useless and time-consuming projects were being selected. As a result, these projects consumed a lot of resources and projects with strategic value were being plagued by resources. It eventually led to problems such as project delay completion and over-budget.

Project Planning:

Despite the application of total quality management (TQM), this strategy has not played a significant role in the engineering department. Many people just take this strategy as a form, they even think it affects their normal work, in other words, they feel it is a waste of their time. I think because of Teradyne's organization culture, this strategy may be hard to achieve. This ultimately leads to:

1. The goal is not clear. This is very fatal. The success of a project depends largely on that.

2. Unclear milestones.

3. The definition of project schedule is lax and also an unrealistic timetable. This not only allows the project to be delayed, it can also cause people to feel less pressed to do their work.

4. There is no structured method for project tracking.

5. There is no project manager, because we can know from material that no one is in charge of the whole project.

6. Failure to coordinate or communicate due to lack of any regular or systematic approach.

Planning:

Unlike traditional strategies, Jaguar's definition of requirements and scope is very clear. Moreover, the delivery date is determined, and increasing the scope is not allowed during development. Jaguar project also has some clear milestones and uses formal project management tools such as Work Breakdown structure, 3-point Estimation, Earned Value Analysis, Critical Path analysis.

Engineers’ Autonomy :

In traditional projects, engineers have a lot of autonomy. Just like Teradyne's corporate culture, the employees are very casual, so in some ways it can reduce productivity. However, in Jaguar strategy, the employees are required to strictly follow the work rules and procedures.

Process Flow:

In the hardware project, the employees strictly follow the process, which has achieved some results, because the hardware projects are set goals and then step by step to achieve. However, in software projects, this strategy does not work. In addition to the lack of programmers, there are many uncontrollable factors in the software programming. For example, programmers can't fix some bugs in a given time. This usually takes some time. These factors cannot be controlled by strictly following the process. Although the Jaguar project follows the process strictly, through the final reflection we can know that the process is not the most important, the most important thing is the ability of employees.

Senior Management:

For senior management, they made more mistakes than above aspects. According to the material provided, although senior management has obtained a lot of valuable data, they do not pay enough attention to the data provided by the project management tools and do not understand these indicators. In addition, since management teams are unable to understand certain indicators, they choose to use more easily understood indicators. But this does not reflect the correct project status.

Furthermore, most of the time spent in meetings looking for the right tools, and reporting data in the right way, rather than thinking about product solutions.

**Work Breakdown Structure:** This tool can detail the responsibilities of each department. It helps PMs clearly identify the relationship between each sub project. WBS helps PMs find project milestones which may be easily overlooked. WBS can also help PMs share responsibility for each task and choose supervisor.

However, we can learn from the material that when the project is executed according to this structure of work, it is found that the work should actually be done in other ways, but the schedule is made according to the original plan, so the reporting schedule becomes meaningless. Moreover, it is usually necessary to modify the critical path. The consequence is that outcomes are often disconnected and work is not done efficiently as planned. In other words, this strategy increases the workload of management and management functions in planning, organizing, supervising and reviewing projects.

**3-point Estimation:** This tool can help PMs make the project schedule. From the material, PMs will consider three scenarios for each task of the project: optimistic, most likely, and pessimistic. This will help PM make overall plans and timetables for the project.

However, because it is only an estimate, it may lead to erroneous estimates, that is, too optimistic or too pessimistic.

**Critical Path:** This tool can help PMs identify and analyze important tasks in the project. Every important task will be displayed clearly in this way. For employees, they focus on the most important tasks, and for PMs, they can easily prepare some plans to respond to emergencies in these tasks.

As mentioned earlier, the critical path is often modified because of the gap between the actual execution of work and the plan of WBS, which is a big challenge for the application of this tool.

**Earned Value Analysis:** This tool can help PMs analyze the actual time and cost of the project and identify the project situation. Using the three elements: ACWP, BCWP, BCWS to analyze the situation of each milestone. Through Earned Value Analysis, PMs can find some problems, such as high cost or lagging behind the plan. And then, PM can identify these problems or change plans in time.

But as the material says, it cannot reflect everything. Although it reflects the length of work, it doesn't reflect how long it will take to complete the work. Therefore, even if the project is not in progress, it may reflect progress.

**3-point Estimation:**

The **positive effects** of this tool are:

1) defining project objectives and scope.

2) the project assumptions and constraints listed.

3) calculating the various cost plans and estimating and average accordingly.

**Work Breakdown Structure:**

The **positive effects** of applying this tool are:

1) the responsibility of each organization can be enhanced.

2) it is easier to monitor job definition.

3) progressive work management.

4) planning evaluation.

5) risk management.

6) constantly improve the process.

**Explain consequences of project management tools**

I think the consequences of using project management tools are mainly in the following aspects:

1. Project delay

In early project planning, the ambiguity of the objectives of the project plan (or the inclination to be all-inclusive in planning) results in projects that often lag behind schedule. In other words, the Jaguar project lacks the focus of its goal, which makes it very inefficient. After using the project management tools at a later stage, they have clear project goals which improves this situation. Even if some project plans are delayed, it will not affect the delivery time of the final project. This is because if some project plans are delayed, the managers of these teams have to explain the reasons to the higher management, which will increase the pressure on the teams, but also let them pay more attention to key problems and work more efficiently.

2. Some project management tools are inefficient

Senior management hopes to use project management tools to improve project efficiency and supervision. However, due to the lack of training for employees and project managers, they can't use these tools flexibly and availably. In other words, they ignore a lot of useful data because some tools aren't used correctly.

3. Loss of motivation

For engineers, these project management tools have changed the way of engineers’ work. Engineers now only respond to part of the project, so they lose their motivation to the whole project. For managers, since they report large amounts of data to senior management, they are more concerned about making the data appear to be more satisfying to senior management than about really working for high-quality jobs.

**Identify lesson learned**

Part 1: The main points of failure are:

1. Some engineers do not accept project management tools.

2. Some senior managers are skeptical of these tools.

3. The company's resources are not evenly distributed.

4. Using project management tools inflexibly.

5. Lack of supervision during the project.

6. There are too many data for managers and engineers.

Part 2: Lessons learned:

Based on the above unsuccessful points, I have found some solutions:

1. Training engineers to make them understand and use these project management tools.

2. Training senior managers to make them understand how to handle the data effectively and use them correctly.

3. Defining project objectives and balancing company resource allocation.

4. Changing and improving these tools to suit Teradyne himself and to use these tools more flexibly.

5. Strengthening the supervision of various departments to ensure the situation of each team.