Technolution

/vision

Problem identification comes before the solution

A good solution stands or falls with proper problem identification. People often start thinking in terms of concrete solutions even before their demands and needs have been properly defined.

People are often inclined to think in terms of solutions straight away. Someone complains that they are feeling out of sorts and you tell them to go out for a walk – whereas the solution might have been a listening ear. But that is difficult: listening and continuing to ask questions without already working towards a solution. The business world also displays such human traits. A customer will often already be thinking about what he wants in very technical and product-specific terms. But his demand is based on something, on a need. He wants to improve or speed up his processes. To achieve a solution, it is important to understand the problem behind the demand. This will make sense of the wishes and requirements expressed and help us develop a solution that meets that need. The essence is not to fix the “how” (for example, a system for image processing using 8 processors) but the “what” (a system that can suppress noise in incoming images by 10% at 60 frames per second with an image size of 4096 x 4096). This is called functional specification. And it starts with good problem identification that answers the “what” and “why” questions before it addresses the “how” and “when” questions. That answer will depend on the core competencies of an organisation. The core competency of the Dutch Directorate-General for Public Works and Water Management is water and transport. In the past, it would order an overhead sign gantry, specified down to colour and material. Nowadays it will ask for a solution to reduce the pressure of congestion on a road section. The thinking (and commissioning behaviour) has shifted from systems, through organisational processes, to functions or services.

Problem identification as a process

The package of requirements for a tender is more than a weighty document to which every party involved can contribute their own list of requirements. Coherence is important; instead of separate lists, what is called for is a single, optimum list. This requires consultation between all the disciplines involved: mechanics, physics and software, but also finances and logistics. The functional manager, also known as the system architect, stands between the product and the individual disciplines and seeks to establish the optimum package of requirements. Preferably in consultation with both parties, so that each can indicate what is and is not feasible or realistic based on their own expertise. This serves to create acceptance in all parts of both organisations: people feel heard and needs are met.

Culture

A customer must dare to delegate and overcome his fears – for example that his intellectual property (IP) will end up in the public domain. Because when IP is fenced off, it makes things more difficult. Creating an optimum platform to enable extremely fast processing of unfamiliar image processing algorithms is impossible if you do not know the functionality of those algorithms. It would be like having to make a frame for a painting whose dimensions you did not know. With a little openness, a much more suitable interface might be possible. A closed attitude puts a brake on creativity and makes insufficient use of the expertise available.

But a high degree of openness can lead to insecurity: “If we let you look that deeply into our organisation, why would we outsource the work? Why not do it ourselves? And what are our core competencies anyway? What do we want to be good at?” Existential questions, in other words, which can also arise in individual staff members. For example, the specialist who feels put on the spot when an outsider asks critical questions. Why didn’t he think of that himself? A good company culture strengthens the self confidence of staff. If they feel heard and supported, they will understand that the interests of the organisation and their own interests coincide.

Problem identification during development

Problem identification does not end after a package of requirements has been drawn up at system level. The complexity of systems and products is such that breaking them down into subsystems and components is essential. This involves solving problems at the level of subsystems or components. In order to be able to flexibly meet the wishes of the customer, an incremental development model is useful. This involves the developer repeatedly giving feedback to those concerned in order to make sure he is still on the right track. Short “feedback-loops” with prototypes, models or partial designs allow him to quickly gauge responses, exchange user experiences and create suitable solutions at the level of subsystems and components. He builds in flexibility by making the right choices in architecture, design and programming language at the outset. “By doing such and such, I am keeping these choices open for you.”

Verification at all levels is essential. For example, does the solution match the core problem as set out in the package of requirements? Is this solution essential, or just “nice to have”? A well structured development process and capable project management offer traceability: one can always see which needs have resulted in which choices. So it is possible to check that everything is still as it should be.

Conceptualisation

Even when all the wishes and requirements are neatly down on paper, things can still go wrong due to differences in conceptualisation. For example, a “user-friendly” system can mean all sorts of different things to different people. The point is to be specific. So functional specification is also about making sure everybody’s ideas match. Do we mean the same thing? For example, you might specify “user-friendly” as: no more than four choices per screen, in order to limit differences in interpretation. Or: you must be able to reach your destination within three clicks. Prototypes also help to ensure that visions match. Good problem identification is an essential start to any project. If the parties communicate openly on the basis of “what”, “how”, “why” and “when” and work together constructively, the most suitable and valuable solution will be the result. Everybody’s happy. The service provider gets to put its expertise and creativity to full use. And the customer? He gets a solution that matches his need.