Products, Projects, and Services; similarities and differences in architecting

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Abstract

Systems Architecting for project, product and service businesses are slightly different. These differences are reflected in the structure of the processes and the role of the architect. We elaborate the similarities in these businesses and the differences.

version: 0 status: draft July 1, 2011

1 Introduction

We have focused on the product creation of "box" like products: products that have a clear physical part; the product is a box that is created and the products are sold as boxes by sales. In the twentieth century this was one of the dominating models in industry. Another business model is *project* delivery: customers order a turn-key solution to be delivered by the supplier.

At the end of the century, several other types of systems and related business models became increasingly important. An increase of interoperating systems has opened a world of *services*, e.g. traffic information for navigation systems. *Services* are also systems, but these systems tend to be less tangible, while these service systems often include people, processes and organizations.

Similarly, System of Systems emerge everywhere. We have become dependent on the interoperation of multiple systems, the system of systems.

2 Products and Projects

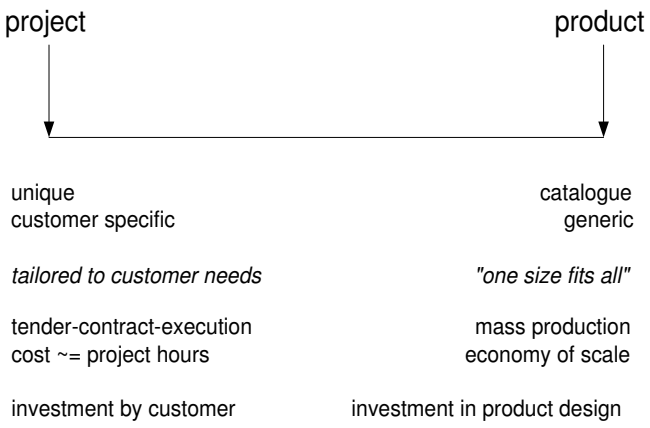

Figure 1: Projects versus Products

Figure 1 shows an axis with on the left hand extreme *projects* and on the right hand extreme *products*. We can characterize the extremes as:

Projects are unique for a specific customer. The solution is tailored to the customer needs. The sales starts with a tender phase, the execution phase starts when the contract has been signed. Cost is typically proportional with the number of project hours. In project business the customer is the investing party and carries most of the risk.

Products are standardized as part of the sales catalogue. Products are designed to be generic, i.e. to serve multiple customers. The standardization in extremis assumes that "one size fits all". At the same time standardization enables mass production, while the increased volume of multiple customers provides an *economy of scale*. Product companies typically invest themselves in new product designs

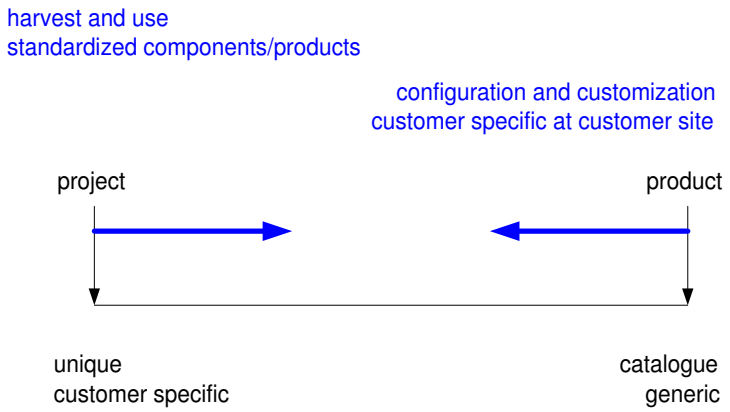

Figure 2: Convergence of Projects and Products

In practice business models are less black and white. Figure 2 shows a number of forces that lead to convergence between these two extremes. Project organizations see opportunities to increase their margin by harvesting and re-using standardized components or products. Product organizations adapt their standard products more to specific customer needs by making their products customizable and configurable. Customer support can adapt the product at the customer site to customer specific needs.

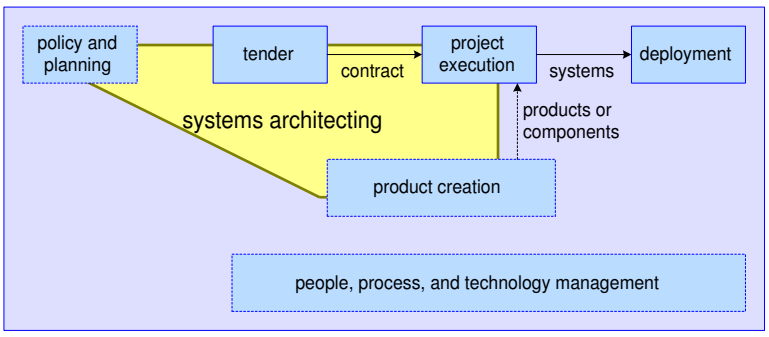

Figure 3: Simplified process diagram for project business

Figure 3 shows a simplified process diagram for project business. The Customer

Oriented Process is replace by a triplet of processes:

Tender process where the specification and price are negotiated with the customer.

Execution process where the solution is created.

Deployment process where the systems are installed at the customer site and the operation is started.

3 Services

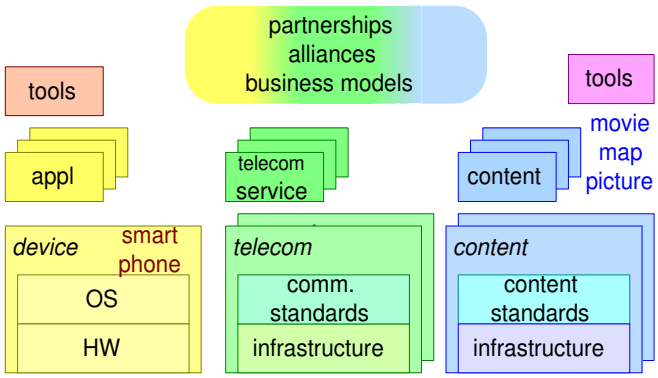

Figure 4: Example of extensive complex of services for smart phone type of device

Figure 4 shows an example of a smart phone context. The smart phone as device contains hardware, operating system and software. The device offers an application infrastructure for many applications that are created by many different parties. The application creation probably will be supported by tools.

The applications on the device and telecom services facilitate content services in the broader world. E.g. a location service based on position, map, and directory information.

Device builders have to cooperate with the telecom world and the content world to create a sellable device. Developing telecom services and developing content services can also be seen as the creation of systems. However, this world has many less technical aspects. Forging and nurturing partnerships and alliances is crucial, as well as the development of business models.

The type of deliverable and the related business model is also shifting. The conventional model is that the supplier delivers a product according to specification. The relation with the customer stops once he product has been delivered. In many business to business segments the relation is extended by offering maintenance contracts. However, in the conventional model, the customer takes ownership

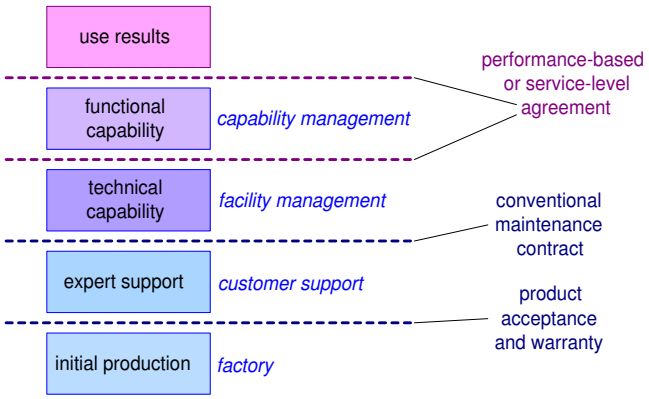

Figure 5: Model of operational services showing that the boundary between provider and customer can be defined at different levels

of the system. The bottom two layers in Figure 5 represent the conventional business models.

In business to business situations the system that is delivered will be managed by a facilitation or technical department. E.g. in hospitals the radiology equipment is supported by technical hospital staff. The actual operation of the system is done by application experts, in the hospital example the radiology equipment is run by dedicated clinical staff and radiologists. The radiology department provides an imaging and diagnosis capability to the referring physicians.

The equipment manufacturer can shift their support “upwards” to offer:

Facility management a technical working and prepared system.

Capability management where the whole capability, such as diagnostic imaging, is offered.

The consequence of this shift is that the supplier creates a recurring revenue stream. The integral consequence for customer and supplier is that incentives are changing.

For example, when the supplier is responsible for a constant performance, then the supplier might decide to upgrade the equipment much more regular. The supplier also gets an incentive to minimize down time and maintenance costs.

The process structure might be adapted to facilitate the service development. Service development, both for the content type as well as for the operational type, require many less technical, more political, social, and economical development activities.

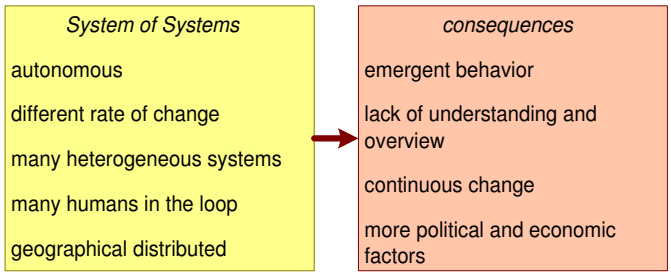

Figure 6: System of Systems and the consequences of this approach

4 System of Systems

Today's society depends heavily on the interoperability of many systems. We recognize that the solution can be created by interoperability of multiple systems, the so called *System of Systems*. See Figure 6 for the characteristics of System of Systems and the consequences of this approach. The System of Systems can be seen as a super system.

Examples of system of systems are:

Military capabilities , where amongst others planes, tanks, guns, officers, soldiers, and sensors are interconnected.

Health care treatment room , e.g. operating theater or catherization laboratory, where respiratory and physiology monitors, surgical tools, clinical support systems, nurses, surgeons, et cetera collectively perform the treatment function.

The individual systems in a System of Systems can operate autonomously. Most often these systems have not been created with this specific super-system in mind. The individual systems follow their own life cycles, with different rates of change. The systems can be quite heterogeneous (large, small, expensive, low cost, re-usable, disposable, fragile, robust, et cetera). Every system has its own human machine interface and its own control paradigm. The geographical location of the systems can be distributed and may change.

These characteristics have several consequences. The most dominant consequence is that the super system is so complex that nobody has the understanding and the overview of the whole. Hence nobody can predict what will happen and we get so-called *emergent behavior*. The amount of systems with their different change rates and the amount of humans create a super system that is never exactly the same: it changes continuously. In the larger scope of the System of Systems many non technical factors play a role, e.g. economical or political.

References

[1] Gerrit Muller. The system architecture homepage. http://www.gaudisite.nl/index.html, 1999.

History

Version: 0, date: June 17, 2010 changed by: Gerrit Muller

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