Architecture; the building as a product

Annotated presentation, given at a mini symposium at the official opening of building WDC; September 2001

Gerrit Muller
University of Southeast Norway-NISE
Hasbergsvei 36 P.O. Box 235, NO-3603 Kongsberg Norway
gaudisite@gmail.com

Abstract

Software and System Architects frequently use the building architecture as metaphor. The maturity and visibility of building architecture makes it an attractive vehicle for illustrations.
This presentation at the formal opening of the new IST (Information and Software Technology) building, identified by "WDC", shows the similarities between building architectures and product architectures. One of the main areas of research of the IST is architecture, ranging from Silicon architectures to Software architectures.

version: 0.2 status: finished June 5, 2018

1 Introduction

The formal opening of the new IST[1] building of Philips Research provided an opportunity to compare architecting buildings and architecting electronic products. Many IST people are involved in architecting electronic products.

2 The Product: Building WDC

Figure 1 shows the new IST building, which is the product of a significant architecting effort.

Figure 1: The product

Architecting a product involves 3 major phases, see also figure 2:

- Understanding **why**
- Defining **what**
- Guiding **how**

[1] Information and Software Technology

The **why** and the **what** of a product are directly derived from the needs and the constraints of the stakeholders. The **what** is consolidated in a requirement specification. To determine the**what** sufficient understanding of the **how** is needed to ensure the feasibility. Understanding the **how** requires a significant amount of technology and construction know-how.

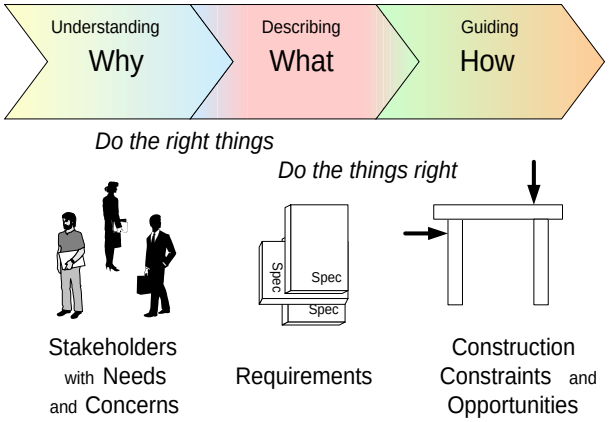

Figure 2: What is Architecting?

The authentic objectives of the Philips management with respect to the Campus can be read (in dutch) in figure 3. These objectives and subgoals are translated in English, see tables 1 and 2.

Campus Doelstellingen
* Stimulerende werkomgeving voor synergie en innovatie
* Duurzame ontwikkeling van de organisatie
* Efficiënte huisvesting

Sub-doelen :
+ Open relatie met omgeving
+ Innovatieve werkomgeving
+ Bevorderen van synergie d.m.v. gemeenschappelijke faciliteiten
+ Integratie van werken en privé
+ Blijvende positie van Philips onder de eerste elektronica concerns
+ Versnelling van innovatie-processen
+ Aantrekkingskracht toptalent
+ Opheffen versnippering
+ Versterken imago

Figure 3: Philips management objectives w.r.t. Campus

The objectives make it clear that the Philips management is aware of influence of the housing on the organization and may other human factors. The objectives address mostly human factors, within an economic efficiency constraint.

- Stimulating working environment for synergy and innovation
- Enduring development of the organization
- Efficient accomodation

Table 1: *Objectives of the Philips management w.r.t. the Campus*

- Open relation with environment
- Innovative working environment
- Encouraging synergy by sharing facilities
- Integration of professional and private life
- Consolidation of position of Philips as one of the leading electronic companies
- Acceleration of innovative processes
- Remove fragmentation
- Improve image

Table 2: *Subgoals w.r.t. the Campus*

The vision of the architects, see figure 4 is to create a very *open* and *transparant* building. *Open* and *transparant* stimulates *communication*, *sharing* and *cooperation*. An modern outlook and embedding the building in the high-tech campus creates a stimulating and innovative environment.

- Comfortable
- Concentration
- Communication
- Practical

Table 3: *Wishes and concerns of the inhabitants*

Somewhat late in the process the final inhabitants were involved in the internal design of the building. Table 3 show some of the wishes of the inhabitants. especially the *concentration* requirement was undervalued by the architects and some raging debates took place about this subject.

Figure 5 shows the internal design after taking into account the *concentration* requirement. The open space is mostly filled with (small) two person rooms, to provide the required quiet atmosphere. The informal communication is now foreseen near the two coffee pantries.

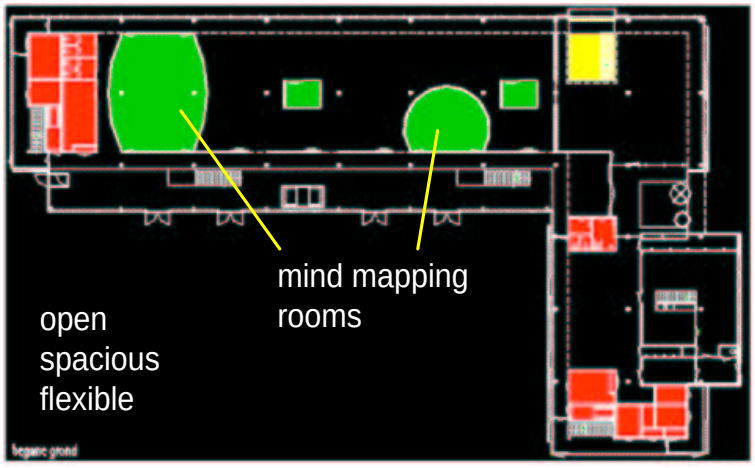

Figure 4: The architects vision

The openess is reduced to open staircases and the atrium at the south side of the building. Figure 6 shows an impression of the space near the staircase.

The work of the architect is to bridge the stakeholder world and the construction world. This construction world is much more technical, many technical aspects must be taken into account by the architect.

Figure 7 shows a number of the more technical aspects:

- Facilities
- Infrastructure
- Design aspects
- Construction aspects

Note that most technical aspects have a counterpart in terms of stakeholder concerns. For instance safety is a major concern of a plant manager, which results in many procedures, guidelines, provisions and hence also in requirements for the new building.

In technical architecting we promote the ”CAFCR”-model[2]. This model provides a spectrum of 5 viewpoints, ranging from the customer objectives (customer **what**) to the realization (product **how**). Figure 8 shows the architecting aspects mapped on this model.

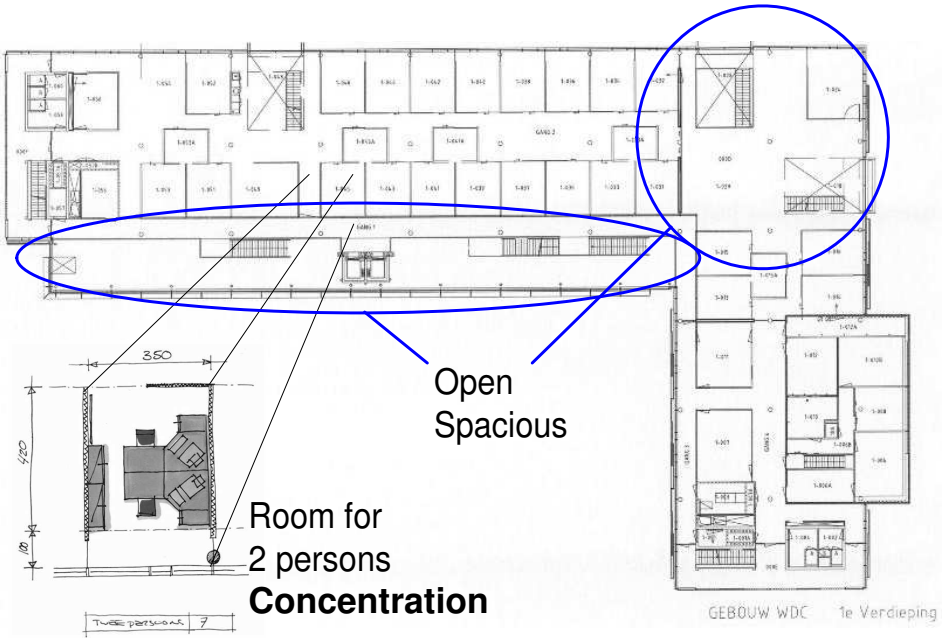

Figure 5: After user amendation

Figure 6: Space impression

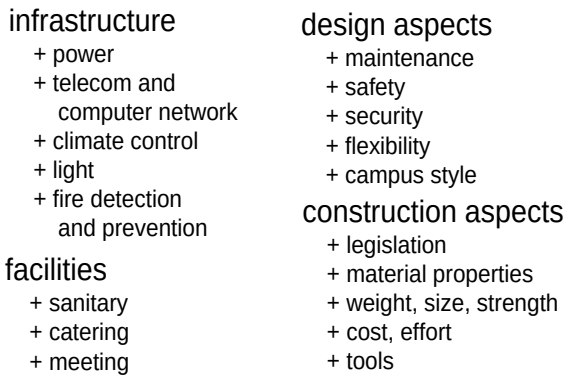

Figure 7: The technical side of the architecture

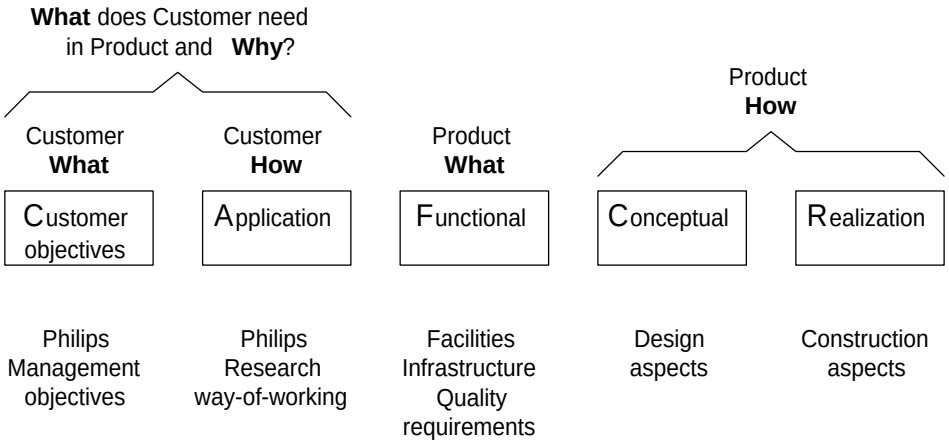

Figure 8: WDC architecting mapped on ”CAFCR”

3 The Product: Digital Video Recorder

A Digital Video Recorder (DVR) is described in the same perspective as the building WDC to compare building architecting and electronic product architecting. One of the main functions of a DVR is *time shifting*, providing a consumer freedom in time. Figure 9 shows a simple example of the application of *time shifting*.

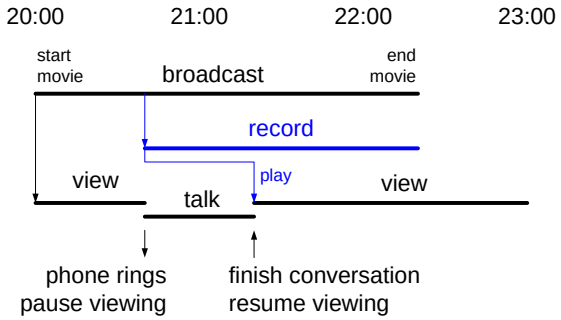

Figure 9: Example product: Digital Video Recorder

Some objectives of the consumer are summed up in table 4.

- **Time independent** entertainment and other video content
- Convenience, no hassle
- Fits in family environment

Table 4: *Consumer Objectives*

The product requirements are translated in a design in an iterative fashion. Figure 10 shows some of the relevant technical side of a DVR.

Finally all these issues are mapped on the ”CAFCR”-model, see figure 11 Many similarities of the WDC and the DVR ”CAFCR”-model are evident.

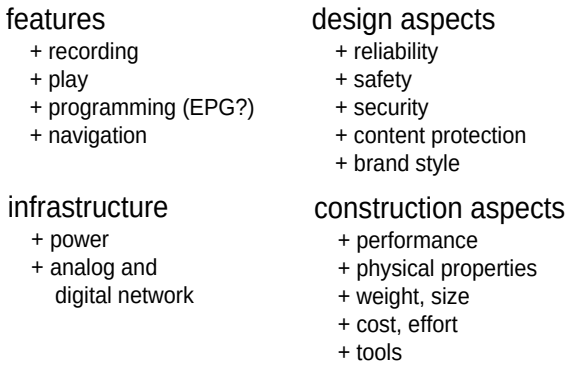

Figure 10: The technical side of the architecture

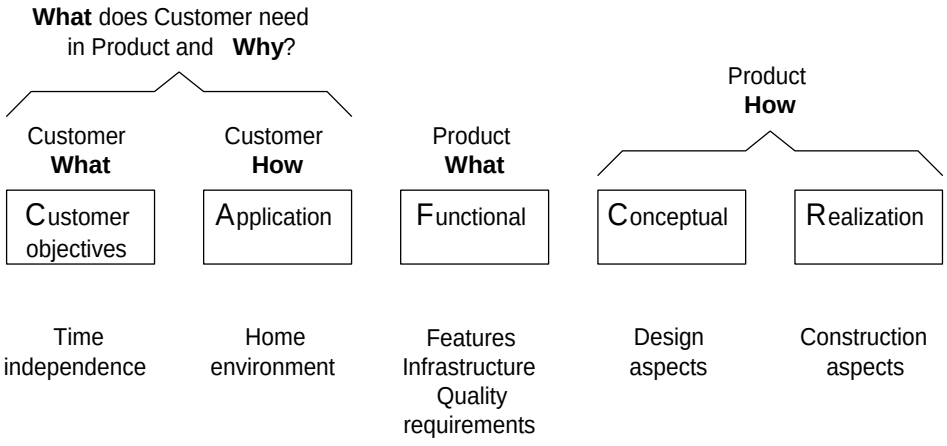

Figure 11: Product architecting mapped on ”CAFCR”

4 Discussion

Many similarities exist between the building architect and the (electronics) product architect. The maturity of both disciplines is quite different. Architecting buildings is a very mature discipline, with millenia of experience. At the other hand electronics and software are very young disciplines, where the construction technology is changing rapidly. The (electronics) product architecting is a very immature discipline.

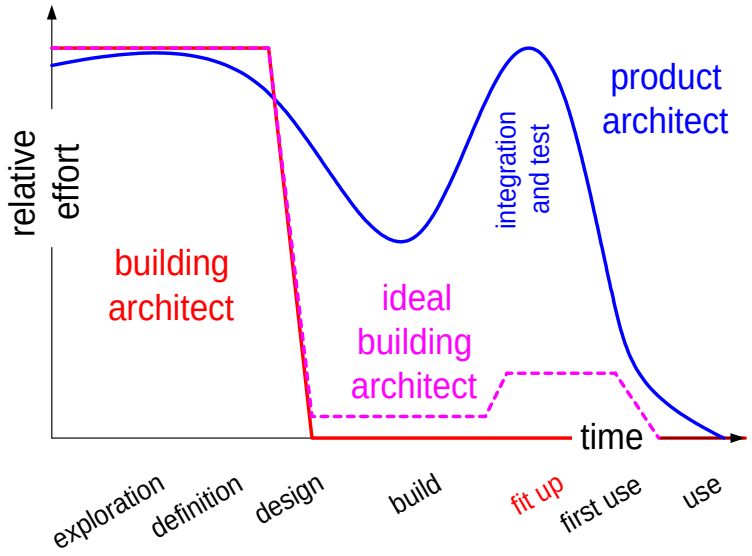

Figure 12: Architecting dynamics

The maturity influences the way of working of the architect. The building architect does most, if not all, work at the beginning of a project. Figure 12 shows the relative effort as function of time, showing that the building architect stops after delivering the design. The building architect is not involved in building, preparing the use, or the actual use of the building. The building architect is sometimes involved in the acceptance of the building, the phase transition between building and using.

The product architect must be involved in the later stages of the project, to solve unforeseen requirements and implementation hurdles. Due to the immaturity of the involved disciplines both unforeseen requirements and implementation hurdles are a fact of life. If the architect is not available in that phase the integrity of the architecture is in severe danger.

The strict phasing of the building world is in my opinion too strong. Many building architects don't get practical feedback from builders and users. Also many unforeseen requirements and implementation hurdles are also a fact of life

in buildings. As example of an unforeseen requirement we can look at the *concentration* wish of the users, researchers, which had a significant impact on the architecture. Examples of implementation hurdles are the climate control and the light controls.

5 Conclusion

The main function of an architect is to bridge the stakeholder world and the construction world. This requires substantial know how and understanding of both worlds. The function of the building architect and the electronic product architect is quite similar from that perspective, see figure 13.

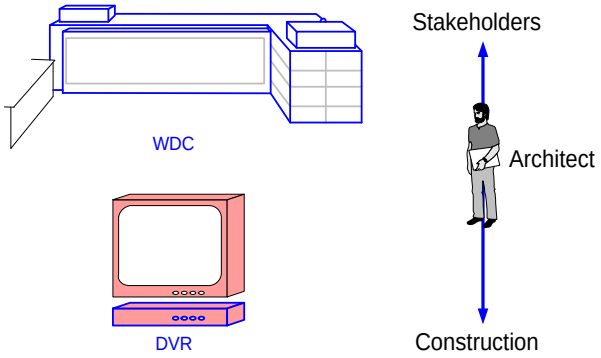

Figure 13: Bridging 2 worlds

References

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

[2] Henk Obbink, Jürgen Müller, Pierre America, and Rob van Ommering. COPA: A component-oriented platform architecting method for families of software-intensive electronic products. `http://www.hitech-projects.com/SAE/COPA/COPA_Tutorial.pdf`, 2000.

History
Version: 0.2, date: June 12, 2002 changed by: Gerrit Muller

- minor change

Version: 0, date: September 12, 2001 changed by: Gerrit Muller

- Created, no changelog yet