Abstract

Describes architecting and the task of the architect, with emphasis on bridging the why, what and how of a product. The memory usage of a medical workstation is used as practical illustration.

The introduction of a system architect in an architecture unaware organisation is described. A metamorphosis takes place from a threatening meddler into an appreciated indispensable team member.
Where is Gerrit in multi-D organisation space?

The System Architect; Meddler or Hero?
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MSorganisation
**Who is Gerrit? What is Gaudí?**

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MSwhoIsGerrit
Practical illustration; a medical imaging workstation

URF-systems EasyVision: Medical Imaging Workstation

typical clinical image (intestines)
Problem: unlimited memory consumption (1992)

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MSmemoryZeroMeasurement
Solution: measure and iterative redesign

- measured code
- OS
- data
- bulk data
- fragmentation
- anti-fragmenting
  - budget based awareness, measurement
  - DLLs tuning

200 MB

74 MB

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M3memoryUsageReduction
Method: budget per process

Budget:

+ measurable

+ fine enough to provide direction

+ coarse enough to be maintainable
Integration uncovers hidden problems

Do you have any design issues for the design meeting?

The default answer is: No.

During integration numerous problems become visible

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MSintegration
Architecting scope

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MSAwarenessPath
The engineer’s perception of the architect

How much memory do you use?
That is too much!

asks questions
uncovers problems
has nicest job

for many engineers the system architect = threat or menace
Understand the customer to drive design choices

What does Customer need in Product and Why?

**Customer Objectives**

- **Customer What**
  - key drivers:
    - throughput
    - diagnostic quality
    - film saving
    - street price 50k$

- **Customer How**
  - Application

**Product What**

- **Product Functional**: 3 exam rooms per exam:
  - 20 images
  - auto-print on 3 sheets

- **Product Conceptual**: decomposition
  - anti-fragmentation
  - DLL's

**Product How**

- **Product Realisation**: measured budget
  - 200 MB
  - 74 MB

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MSeasyVisionCAFCR
Method to detect problems: Question generator

How about the **<characteristic>** of the **<component>** when performing **<function>**?

What is the **memory usage** of the **user interface** when **querying the DB**?
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MSmeddlerAndHeroes

Conclusion

team full of heroes

meddling architect
Benchmarking

- Certainty
- Predictability
- Agility
- Optimization

INCOSE
SEI (CMU)
IEEE1471
Gaudi

"Informatica" curriculum in the Netherlands

Technology only
Including process
Including stakeholders full life cycle
Including business and human factors

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MSbenchmarking
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Daenen, Steven
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Wissink, Getty
Engelsma, Erwin
Stut, Wim
Luttikhuizen, Paul
Bruin, Jan
Gooren, Huub
den Dekker, Wim
van der Laak, Eric
Crins, Wim
Heerinckx, Lex
Schippers, Alef
Schreppers, Jurgen
Deckers, Robert
van Balen, Auke
Huiban, Cristian
van Loon, Gerard
van den Heuvel, Patrick
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Houtepen, Rob
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Veldmans, Ferdinand
Merkus, Paul
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Pu, Xuemei
Boon, Sjirk
ten Pierick, Henk
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Siereveld, Ad
van Bakel, Gerian
Engbers, Rene
van Wetten, Frank
Stevers, Frank
Wubben, Rob
Schellingerhout, Nico
Vugts, John
http://nlww.natlab.research.philips.com:8080/research/swa_group/muller/

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Exploration of new ideas

Application of technology

Consolidation of know how

Research

Application of technology

Consolidation of know how

Product Division
Is architecting scientific?

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MSarchitectureAndScience
1. Functional Decomposition

2. Construction Decomposition

3. Allocation

4. Infrastructure

5. Choice of integrating concepts
The architect as integrator

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MATcomplementaryExpertises
The architect maintains technical roots

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MATfromSpecialistToSystemArchitect
sheets that didn’t make it into the final presentation
Memory Budget; too detailed

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MSmemoryBudget
Engineers feeling caused by architect's activity illustrated by examples of architect behavior

Which can be nasty, if you don't have any answer

- Asks questions

Or worse, a problem is hiding underneath

- Identifies risks and problems

A judgement is given

- Voices opinions

Meddling in my backyard, without any substantial know how

- Does have holes in know how

While we are busy with detailed bug fixing and maintenance

- Does the nice work

Every question or problem explodes into an even more extensive set of questions and problems

- Does not provide definite answers or solutions

What happens if we have many small images? Or if we have very large images?
Integrating CAFCR; too glossy

**What** does Customer need in Product and **Why**?

- **Customer**
  - **What**
    - context understanding
    - opportunities
  - **How**
    - customer objectives
- **Application**
  - intention
  - objective driven
- **Product**
  - **What**
    - objective driven
  - **How**
    - knowledge based

**Product How**
Engineers perception

- Asks questions
- Identifies risks and problems
- Voices opinions
- Does have holes in know how
- Does the nice work
- Does not provide definite answers or solutions

Required characteristic of the architect

Questions are the primary tool of an architect

+ Prevention is valuable
+ Focus, selection is key, which requires vision and choices
+ Sometimes the architect needs to dive in deep
+ There is more nice work needed than we ever can do
+ Keeps repeating the previous actions
What is the latency induced by the graphics generator when browsing?
Architecture Awareness Phases; too complex

<table>
<thead>
<tr>
<th>Project Team</th>
<th>Phase 1</th>
<th>Phase 2</th>
<th>Phase 3</th>
<th>Phase 4</th>
<th>Phase 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mood</td>
<td>Happy</td>
<td>Problems</td>
<td>Crisis</td>
<td>Troubleshooting</td>
<td></td>
</tr>
<tr>
<td>Architecture Awareness</td>
<td>Unaware</td>
<td>Nagging</td>
<td>Threat</td>
<td>Builds Up Credit</td>
<td>Amazement</td>
</tr>
</tbody>
</table>

- **Phase 1**: Happy, unaware
- **Phase 2**: Problems, nagging awareness
- **Phase 3**: Crisis, threat
- **Phase 4**: Trouble-shooting, builds up credit
- **Phase 5**: Amazement

Number of known problems builds up as architectural coverage increases.