The role of the architect in today’s turbulent world is discussed. There is a need for systems that improve security, safety, and that provide threat analysis and prevention, and intelligence. These systems are build in an era full of technological opportunities; from biometrics to intelligent vision/analysis et cetera. However we are faced with many challenges: how to cope with huge amounts of information, how to cope with or how to prevent false positives and false negatives. At the same time system builders have to deal with complicating factors: human factor, many open systems in stead of a few closed systems, and the dynamics of the environment (politics, terrorists, nature, ...).

What is the role of the architect, how to cope with the challenges and complications, what methods and tools are available?
The Architect in a Turbulent World

security and safety problems and needs
technological options
architect
complex systems of systems
security and safety solutions
human context

pirates
terrorists
turbulent world
(natural) disasters
large scale fraud
cyber crime
illegale immigrants
narcotics smugglers

architect
security and safety problems and needs
technological options
fast evolving heterogeneous

stakeholders
users
buyers
suppliers
legislation
The Role of the Architect in a Turbulent World

1. Exploring Turbulence
2. From Problem to Solution
3. Fit Technological Options to Problem Context
4. Role and Profile of the Architect in a Turbulent World

Structure of this Presentation

1. Problem
2. Technology
3. Architect
4. Turbulent World
5. Solutions

The Role of the Architect in a Turbulent World

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RATWcontent
Exploring Turbulence

Exploring turbulence

From problem to solution product creation process

Fit technological options to problem context

Role and profile of the architect in a turbulent world
Sources of Turbulence: Mega Events

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RATWmegaEvents
Most Stakeholders Strive for Certainty

dealing with uncertainty

pull towards certainty

inventors
entrepreneurs

managers

quality assurance

employees
genral public
government

purchasers
Contradiction: Humans as Champions of Adaptability

Homo Sapiens
thousands of years of adaptation
sea, desert, polar, mountain,
dehydration, flood, fire, famine,
war, plague, diseases

technological systems
hundreds of years of dedication
From Problem to Solution; Product Creation Process

1. Exploring turbulence
2. From problem to solution
3. Fit technological options to problem context
4. Role and profile of the architect in a turbulent world

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Product Creation: Phasing of Process Steps

1. feasibility
2. definition
3. system design
4. engineering
5. integration & test
6. field monitoring
7. product operational lifecycle

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RATWsystemActivities
The “CAFCR” model

What does Customer need in Product and Why?

Customer What
Customer How
Product What
Application
Functional
Conceptual
Realization

drives, justifies, needs

enables, supports

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CAFCRannotated
Security as example through all views

<table>
<thead>
<tr>
<th>Customer objectives</th>
<th>Application</th>
<th>Functional</th>
<th>Conceptual</th>
<th>Realization</th>
</tr>
</thead>
<tbody>
<tr>
<td>sensitive information</td>
<td>selection</td>
<td>functions for administration</td>
<td>cryptography</td>
<td>specific</td>
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<tr>
<td>trusted</td>
<td>classification</td>
<td>authentication</td>
<td>firewall</td>
<td>algorithms</td>
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<td></td>
<td>people</td>
<td>intrusion detection</td>
<td>security zones</td>
<td>interfaces</td>
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<td>logging</td>
<td>authentication</td>
<td>libraries</td>
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<td>authentication</td>
<td>quantification</td>
<td>registry</td>
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<td>badges</td>
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<td>protocols</td>
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<td>locks / walls</td>
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<td>guards</td>
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<tr>
<td></td>
<td>administrators</td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

**desired characteristics, specifications & mechanisms**

- social contacts
- open passwords
- blackmail
- burglary
- fraud
- unworkable procedures

- missing functionality
- wrong quantification

- holes between concepts

- bugs
  - buffer overflow
  - non encrypted storage
  - poor exception handling

**threats**
Will biometrics improve authentication?
Is encryption guaranteeing information security?

What are the implementation related security hazards?

What are the process assumptions?

Does the technological solution fit in the human mindset?
Fit Technological Options to Problem Context

1. Exploring turbulence from problem to solution product creation process
2. Architect role and profile of the architect in a turbulent world
3. Turbulent world solutions
4. Technical options to problem context

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What is Architecture?

- Understanding Why
- Describing What
- Guiding How

Do the right things

Do the things right
"Guiding How" by providing rules for:

1. Functional Decomposition
2. Construction Decomposition
3. Allocation
4. Infrastructure
5. Choice of integrating concepts

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LWAArchitectureHow
The Art of Architecting Anno 1990

Stakeholders

Expectations

Architecting

- analyze
- assess
- balance
- trade-off
- decide
- vision
- overview
- insight
- understanding

Architecture

Note:
Facts, Expectations and Intuition might be false

Architect(s)

Intuition

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LWAarchitecting
The Art of Architecting Anno 2006

Stakeholders

\[ \text{Expectations} \]

Architecting

- analyze
- assess
- balance
- trade-off
- decide
- vision
- overview
- insight
- understanding

Architecture

- does it fit and satisfy today's and tomorrow's situation?

Intuition

- or out of date
- or fluctuating

Note:
Facts, Expectations and Intuition might be false

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RATWarchitecting
Architecting is much more than Decomposition.

Decomposition is "easy"

Integration is difficult
Architecting: Preparing for Integration

Decomposition is "easy"
Integration is much more difficult

Decomposition becomes minor part

Integration is much more difficult

future extension
Technical Decisions Require Detailed Know How

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RATWpyramid

The number of details and growing every year.

- System
- Multi-disciplinary
- Mono-disciplinary
The Role of the Architect in a Turbulent World

1. Exploring turbulence
2. From problem to solution
3. Fit technological options to problem context
4. Product creation process

Role and Profile of the Architect in a Turbulent World
Organizational Problem: Disconnect

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

- **Customer objectives**
- **Application**
- **Functional**
- **Conceptual**
- **Realisation**

**How can the product be realized**

- Critical decisions
- System requirements
- Design decisions
- Parts connections lines of code
- and growing every year....

The Role of the Architect in a Turbulent World

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Architect: Connecting Problem and Technical Solution

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

- **Customer objectives**
- **Application**
- **Functional**
- **Conceptual**
- **Realisation**

**How** can the product be realized

- **What** are the critical decisions

- **How can the product be realized**
- **What are the critical decisions**

- The number of details and growing every year....
- System requirements
- Design decisions
- Parts
- Connections
- Lines of code

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The Role of the Architect in a Turbulent World

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RATWbreadthAndDepth
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RATWmentalDynamicRange
Opposing, but Complementary Skills and Cultures

Based on: "Some Future Trends and Implications for Systems and Software Engineering Processes" by Barry Boehm, Systems Engineering, Spring 2006

Agility people: thrive on chaos. System architects: create some order in chaos but fear dogmatic use of procedures and policies.

Plan-oriented people: thrive on order. System engineers: create reliable, reproducible, maintainable, manageable systems introducing procedures and policies.
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RATWsystemRoles
Recommendation 1: Team Work

1 team

mutual respect
complementary

few

agility
people

thriving
on chaos

many

plan-oriented
people

thriving
on order

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RATWteamwork
Recommendation 2: Symbiose via Workshops

- workshop(s)
- management
- stakeholders
- agility
- plan-oriented
- people
- people
- early in the project
- shared problem understanding
- shared solution exploration