Architecture Development Process

Context

Do the right thing

Plan

Do the thing right

Build

Run it right

Operate

Retire it right

Retire the solution

Initiation

#1

#2

#3

#4

#N

Transition & Operation

Idea Creation & Verification

Plan

Build

Operate

Retire

Define Enterprise Architecture Context

Determine Context

Develop Understanding of Problem

Brainstorm on alternative Solution approaches

Develop Black-Box Perspective of Solution

Not forget to communicate («Marketecture»)

Create the Architecture’s core views

Create the Architecture’s cross-cutting views

Create the Architecture’s cross-cutting perspectives

Document key assumptions / decisions

Review and assess the Architecture

Elaborate Technology Architecture

Idea Creation & Verification

Plan

Build

Operate

Retire

Elaborate Technology Architecture

Elaborate System Context

Elaborate Architecture Vision

Elaborate Application Architecture

Elaborate Data Architecture

Elaborate cross-cutting Architecture Perspectives

Document Architecture Assumptions & Decisions

Review Architecture

Elaborate System Context

Elaborate Architecture Vision

Elaborate Application Architecture

Elaborate Data Architecture

Elaborate cross-cutting Architecture Perspectives

Document Architecture Assumptions & Decisions

Review Architecture
Architecture View Model

**Context**

Enterprise Architecture Landscapes & Views

- Requirements
  - Principles & Constraints
  - Functional Requirements
  - Non-Functional Requirements

- Application Architecture
  - Technology Architecture
  - IT-Infrastructure

- Data Architecture
- Security Perspective
- Performance & Scalability Perspective
- Extensibility Perspective
- Availability & Reliability Perspective

External Viewpoint

- Architecture Alternatives
- System Context
- Architecture Vision

2 | (C) by Ingo Arnold | IT Architecture | e-Vaccine-Card
## Step 9: Elaborate Technology Architecture

### Objective

Where the Application Architecture describes a solution’s key functional building blocks (aka: Application Components) and their inter-connections, the Technology Architecture elaborates the Application Components’ operational underpinnings.

With the Technology Architecture an Architect creates a model of System Components and their respective inter-connections.

The Architect also develops a model that explains how each of the Application Components in the Application Architecture are mapped onto one or more System Components in the Technology Architecture.

An Architect uses the Technology Architecture mainly to verify coverage of all non-functional requirements and quality attributes the solution is expected to have.

### Roles

- Solution Architect
Architecture Knowledge Framework

**Context**

**WHAT**
(Introductions, Definitions, Disciplines)

**WHERE**
(Architecture Perspectives)

**WITH WHAT**
(Architecture Techniques & Means)

**WHY**
(Architecture Requirements)

**WHO**
(Organizations & Roles)

**HOW**
(Methods & Process Models)

**Architecture Technologies**
- Naming & Directory Systems
- Transaction Systems
- MOMs
“Multi-tenancy Broker” as it is introduced conceptually as well as to the Application and Data Architecture raises two questions here

- Which technology component can be used to cover the need to maintain the «business unit name → bind target» information
- Which technology component will underpin the application component «multi-tenancy broker»?

The separation of infrastructure underpinnings of ..

- Multi-Tenancy Broker
- And the remaining proportions of e-Vaccination Card (i.e. profECard)

... makes a lot of sense, since «Multi-Tenancy Broker» will exist only once for all clones / instances of the profECard system
Elaborate Technology Architecture

Context

- Furthermore the team wants to zoom into more detail around the development environment’s design of the e-Vaccination Card system.

- profECCard documentation is consulted in order to determine required IT-infrastructure underpinnings – among these are:
  - X86 / WinServer7
  - vSphere Virtual Servers
  - CISCO HW LoadBalancers
  - SSL accelerator cards (recommended)

- Also attention is paid to standards-conformance regarding improveHealth’s technology standards
  - vCenter needs to be consumed via improveHealth’s VBlock\(^{(1)}\) service

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\(^{(1)}\) VBlock is an appliance which provides an integrated platform comprised of ..
- hypervisor (vSphere)
- Network
- Storage (SAN)
Elaborate Technology Architecture

Context

- Reflecting back on iteration #1 Technology Architecture the team realizes that not all technology architecture layers are covered, yet

What's covered so far is this technology architecture layer:
- Application infrastructure / middleware

These components, for example, are not yet covered:
- X86 / WinServer7
- vSphere Virtual Servers
Elaborate Technology Architecture

**Context**

- Technology Architecture covers a broad variety of technical systems where these systems are often categorized by the notion of vertically stacked layers (i.e. layered system)

- A coarse grained notion of this is introduced by the view model used
  - Application infrastructure
  - IT-infrastructure
Looking a little closer at both layers we see that Application Infrastructure is very much geared to underpin application components (which is reflected by the tiering of typical app-infra components).
Elaborate Technology Architecture

Context

- Looking a little closer at both layers we see that IT-Infrastructure is usually further layered and stacked.
Elaborate Technology Architecture

**Context**

- Typical technology components that can be found across the below vertical layers are ...

<table>
<thead>
<tr>
<th>IT-Infrastructure</th>
<th>OS</th>
<th>Mobile OS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Linux</td>
<td>Special Device OS</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hypervisor</th>
<th>Logical Partitions</th>
<th>Virtualization</th>
<th>...</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Computing (Client &amp; Server Devices)</th>
<th>SPARC</th>
<th>HP</th>
<th>Sun</th>
<th>X66</th>
<th>IBM</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smartphone</td>
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<tr>
<td>Notebook</td>
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<tr>
<td>Lab. Device</td>
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<tr>
<td>Man. Device</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Network &amp; NOS</th>
<th>Intranet</th>
<th>Extranet</th>
<th>WAN/LAN</th>
<th>Internet</th>
<th>Extranet</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Http</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>SOAP</td>
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<tr>
<td>IIOP</td>
<td></td>
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<td></td>
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<tr>
<td>RMI / RPC</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Storage</th>
<th>SAN</th>
<th>Tape / Tape Libs</th>
</tr>
</thead>
<tbody>
<tr>
<td>NAS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DAS</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Data Centres
Update of the Technology Architecture viewpoint

- Network zones are now mentioned as well
- Technology as per company’s standards
- Additional components are introduced

Infrastructure for «Multi-Tenancy Broker» has also been introduced to the picture
More details are elaborated regarding selected technology components

<table>
<thead>
<tr>
<th>System Component Name</th>
<th>JEE WLS Server</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>JEE compliant server from Oracle (WebLogic) which provides web- and ejb-containers including their underpinning services, as well as a standardized programming model.</td>
</tr>
<tr>
<td>Description of the requirements and characteristics</td>
<td></td>
</tr>
<tr>
<td>Hardware</td>
<td>Fundamentally underpinning hardware components is VBlock appliance (described in detail, separately).</td>
</tr>
<tr>
<td>Operating System</td>
<td>JEE WLS Servers will all be run on a Win7 OS and on latest patch-updates</td>
</tr>
<tr>
<td>Middleware</td>
<td>JEE WLS Server provides a broad variety of middleware options e.g. JMS, RMI, JDA, JNDI, JDBC</td>
</tr>
<tr>
<td>Communication</td>
<td>http* protocols, advanced remoting protocols (e.g. RMI/IIOP), WS-related protocols</td>
</tr>
<tr>
<td>System Management</td>
<td>Provides standard MIB that can be snapped into improveHealth’s systems management suite</td>
</tr>
</tbody>
</table>
| Non-functional requirements | - Availability (based on a WLS-cluster configuration, where the master-server has a JDBC connection pool included)  
                         - Adoptability (based on deployment descriptors)  
                         - Security (JEE JAAS will be utilized to implement privilege model) |
Elaborate Technology Architecture

Activity

- Now that both, Application and Technology Architecture have matured a deployment model explains
  - Which deployment units exist
  - Which application components are bundled into which deployment unit
  - Which (possibly how) deployment units are deployed into which technology component

<table>
<thead>
<tr>
<th>Installation Deployment Unit</th>
<th>Description</th>
<th>Included Application Components</th>
<th>Deployed on System Components</th>
</tr>
</thead>
<tbody>
<tr>
<td>profECard Core Presentation DU</td>
<td>..</td>
<td>- Core Presentation Engine</td>
<td>- JEE WLS Server</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- RDBMS Oracle</td>
</tr>
<tr>
<td>profECard Patient Module DU</td>
<td>..</td>
<td>- Patient Module</td>
<td>- JEE WLS Server</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- RDBMS Oracle</td>
</tr>
<tr>
<td>profECard Physicians Module DU</td>
<td>..</td>
<td>- Physician Module</td>
<td>- JEE WLS Server</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- RDBMS Oracle</td>
</tr>
<tr>
<td>profECard Vaccine Module DU</td>
<td>..</td>
<td>- Vaccine Module</td>
<td>- JEE WLS Server</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- RDBMS Oracle</td>
</tr>
<tr>
<td>profECard User Management DU</td>
<td>..</td>
<td>- User Management</td>
<td>- JEE WLS Server</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- RDBMS Oracle</td>
</tr>
<tr>
<td>profECard Core Meta-Control FW DU</td>
<td>..</td>
<td>- Master Data Module (Meta-Object-Protocol)</td>
<td>- JEE WLS Server</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Connector Framework / Customization API</td>
<td>- RDBMS Oracle</td>
</tr>
<tr>
<td>profECard Multi-Tenancy Broker DU</td>
<td>..</td>
<td>- Multi-Tenancy Broker</td>
<td>- JEE WLS Server</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- RDBMS Oracle</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Naming Service</td>
</tr>
</tbody>
</table>
Questions?