Quantitative Models in Enterprise Architecture Management
29.06.2016, Prof. Dr. Florian Matthes

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www.matthes.in.tum.de
1. Quantitative Models in Enterprise Architecture Management
Usage Scenarios for Quantitative Models in the Domain of Enterprise Architecture Management

Identified usage scenarios

1. Assess the Architecture with Metrics
2. Measure architecture changes
3. Plan architecture changes
4. Monitor system performance with KPIs

System Structure (Static)

System Behavior (Dynamic)

Performance

$t - 1$

t = NOW

$t + 1$
The usage of metrics is related to several risks and problems.

Top five risks ranking by the experts:

1. Defective data
2. Metrics are not properly defined
3. Irrelevant metrics
4. Missing automation of the measurement process
5. Metrics are too abstract
### 1. Title

| Application continuity plan availability |

**Application continuity plan availability**
1. Title
Application continuity plan availability

2. Summary
Completeness measure of assigned and tested IT continuity plans for critical business applications.

Description
A measure of how completely IT continuity plans for business critical applications have been drawn & tested up for the IT's application portfolio.
### 1. Title

Application continuity plan availability

### Goals

- Ensure compliance
- Foster innovation
- Improve capability provision
- Improve project execution
- Increase disaster tolerance
- Increase homogeneity
- Increase management satisfaction
- Increase transparency
- Reduce operating cost
- Reduce security breaches

### Summary

- Improve capability provision
- Increase disaster tolerance
**1. Title**
Application continuity plan availability

**2. Summary**
Completeness measure of assigned and tested IT continuity plans for critical business applications.

**3. Goals**
- Improve capability provision
- Increase disaster tolerance

**4. Calculation**
The number of critical applications where tested IT continuity plan available divided by the total number of critical applications.
## 1. Title
Application continuity plan availability

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Completeness measure of assigned and tested IT continuity plans for critical business applications.

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- Improve capability provision
- Increase disaster tolerance

## 4. Calculation
The number of critical applications where tested IT continuity plan available divided by the total number of critical applications.

## 5. Source
CobiT 4.0
## Metric Management Fact Sheet Example

<table>
<thead>
<tr>
<th>1. Title</th>
<th>Application continuity plan availability</th>
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</thead>
<tbody>
<tr>
<td>2. Summary</td>
<td>Completeness measure of assigned and tested IT continuity plans for critical business applications.</td>
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<td>Improve capability provision. Increase disaster tolerance.</td>
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<td>4. Calculation</td>
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</tr>
<tr>
<td>5. Source</td>
<td>CobiT 4.0</td>
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### Layers

![Layers Diagram](image_url)

- Business Capabilities
  - Organization & Processes
  - Business Services
  - Application & Information
  - Infrastructure Services
  - Infrastructure & Data
### 1. Title
Application continuity plan availability

### 2. Summary
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### 3. Goals
- Improve capability provision
- Increase disaster tolerance

### 4. Calculation
The number of critical applications where tested IT continuity plan available divided by the total number of critical applications.

### 5. Source
CobiT 4.0

### 6. Layers

### 7. Information Model

![Information Model Diagram]

**Diagram Notes:**
- **Business application** isCritical: boolean[1..1]
- **IT continuity plan** isTested: boolean[1..1]
### 1. Title
Application continuity plan availability

### 2. Summary
Completeness measure of assigned and tested IT continuity plans for critical business applications.

### 3. Goals
- Improve capability provision
- Increase disaster tolerance

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The number of critical applications where tested IT continuity plan available divided by the total number of critical applications.

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CobiT 4.0

### 6. Layers
EAM-KPI-0001
General part (GP) is independent from a particular organization

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<td>Organization-specific part (OSP) describes the configuration of the metric in a specific organization.</td>
<td>EAM-KPI-0001</td>
<td></td>
</tr>
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### General part (GP) is independent from a particular organization

**Mapping:**

<table>
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<tr>
<th>Name in model</th>
<th>Mapped name</th>
<th>Data owner</th>
<th>Data sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business application</td>
<td>Application</td>
<td>J. Doe</td>
<td>EA repository</td>
</tr>
<tr>
<td>isCritical</td>
<td>criticality</td>
<td>J. Doe</td>
<td>EA repository</td>
</tr>
<tr>
<td>covered by</td>
<td>Covers</td>
<td>R. Miller</td>
<td>Risk Mgmt rep.</td>
</tr>
<tr>
<td>IT continuity plan</td>
<td>Disaster plan</td>
<td>R. Miller</td>
<td>Risk Mgmt rep.</td>
</tr>
<tr>
<td>isTested</td>
<td>tested</td>
<td>R. Miller</td>
<td>Risk Mgmt rep.</td>
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### Organization-specific part (OSP) describes the configuration of the metric in a specific organization.

9. Mapping

- **Name in model** — Business application, isCritical, IT Continuity Plan, isTested, covered by.
- **Mapped name** — Application, criticality, Disaster plan, tested, covers
- **Data owner** — J. Doe, J. Doe, R. Miles, R. Miles
### General part (GP) is independent from a particular organization

#### Properties:

<table>
<thead>
<tr>
<th>KPI property</th>
<th>Property value</th>
<th>Best-practice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measurement frequency</td>
<td>Yearly</td>
<td>Quarterly</td>
</tr>
<tr>
<td>Interpretation</td>
<td>good if &gt; 80%, normal if between 60% - 80%, bad if &lt; 60%</td>
<td>Problematic if &lt; 60% Normal if between 60% - 80% Good if &gt; 80%</td>
</tr>
<tr>
<td>Owner</td>
<td>J Smith (CIO)</td>
<td></td>
</tr>
<tr>
<td>Responsible</td>
<td>J. Doe (Risk Manager)</td>
<td></td>
</tr>
<tr>
<td>Target value</td>
<td>85% after 01.01.15</td>
<td>80%</td>
</tr>
<tr>
<td>Planned value(s)</td>
<td>5% on 31.13.12,...</td>
<td>70%, 75%</td>
</tr>
<tr>
<td>Tolerance value(s)</td>
<td>5%</td>
<td></td>
</tr>
<tr>
<td>Escalation rule</td>
<td>Report to Leo Mueller</td>
<td></td>
</tr>
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</table>
Contains ten structure elements based on suggestions from literature in the fields of EAM, IT and economics and observations in industry [Ma12e]

- General structure elements support benchmarking
- Supports the alignment of measurement and goals
- Organization-specific structure elements enable actionable KPIs
- Helps to identify required data and relevant stakeholders in the specific enterprise context
- Supports organization-specific instantiation of relevant KPI properties
- Supports multiple instantiation of the same KPI
Metric Management Method (MMM) as Extension of the BEAMS Conceptual Framework

Stakeholders

Goals + Concerns

Organizational Context

Implementation Guide
(Patterns & Building Blocks)

+ EAM Metric Catalog

Enterprise Architects

Development method

Characterize situation

Configure EAM function

Analyze EAM function

Adapt and evolve EAM function

EA Metric

Performance Indicator

VBB

VBB

IBB

IBB

IBB

EAM Metric

Beams, EAM Pattern Catalog and EAM KPI Catalog
Requirements for a calculation engine

- Analysis capability for linked data, e.g. networks and tree structures
- Batch and/or ad-hoc calculations
- Definition of metrics at runtime
- Model independence
- Resistant to model changes
- Reusable results, e.g. for visualizations
- Parameterized metric definitions

Prototype used for metric calculation @ sebis

- Model-based Wiki system with calculation engine (Tricia & TxL)
- Current issues:
  - Improvable performance for large calculations
  - REST interface for metric result export

```javascript
/* define the components of the current business application to be considered for heterogeneity calculation */
let components = 'Betriebssystemtyp(en)' in

/* count components */
let totalNumber = components.count() in

/* group components by identity -> relative frequency */
let groups = components.groupby() in

/* calculate Shannon entropy as result */
shannonEntropy(components)
```
Thank you for your attention. Questions?