Kriterien für die Auswahl eines EAM Tools


Florian Matthes
Software Engineering for Business Information Systems (sebis)
www.matthes.in.tum.de
Outline

1. Why does EAM require specific tool support?

2. What are specific functions and scenarios identified in collaboration with experienced practitioners?

3. How do current EAM tools perform in these scenarios?

4. What are trends in EAM and EAM tool support?
   a) Market perspective
   b) Research perspective
Key challenges of EA modeling

Complex information structures

- Holistic view ➔ lots of types and elements
- Relationships more important … ➔ lots of links and causal dependencies
- Multiple viewpoints ➔ lots of attributes, documents, generated views (reports, diagrams)
- Multiple roles & processes ➔ access rights, audit trails, notifications

Element life cycles

- demand, project proposal, budgeted project, project in execution, completed project

Evolving information structures

- Mismatch between information demand & supply
- Changing architectural concerns
- Increasing maturity of the EAM function

Special-purpose repositories

- EAM tool, process modeler, CMDB, project portfolio tool, requirements manager, …
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The sebis Enterprise Architecture Management Tool Surveys

- First version published in 2005

- Second version in 2008 (EAMTS 2008)
  [http://www.matthes.in.tum.de/wikis/sebis/eamts2008](http://www.matthes.in.tum.de/wikis/sebis/eamts2008)

  384 full color A4-pages

  350 graphics, screenshots and tables
Partners and sponsors in the year 2008

Users
- Fraport
- BMW
- MINI
- Nokia Siemens Networks
- schufa
- SEB
- KUEHNE+NAGEL
- EWE
- Postbank
- HVB Information Services
- HSH Nordbank
- TeamBank
- p&g
- TUI
- Wacker
- FIDUCIA
- Die Bahn
- B/S/H/
- Deutsche Bank
- O₂
- LVM Versicherungen
- Allianz
- Münchener Rück Munich Re Group
- Zollner
- Siemens

Consultants
- act!
- DETECON
- sd&m Consulting
- Syracom

© sebis
## Tools sorted based on interest of sponsors & partners

<table>
<thead>
<tr>
<th>Vendor</th>
<th>Tool</th>
</tr>
</thead>
<tbody>
<tr>
<td>alphabet AG</td>
<td>planningIT</td>
</tr>
<tr>
<td>IDS Scheer</td>
<td>ARIS IT Architect</td>
</tr>
<tr>
<td>Telelogic</td>
<td>System Architect</td>
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<tr>
<td>Troux Technologies</td>
<td>Metis Architect, Metis Server, Metis Collection</td>
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<tr>
<td>* IDS Scheer</td>
<td>ARIS ArchiMate Modeler</td>
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<tr>
<td>* Hewlett Packard</td>
<td>Mercury Project and Portfolio Management Center</td>
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<tr>
<td>Casewise</td>
<td>Corporate Modeler Suite, IT Architecture Accelerator</td>
</tr>
<tr>
<td>* IBM</td>
<td>Rational Software Architect</td>
</tr>
<tr>
<td>MEGA International</td>
<td>MEGA Modeling Suite</td>
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<td>BOC</td>
<td>ADOit/ADOxx</td>
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<td>Adaptive EAM</td>
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<td>ProVision Modeling Suite</td>
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<td>EA/Studio</td>
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<td>Agilense</td>
<td>EA WebModeler</td>
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<td>EAM Suite</td>
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<td>ABACACUS</td>
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<td>Enterprise Architect</td>
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<td>ASG</td>
<td>ASG Enterprise Management/Rochade</td>
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<td>pulinco</td>
<td>TopEase Suite</td>
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<td>Visible Systems Corporation</td>
<td>Visible Enterprise Products</td>
</tr>
<tr>
<td>…</td>
<td>…</td>
</tr>
</tbody>
</table>

* Tool unaccounted for evaluation
Scenarios for Analyzing Specific Functionalities

- Importing, editing, and validating model data
- Creating visualizations of the application landscape
- Interacting with and editing of visualizations of the application landscape
- Annotating visualizations
- Supporting light weight access
- Editing model data using an external editor
- Adapting the information model
- Handling large scale application landscapes
- Supporting multiple users and collaborative work

Scenarios for Analyzing EA Management Support

- Landscape Management
- Demand Management
- Project Portfolio Management
- Synchronization Management
- Strategies and Goals Management
- Business Object Management
- SOA Transformation
- IT Architecture Management
- Infrastructure Management
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<table>
<thead>
<tr>
<th>SoCaStore Model</th>
<th>SoCaStore Metamodel</th>
<th>Utilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Excel Icon]</td>
<td>![UML Ecore Icon]</td>
<td>Generated data for „handling large scale application landscapes“</td>
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<tr>
<td>![Class Diagram Icon]</td>
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</tbody>
</table>

**Microsoft Excel Files**
- total ca. 200 instances, ca. 700 links (using foreign keys)

**UML / Ecore**
- ca. 25 classes, ca. 30 associations, ca. 90 attributes

**Utilities**
- 3 different sizes
  - total ca.1000/5000/10000 instances with each
  - ca. 70 attribute values and ca. 15 links
What is SoCaStore?

Simulation is based on a fictitious department store, called SoCaStore.

Information model of SoCaStore consists of:
- Business Processes
- Organizational Units
- Application Systems
- Domains
- Projects
Scenario: Creating visualizations of the application landscape

Concerns of this scenario

- The department store SoCaStore wants to get an overview of its application landscape and its EA. This should be accomplished by the creation of six different visualizations for different aspects of the application landscape: a cluster map, a process support map, a time interval map, and a graphlayout map as well as a swimlane diagram and a portfolio matrix.

Exemplary Deliverables
Scenario: Business object management

Concerns of this scenario

- The department store SoCaStore wants to get an overview of the business objects involved and exchanged in the execution of the business processes. Therein, especially the data flow between the application systems performing operations on the business objects should be modeled and the kind of operation performed in a specific application system should be detailed.

Typical questions to be answered

- Which business objects are created, modified, or deleted by which application systems during the execution of which business process?
- Which application systems exchange business objects via which interface?
- Which application system holds the master copy of which business object?
Scenario: Infrastructure management

Concerns of this scenario

- The department store of SoCaStore intends to consolidate its database systems to decrease the costs for maintenance and licensing. Also, expected support periods offered by the database vendors should be considered.

Typical questions to be answered

- What DBs are in danger of running out of support?
- Which DBs are currently in use?
- Which application systems use which DB?
- What are the costs for operating and licensing which DB?
Overview on the evaluation process and its criteria

9 Tools are evaluated by 3 teams

**Functional Criteria**
- Online questionnaire for every vendor
- Simulation of functional scenarios with every tool
  ➔ Documentation of the functional aspects and the evaluation results in simulation

**EA Management Task Criteria**
- Simulation of typical EA Management tasks with every tool
- One scenario per EA Management task
  ➔ Documentation of the evaluation results in simulation

Final evaluation based on the results documented
  ➔ Each evaluation criterion is assigned an ordering of tools reflecting their specific support

9 Spider diagrams each with 8 specific functionalities

8 Spider diagrams each with 9 EA management tasks
Analyzing specific functionalities – Details of the evaluation results

Communication and Collaboration Support
- Well supported with interesting features for collaboration, e.g. workflows and notification mechanisms

Creating Visualizations
- Different approaches to visualizing the EA or parts thereof - retaining potential for improvement
  - (Semi)-Automatic generation of visualizations still has its limitations
  - Flexible models without predefined semantics are not supported out-of-the-box and mostly have to be created manually

Interacting with, Editing of, and Annotating Visualizations
- Interaction is mostly “drawing“ – semantic changes could provide an improvement towards graphical modeling

Importing, Editing, and Validating
- No standard exchange format for EA models
- No common information model or core concepts thereof exist
Analyzing EA management support – Details of the evaluation results

**Business Object Management**
- Business object modeling differs with respect to the level of detail, e.g. inheritance modeling
- Modeling operations (create, update, …) on business objects are supported by some tools

**SOA Transformation Management**
- Many tools support application-level services instead of business application modeling
- Tool support for identifying services retains potential for improvement

**Infrastructure Management**
- Infrastructure components are well-supported by the majority of the tools
- Not all tools provide concepts for lifecycle aspects of infrastructure components
EAM tools and repositories in 2008 vs. 2005

- Focus on entities, relationships, and attributes
- Basic principles of software cartography adopted by major players
- Limited versioning capabilities
- Significant differences in the approaches to managing model histories (revisions)
- Collaboration support has been enhanced significantly
  - triggering & notification
  - web-based access (read & write)
  - customizable workflows
Approaches of the tools (1)

Flexibility vs. Guidance

- Meta model driven approach:
  - Customers can adapt the information model to their needs
  - Reports and visualizations have to be adapted to the changed information model
  - Mightiness of the tools at changing the information model is heavily variable; From small proprietary solutions up to MOF compliant solutions

- Methodology driven approach:
  - Predefined and documented methodology (methodology manual)
    ➔ How to use which models?
    ➔ Which elements belong to which models?
  - Only small or no changes to the information model, methodology remains
  - Reports and visualizations are coupled to the information model

- Process driven approach:
  - Methodology is expanded with a management process
    ➔ The “what” and “how” of the methodology is extended by the “when”
  - Process connects different modules in a process model
Approaches of the tools (2)

Preconfigured vs. Customization

- **EA Management Solutions (Preconfigured)**
  - Preconfigured functionality for typical EA Management tasks are provided by delivery
  - “Misuse“ is aggravated
  - Rampant learning curve (Training, Consulting necessary)

- **EA Management Platforms (Customization)**
  - At delivery only basic functionality is provided
  - Implementation of a company specific EA Management approach is possible
  - At the beginning of the implementation of the tool a customer specific adaption is necessary
Approaches of the tools (3)

Integration vs. Single-point-of-truth

- Single-point-of-truth
  - Data of EA are stored centrally in the EAM Tool
  - Replication is done „manually“ via imports
    ➔ conflict resolution strategy is necessary
  - High data consistency, clear data sovereignty

- Integration
  - EAM-Tool acts as „Data Warehouse“
  - Main target of these EAM-Tools is the maintenance of the relation information
  - Reuse of different data sources
  - Linking, integration and aggregation of different sources in one model
  - Demands sophisticated transformation possibilities
  - Is also called „Metadata Integration“
    ➔ Data consistency and data sovereignty may be problematic
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   b) Research perspective
Participants

EAM-Pattern catalog
EAMTS 2005 & 2008
BEAMS 2011
Wiki4EAM
TOGAF Training Provider
Consulting expertise
EAM Framework Provider

sebis (TU Munich)
Detecon

TEAMT

EAM in the practice

... and 22 more partners prefer to remain anonymous
Identification of future EAM trends scenarios → Workshops with industry partners → Refined scenarios → Scenario prioritization by industry partners

Identification of relevant EA tools → Selection of tools via online survey → Scenario prioritization by EAM tool vendors → Analyze & document results

Source: [http://www.matthes.in.tum.de/wikis/sebis/teamt](http://www.matthes.in.tum.de/wikis/sebis/teamt)
Scenarios identified

1. Analytics and KPIs for EA Management
2. Agile Support of a Continuous IT Restructuring
3. Business Platform Management
4. Cloud Computing
5. Collaboration with Partners in an Extended Enterprise
6. Corporate Performance Management
7. Corporate Risk Management
8. Data Consolidation
9. Enterprise Web 2.0 and Social Computing
10. Improving Security via Activity Monitoring
11. Virtualization for Data Centers
12. Management of a Federated Network of Outsourcing Partners and Services
13. Mobile Devices and Universal Availability of Information
14. Sourcing Decisions in a Modular Enterprise
15. Strategic Allocation of Open Source Solutions
16. Strategic IT Human Resource Planning
17. Workplace of the Future
**Exemplary scenario description (1)**

**Workplace of the Future**

<table>
<thead>
<tr>
<th>Short description</th>
</tr>
</thead>
<tbody>
<tr>
<td>The ways we work as well as the working environment itself will change dramatically in the future. Technical innovations as virtualization and virtual reality provide new opportunities to design the working environment and to foster communication as well as collaborative work among employees. Especially, decentralized decision making and flexibility in work processes poses a particular challenge to the organization of the enterprise. An holistic EAM approach entails potential to support a smooth transition to a modern working place.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicators &amp; Factors</th>
<th>Technological dependencies, low IT agility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stakeholders</td>
<td>All stakeholders &amp; roles in the company affected</td>
</tr>
<tr>
<td>Tasks</td>
<td>All task in the company affected</td>
</tr>
<tr>
<td>Artifacts, concepts &amp; techniques</td>
<td>Virtual meetings &amp; reality, client virtualization, new portable devices, workplace pools, web 2.0 technologies, democratic management, etc.</td>
</tr>
<tr>
<td>Consequences, opportunities &amp; threats</td>
<td>Reduced technology dependencies, cost savings; higher IT related business risk</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Classification in the scenario portfolio</th>
</tr>
</thead>
<tbody>
<tr>
<td>business</td>
</tr>
<tr>
<td>operational</td>
</tr>
</tbody>
</table>
Exemplary scenario description (2)

Virtualization for Data Centers

Short description

An adaptive IT infrastructure has been recognized as a vehicle for cost optimization in industries such as telecommunications and energy. The concepts of Data Center Virtualization enable the operationalization of this idea. Enterprise Architecture Management provides the guidelines for the adoption of this paradigm in new branches, offering support by the identification of opportunities for dynamic hardware and software allocation in continuous alignment to the business rules.

<table>
<thead>
<tr>
<th>Indicators &amp; Factors</th>
<th>High energy consumption, high amount of hardware, low IT agility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stakeholders</td>
<td>IT data center managers, IT managers</td>
</tr>
<tr>
<td>Tasks</td>
<td>Hosting, deployment, IT support, security, etc.</td>
</tr>
<tr>
<td>Artifacts, concepts &amp; techniques</td>
<td>Server farms, virtual machines, virtualization techniques, VMware, etc.</td>
</tr>
<tr>
<td>Consequences, opportunities &amp; threats</td>
<td>Realize cost saving potentials, infrastructure optimization; higher IT related-business risk, high initial investments, low availability during transformation phase</td>
</tr>
</tbody>
</table>

Classification in the scenario portfolio

<table>
<thead>
<tr>
<th>business</th>
<th>technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>operational</td>
<td>strategic</td>
</tr>
</tbody>
</table>

http://dss.in.tum.de/files/bichler-research/2006_bichler_capacity_planning.pdf
Tool shortlisting based on popularity based on an online survey (top 10 of 50)

1. ARIS IT Architect
   *IDS Scheer AG*

2. Planning IT
   *alfabet AG*

3. Rational System Architect
   *IBM*

4. Troux
   *Troux Technologies Inc.*

5. iteraplan
   *iteratec AG*

6. MEGA Modeling Tools
   *MEGA Int. SA*

7. Enterprise Architect
   *Sparx Systems*

8. HP SOA Center
   *Hewlett Packard*

9. ADONIS
   *BOC / ADOit*

10. Clarity PPM for IT Governance
    *CA*

10. Adaptive EA Manager
    *Adaptive*

20. Essential Project
    *Enterprise Architecture Solutions Ltd*

Shortlisted & prioritization submitted
Shortlisted & prioritization not submitted
Not shortlisted & prioritization submitted
Prioritization of future scenarios

**Industry partner perspective**

- Scenario 1
- Scenario 3
- Scenario 16
- Scenario 17

- **E1**
  - 3 2 1 0 -1 -2 -3

- **E2**
  - Scenario 1
  - Scenario 2
  - Scenario 3
  - Scenario 15
  - Scenario 16
  - Scenario 17

**Tool vendor perspective**

- Scenario 1
- Scenario 2
- Scenario 3
- Scenario 16
- Scenario 17

- **E1**
  - 3 2 1 0 -1 -2 -3

- **E2**
  - Scenario 1
  - Scenario 2
  - Scenario 3
  - Scenario 15
  - Scenario 16
  - Scenario 17

**Cumulative User Perspective**

- Scenario 1
- Scenario 2
- Scenario 3
- Scenario 15
- Scenario 16
- Scenario 17

- 3 2 1 0 -1 -2 -3

**Your Perspective?**

- Scenario 1
- Scenario 2
- Scenario 3
- Scenario 15
- Scenario 16
- Scenario 17

- 3 2 1 0 -1 -2 -3

**Cumulative Vendor Perspective**

- Scenario 1
- Scenario 2
- Scenario 3
- Scenario 15
- Scenario 16
- Scenario 17

- 3 2 1 0 -1 -2 -3
Cumulative scenario prioritization by industry partners and tool vendors (median)

- Analytics and KPIs for EA Management
- Agile Support of a Continuous IT Restructuring
- Business Platform Management
- Cloud Computing
- Collaboration with Partners in an Extended Enterprise
- Corporate Performance Management
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Example: EAM within the IT organization of a medium-sized financial service provider
Example: What is an application and what are its components and interfaces?

Ontology Integration and Evolution Problem

Application, deployed application, business component, technical component, service, license, service instance, interface, connector, ... ...

$10^1 - 10^2$ Classes / Entity Types + Attributes + Relationship Types

Federated Linked Data Management Problem

Identity, Lifecycle, Ownership, Name Space, Access Rights, Versions, Consistency Rules, Conflict Resolution, Data Provenance, ...

$10^3 - 10^6$ Objects / Instances + Attribute values + Links
EAM muss Nutzen für Mitarbeiter, Teams und das gesamte Unternehmen schaffen.

Einzelne Mitarbeiter steigern ihre eigene Produktivität durch
- Suche, Links, Tags, Versionen
- Informationsstrukturen
- Zugang über Web und Desktop

Teams definieren selbst die
- Konsistenzregeln und Sichten
- Gruppen, Rollen und Zugriffsrechte für ihre Zusammenarbeit.

Das Unternehmen bietet einen einheitlichen und sicheren Zugang zu strukturierten und unstrukturierten Informationen
- Offene Internet-Standards
- Konnektoren zu zentralen IT-Systemen
Die IT konzentrierte sich bisher auf strukturierte Informationen und automatisierte Prozesse

E-Business  CRM  SCM  …

Inseln geschäftskritischer Informationen

ERP  PLM  BI  EAM
Tricia reduziert die Lücke zwischen dem Management strukturierter und unstrukturierter Informationen.

Inseln geschäftskritischer Informationen schrittweise verknüpft durch hybride Wikis
Tricia schafft Nutzen für diverse Kundengruppen.
Tricia schafft Nutzen für diverse Kundengruppen.

<table>
<thead>
<tr>
<th>Wiki4EAM Community (seit 12/2010)</th>
</tr>
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<tbody>
<tr>
<td>Allianz SE</td>
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<tr>
<td>Accenture GmbH</td>
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<td>act! consulting GmbH</td>
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<td>Bundesministerium des Innern</td>
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<td>Computacenter</td>
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<td>Cirquent GmbH</td>
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<td>FZI Forschungszentrum Informatik an der Universität Karlsruhe</td>
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<td>UGIS - UniCredit Group</td>
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<tr>
<th>Projekte über die TU München (2012)</th>
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<tr>
<td>adidas</td>
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<td>HUK Coburg</td>
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<td>Itelligence</td>
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<td>Iteratec</td>
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</table>
Erfassen Sie strukturierte und unstrukturierte Inhalte in einheitlicher Weise.

Types (0..m)

- Non-rigid attribute list
- Attributes defined for this type
- Attribute suggestions
- Inverse links

Non-structured information
Ändern Sie Informationen und auch deren Struktur zu beliebigen Zeitpunkten.
Steuern Sie die Evolution der Informationstrukturen durch Konsistenzregeln.

Wiki Pages with Type Tag *business application* in IT-Landschaft

<table>
<thead>
<tr>
<th>Wiki4EAM AG</th>
<th>What are you looking for?</th>
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Constraints for attribute

<table>
<thead>
<tr>
<th>Accounting System</th>
<th>Responsible unit (27)</th>
<th>used technology (20)</th>
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<tbody>
<tr>
<td>Business Traveling System</td>
<td>Headquarter</td>
<td></td>
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<tr>
<td>Campaign Management System</td>
<td>Subsidiary Munich</td>
<td>DB2 8.0</td>
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<tr>
<td>Costing System</td>
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<td></td>
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<tr>
<td>Customer Complaint System</td>
<td>Headquarter</td>
<td></td>
</tr>
<tr>
<td>Customer Relationship Management System</td>
<td>Subsidiary Munich</td>
<td>DB2 8.0</td>
</tr>
<tr>
<td>Customer Satisfaction Analysis System</td>
<td>Headquarter</td>
<td>MySQL 2.1, Tomcat 5.1</td>
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<tr>
<td>Data Warehouse</td>
<td>Headquarter</td>
<td>Oracle 9i</td>
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<tr>
<td>Document Management System</td>
<td>Headquarter</td>
<td>MySQL 2.1</td>
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<tr>
<td>Financial Planning System</td>
<td>Headquarter</td>
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</table>

Constraint violated
At least one value should be defined.

In-place editing
Export to Excel

© sebis 2017
Definieren Sie schrittweise das Informationsmodell und seine Konsistenzregeln (top-down oder bottom-up).

Wiki Pages with Type Tag business application in IT-Landschaft

Rename & merge attributes

Referential integrity
Erkennen, analysieren und lösen Sie Konsistenzverletzungen im Team.

Last editor  Max Mustermann , 24 minutes ago

Types: business application

responsible unit
- used technology

Please specify exactly one hyperlink to a wiki page which is an organisational unit.

At least one value should be defined.
Suchen Sie über Texte, Tags, Attribute und andere relevante Facetten in Kombination.

Contents matching 'mysql'

Search for: mysql

Go

sort by: Relevance

Tag Filter

Attribute Filter

Store searches for re-use

business application technology

Attribute:

Add additional:

result 1 - 9 of 9

MySQL 2.1

Text...

IT-Landschaft [Last edited by Max Mustermann, Jan 23]

technology edit tags

Document Management System

Text... business application business application used technology MySQL 2.1 responsible unit

IT-Landschaft [Last edited by Max Mustermann, Jan 27]

business application edit tags

POS System (Germany/Munich)

Text... business application business application used technology MySQL 2.1 responsible unit

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business application edit tags

Search for broken links

© sebis
Which organizational unit is responsible for which business application?

Which business application uses which technology?

Link to detailed information
Nutzen Sie generierte Listen, Tabellen und Diagramme, um zielgruppenspezifische Sichten zu erzeugen.

What are our domains, subdomains and business applications?

What information dependencies exist for the data warehouse?
Zusammenfassung

- Schneller Einstieg und kostengünstige Migration
- Minimaler Schulungsaufwand
- Verbesserer Informationszugang und Informationsqualität

- Strukturierung und Modellierung nur, falls nutzbringend
- Emergente Informationsstrukturen
- Anpassung an sich ändernde Geschäftsbedarfe

- Möglichkeit zur Verbindung mit existierenden Informationssystemen
- Quellcode für Forschung und Entwicklung verfügbar
Was bietet die Forschung für die Praxis?

- **Wissensaustausch**
  - EAM-Stammtisch München, EAMKON Stuttgart, Softwareforen Leipzig, EA-Network.org, …

- **Best Practice Patterns**
  - EAMPC: EAM Pattern Catalog
  - BEAMS: Building Blocks for EAM Solutions

- **Werkzeuge**
  - Wiki4EAM & Hybrid Wikis
  - IVISMO – Interactive Visualizations of Semantic Models

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⇒ [http://www.infoAsset.de](http://www.infoAsset.de) (infoAsset AG, Tricia, Hybrid Wikis)