ifip

October 26 - 28, 2005
Poznan, Poland

-commerce
-business
-government

Introducing SAP ® NetWeaver® in education: The impact of a SOA based platform

Dr. Holger Wittges, Valentin Nicolescu, Prof. Dr. Helmut Krcmar

Technische Universität München

Chair for Information Systems

Lecturers

Dr. Holger Wittges

E-Mail: holger.wittges@in.tum.de

- Certified SAP technology consultant Netweaver-EP

Teaching emphasis:
- SAP Workflows
- Business Process Managament
- Reference Models
- SOA

Dipl. oec. Valentin Nicolescu

E-Mail: valentin.nicolescu@in.tum.de

- Certified SAP technology consultant Netweaver Basis
- Certified SAP technology consultant Netweaver-EP

Teaching emphasis:
- ABAP- /Java-Development
- Exchange Infrastructure
- R/3 Module HR
- Internet Transaction Server

Technische Universität München
Lehrstuhl für Wirtschaftsinformatik - I17
HCC - SAP Hochschulkompetenzzentrum
Boltzmannstr. 3
D-85748 Garching

Homepage: www.hcc.in.tum.de

SAP HCC @ Technische Universität München

- SAP HCC TUM is a Project located at the chair for information systems at TU München (Prof. Dr. Helmut Krcmar)
- The project is running since October 2003
- Today 53 schools of higher education connected using more than 50 SAP systems with different SAP Solutions (Web AS, R/3, BW, SEM, IS Banking, IS Healthcare (Pilot))
- NetWeaver Components (Pilots): Web AS (ABAP + Java), Exchange Infrastructure, Enterprise Portal, Solution Manager
- 160 SUN servers (96 Blade servers) are up and running
- Homepage: http://www.hcc.in.tum.de

Today‘s agenda

- Introduction / Related Work
- Argumentation why we use SAP NetWeaver to explain SOA
- Introducing ESA the SOA implementation of SAP
- Roadmap to introduce NetWeaver in teaching (Lessons learned)
- Resume & Discussion

Related Work

How NetWeaver is used in education (Samples):

- Integration of external professionals in teaching
- Arrange student projects
- Building a new curricula using SAP NetWeaver

The two architectural constraints behind SOA

How does SOA achieve loose coupling among interacting software agents? It does so by employing two architectural constraints:

- A small set of simple and ubiquitous interfaces to all participating software agents. Only generic semantics are encoded at the interfaces. The interfaces should be universally available for all providers and consumers.
- Descriptive messages constrained by an extensible schema delivered through the interfaces. No, or only minimal, system behavior is prescribed by messages. A schema limits the vocabulary and structure of messages. An extensible schema allows new versions of services to be introduced without breaking existing services.

Source: http://webservices.xml.com/pub/a/ws/2003/09/30/soa.html

Why we use SAP NetWeaver to explain SOA

- SAP NetWeaver is the technical basis of SAPs SOA implementation ESA (Enterprise Service Architecture)
- high practical relevance
- Ready SOA (ESA) examples and tutorials available
- We are implementing a hosting concept for central NetWeaver components
- NetWeaver as showcase with a high level of integration between the different NetWeaver components

Introducing SAP NetWeaver® in education: The impact of a SOA based platform

Challenges

Content:

- High dependency between components
- Integration in the existing curriculum

Personal skills:

- Highly trained lecturers
- Training students in a lot of different domains in short time (1,5 – 3 years)

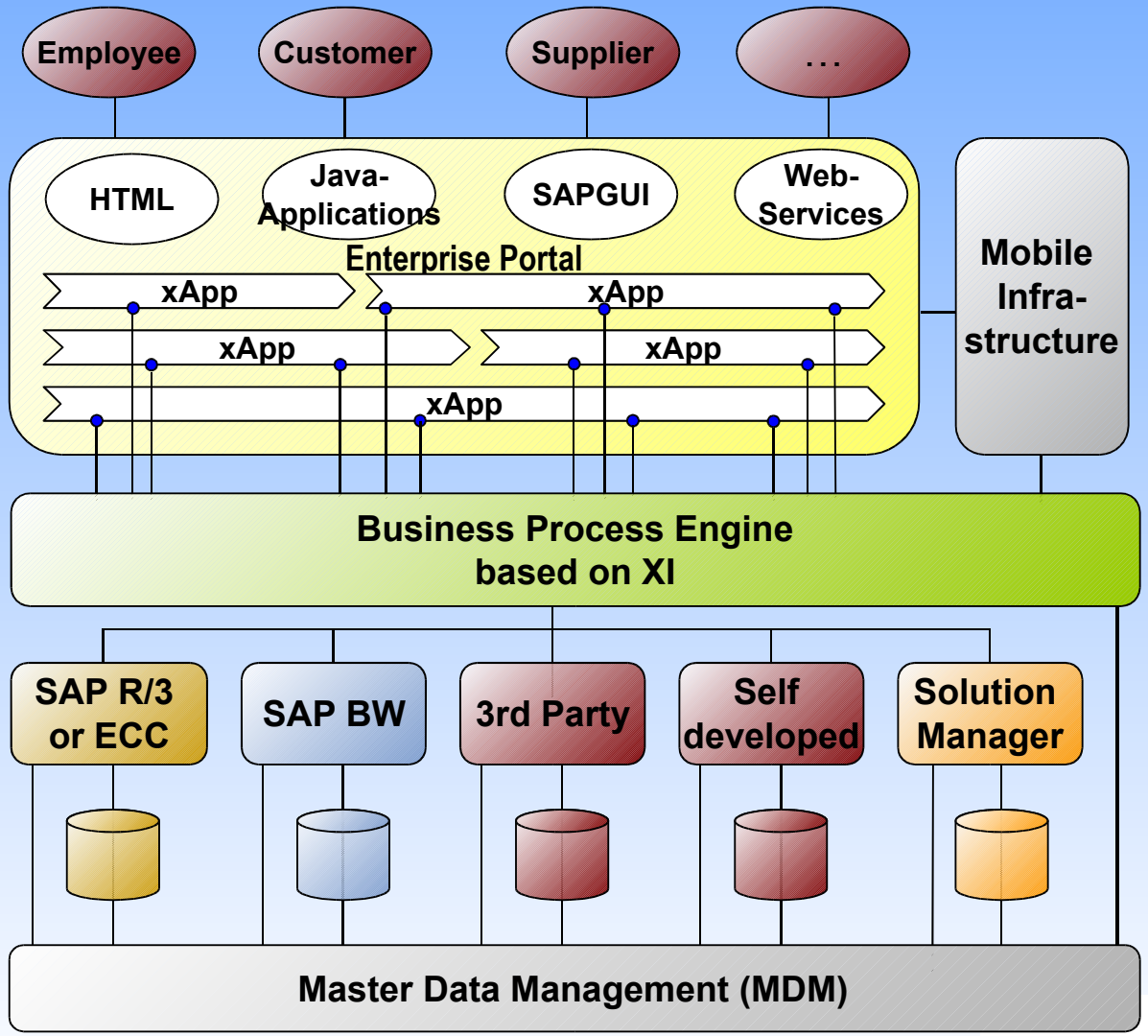
Technical issues:

- Large system landscape needed
- Complex technical administration

Concepts

?

An SAP NetWeaver landscape

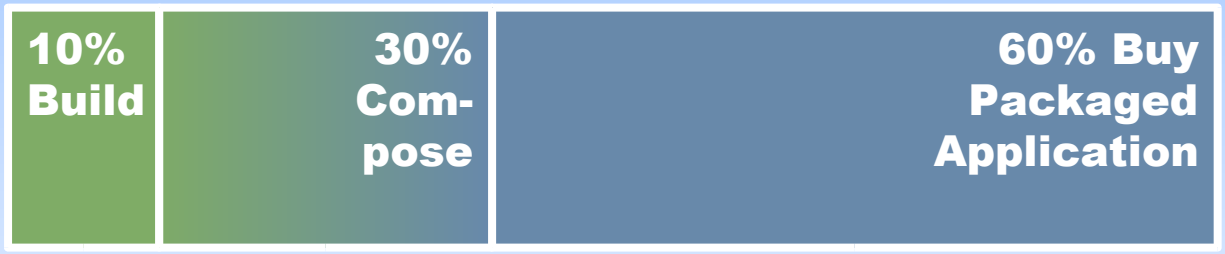


Source: To be published in Rau/Sankar (2006): Implementation Strategies for SAP R/3 in a Multinational Organization: Lessons from a Real-World Case Study

Compose new services with SOA

Without SOA

With SOA



- Customers are no longer limited to choose between buy and build
- Composition is the cost efficient way to Innovation!

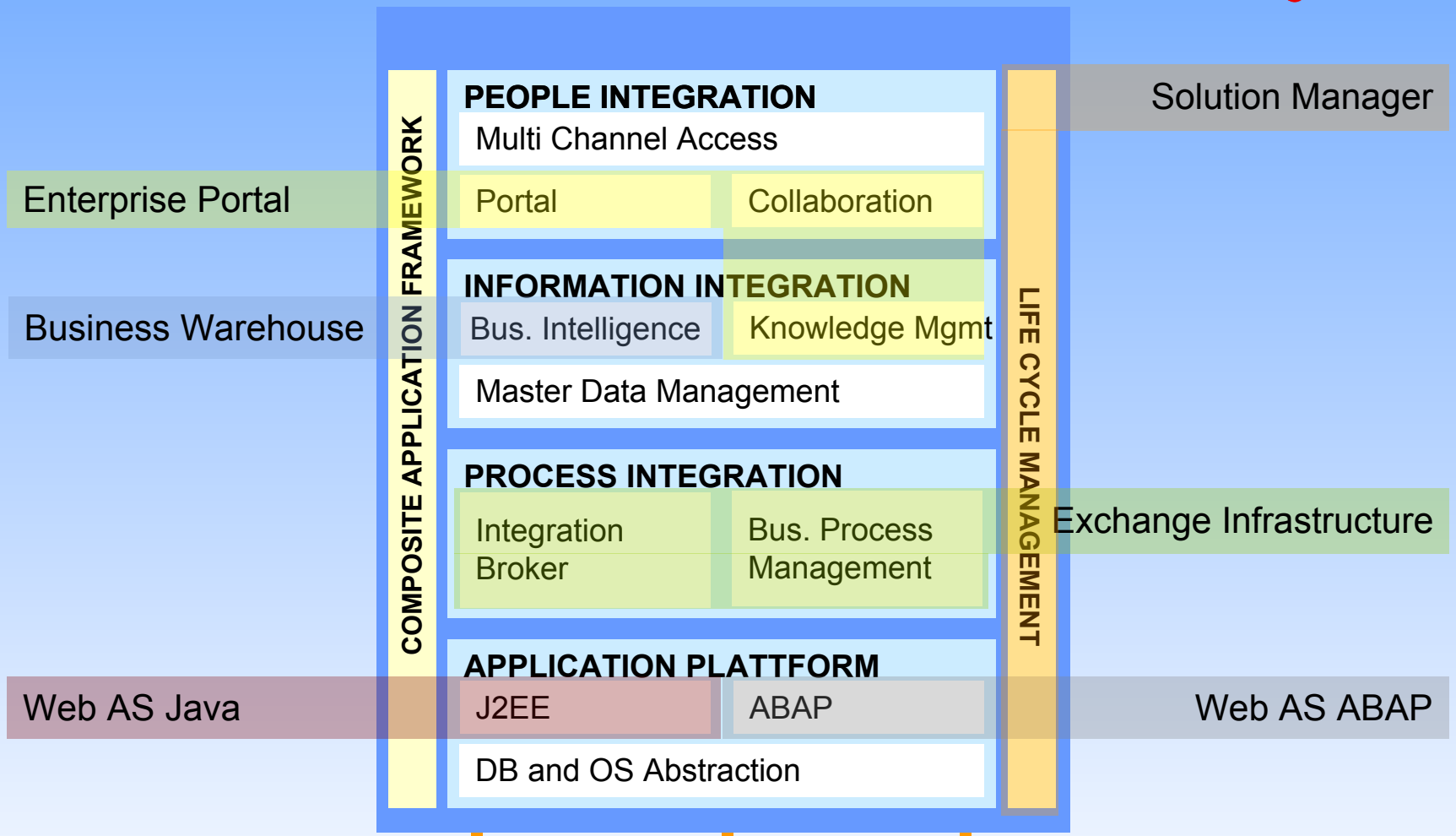
Source: based on SAP TechEd, 2005 (A101)

ESA as an implementation and extension of SOA

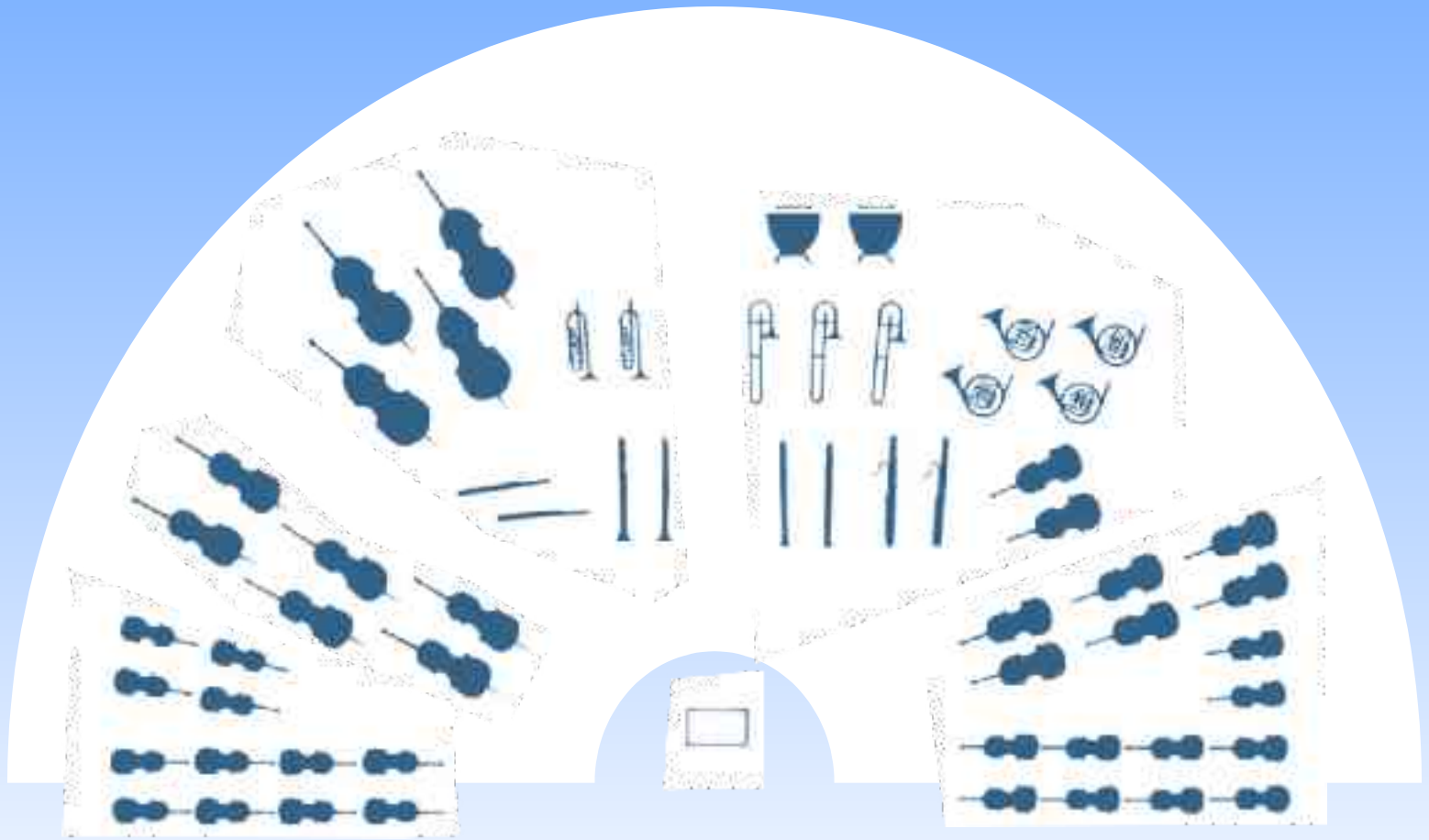
- SOA
  - Differentiate through business process innovation
  - Flexibility of business model, organization and technology
  - Openness to change, and ability to change rapidly
  - View of IT as a competitive weapon, and integral to strategy
- ESA = SOA plus Enterprise Services
  - Boost productivity through best industry practices
    (refers existing services from SAP and its partners)

Source: based on SAP TechEd, 2005 (A101)

Netweaver components we have used in teaching

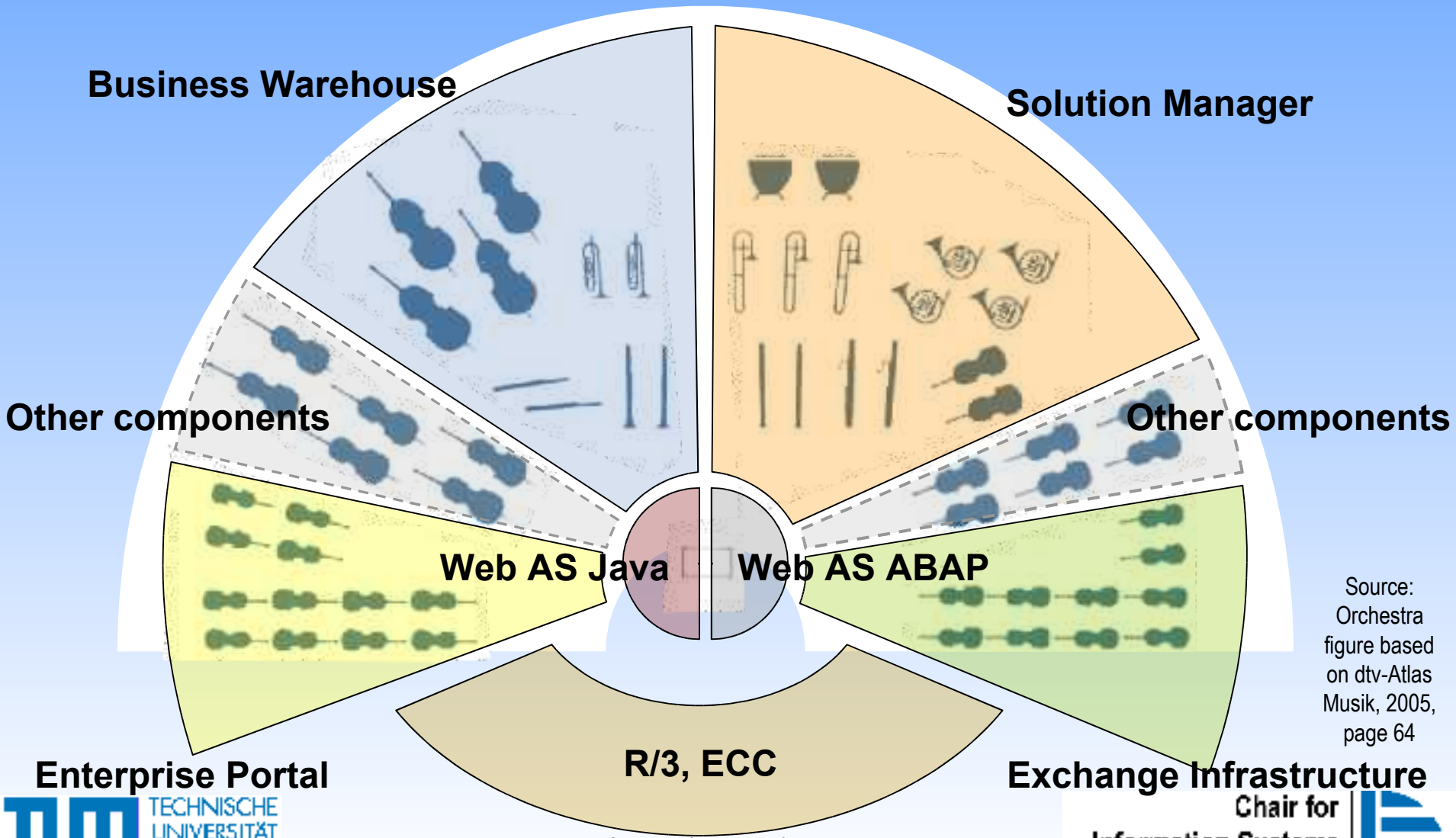


Netweaver as an orchestra



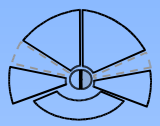
Source: Orchestra figure based on dtv-Atlas Musik, 2005, page 64

Netweaver as an orchestra

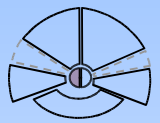


Source: Orchestra figure based on dtv-Atlas Musik, 2005, page 64

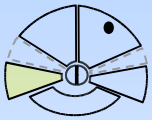
Starting points



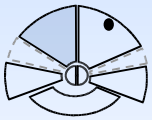
- **ABAP development / SAP operation (Web AS ABAP)**
  - Installation and operation of a SAP system
  - Development of new ABAP / BSP applications



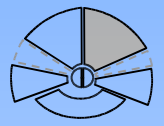
- **Java / web development (Web AS Java)**
  - Development of Java application based on SAP J2EE
  - Large web applications



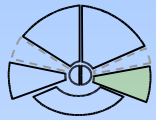
- **Web / frontend integration (EP)**
  - Online collaboration and community design
  - Design and operation a powerful web portal
  - Development of integrated java applications



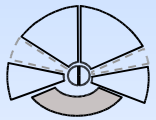
- **Business reporting and analysis (BW)**
  - Analysis of business data
  - Strategic enterprise manegement



- **Solution implementation / business process management (SolMan)**
  - Implementing new SAP solutions
  - Monitoring for cross system business processes

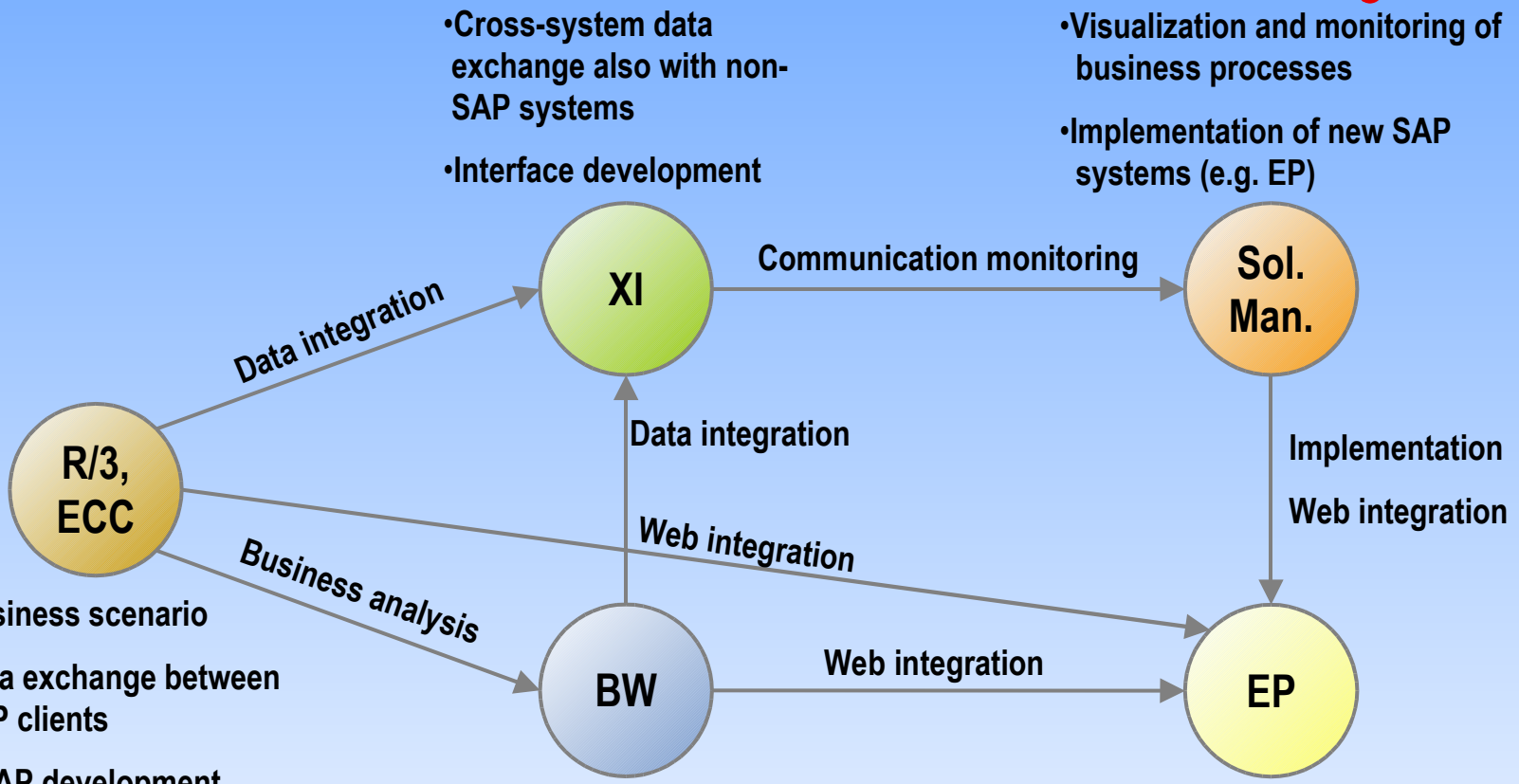


- **Data exchange / integration (XI)**
  - Enterprise application integration (EAI)
  - Data exchange / integration between SAP and non-SAP solutions
  - Development of web services



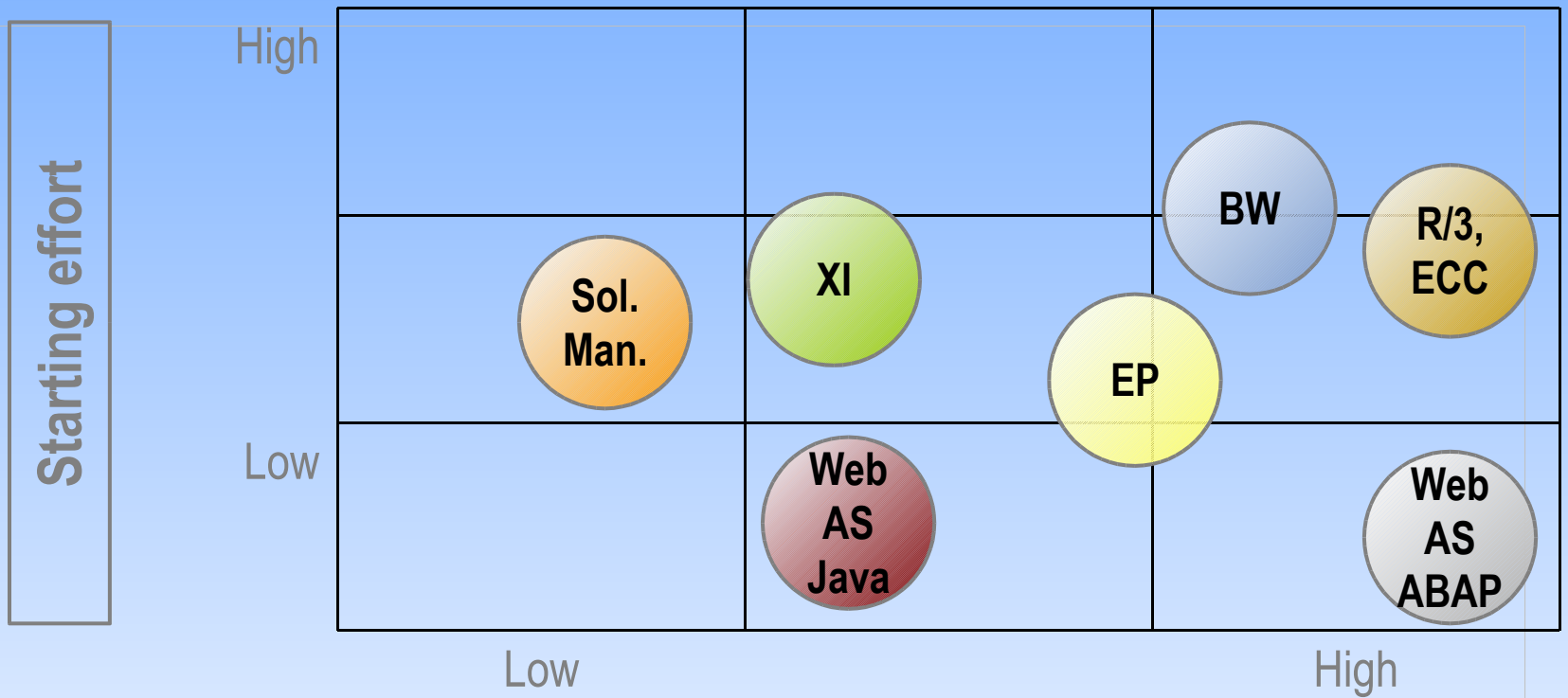
- **Business application (R/3, ECC)**
  - Demonstration of business principles
  - Processing business cases
  - Creating business scenarios
  - Business development with ABAP / BSP

R/3, ECC: Possible Roadmap



Source: Own figure

Where to start ?



Source: Own figure

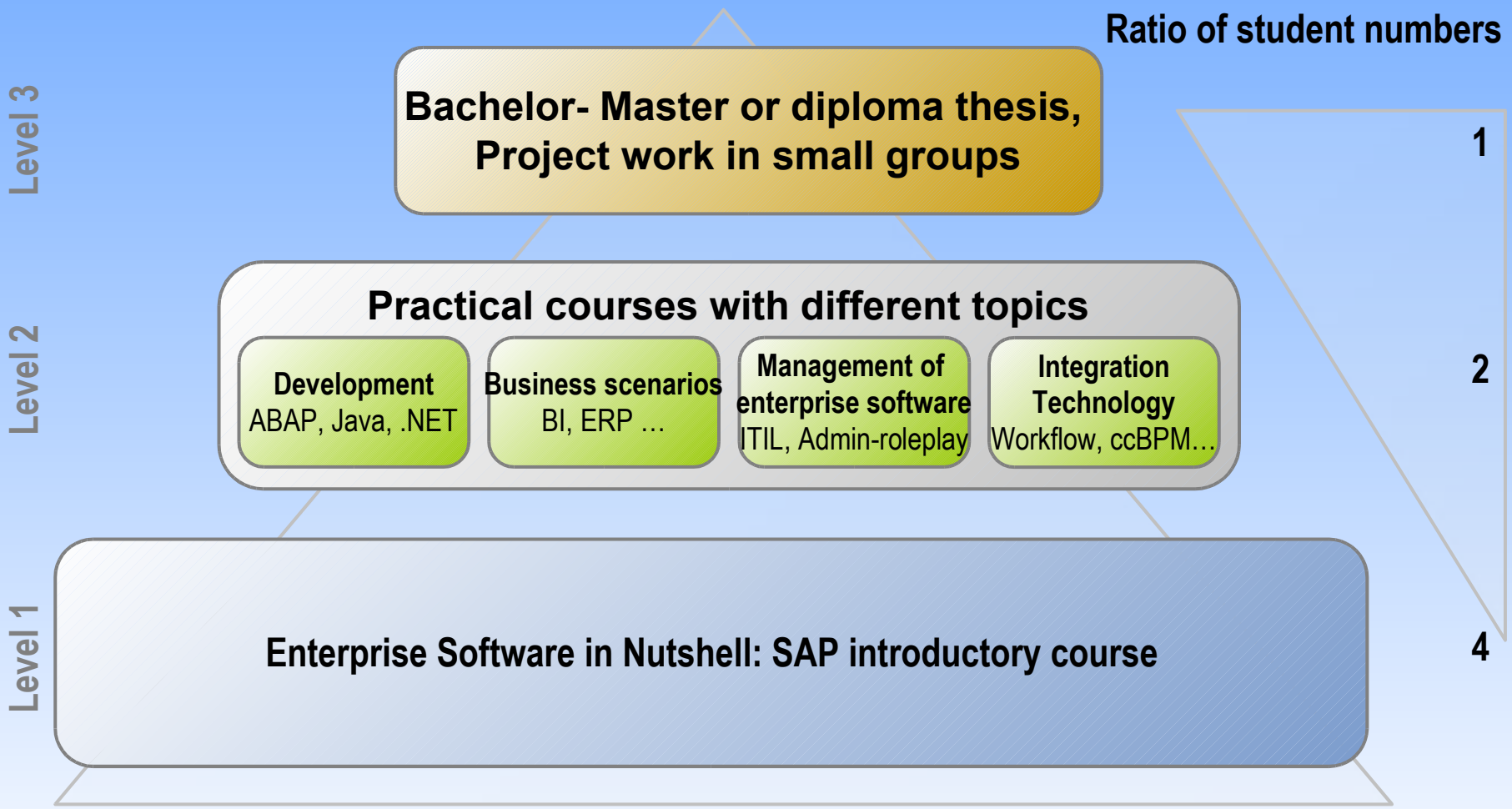
* Based mainly on a Gartner group study, cited in:
Computer Zeitung Nr. 32, 2.8.2005 page 16

Necessary student skills

	Knowledge of …								
	Programming language			Web design	Online community	Economic principles	Business mgmt.	Techn. Interfaces	Excel
Starting point	Any	ABAP	Java						
ABAP development	X								
Java development			X						
Web integration			X	X	X				
Business analysis						X	X		X
Implementation						X			
Data integration		X	X					X	
Business application						X	X		

Source: Own figure

3 Level teaching approach



Source: Own figure

Challenges and our corresponding Concepts (1/2)

Challenges

Content:

- High dependency between components
- Integration in the existing curriculum

Personal skills:

- Highly trained lecturers
- Training students in a lot of different domains in short time (1,5 – 3 years)

Concepts

Content:

- Step by step approach to a selected Components
- Partially ECTS-courses, thesis and voluntary courses (e.g. Enterprise software in a Nutshell)

Personal skills:

- Periodical trainings at manufacturers for academic staff, inhouse-trainings for colleagues
- Students can pass through all levels within one year (students work with 1 – 3 NetWeaver components during this time)

Challenges and our corresponding Concepts (2/2)

Challenges

Technical issues:

- Large system landscape needed
- Complex technical administration

Concepts

Technical issues

- Pilot Projects that evaluate appropriate hosting concepts
- Central hosting by the HCCs

Resume & Opening of the Discussion

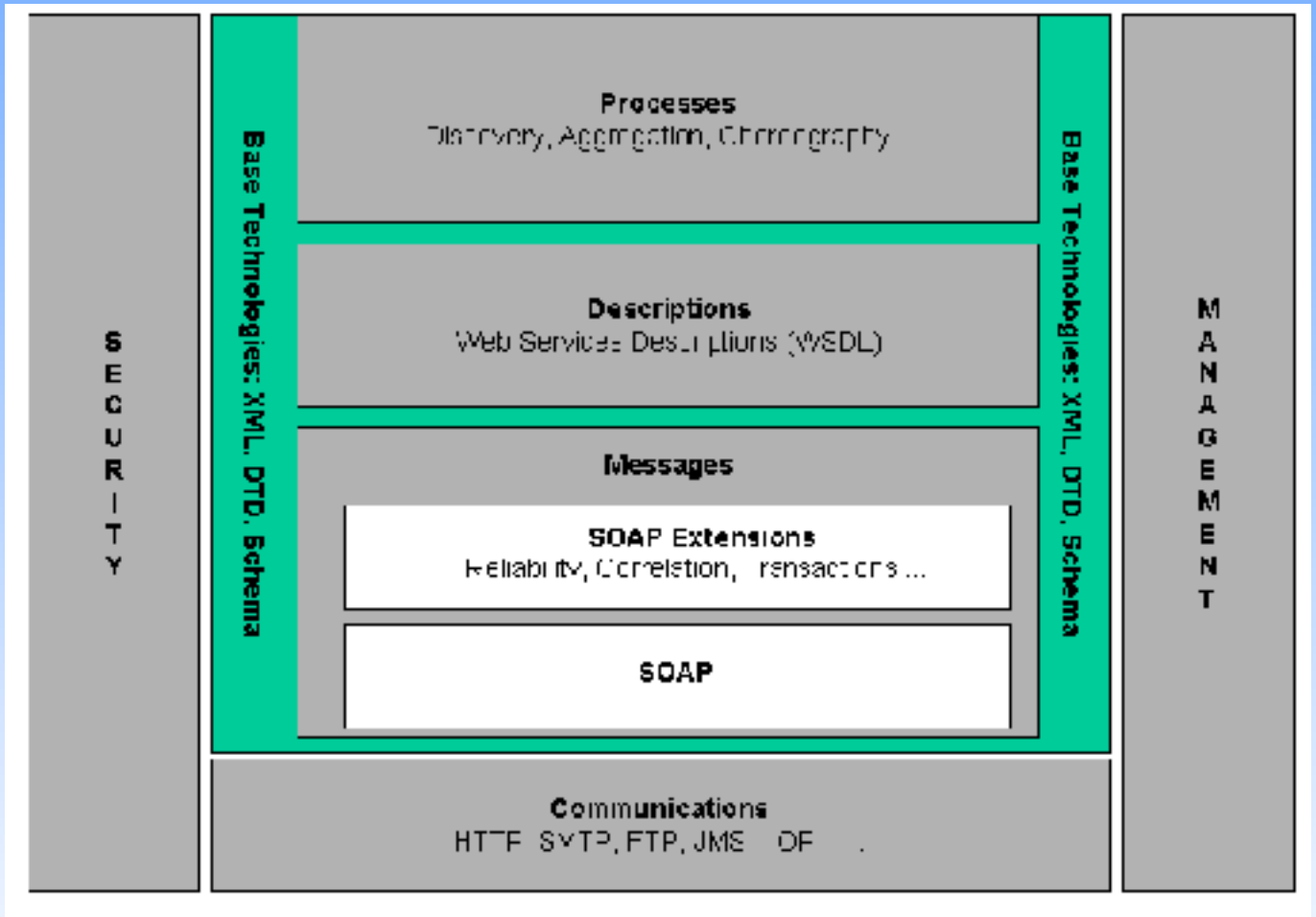
Education of SOA using SAP NetWeaver **is possible!**
Some issues especially concerning
- the **central hosting** and
- **teaching content** (curricula)
need further work.

The HCCs address this point by doing **Pilot Projects** with Partners in order to lower the entrance barrier for other teachers.

Questions?

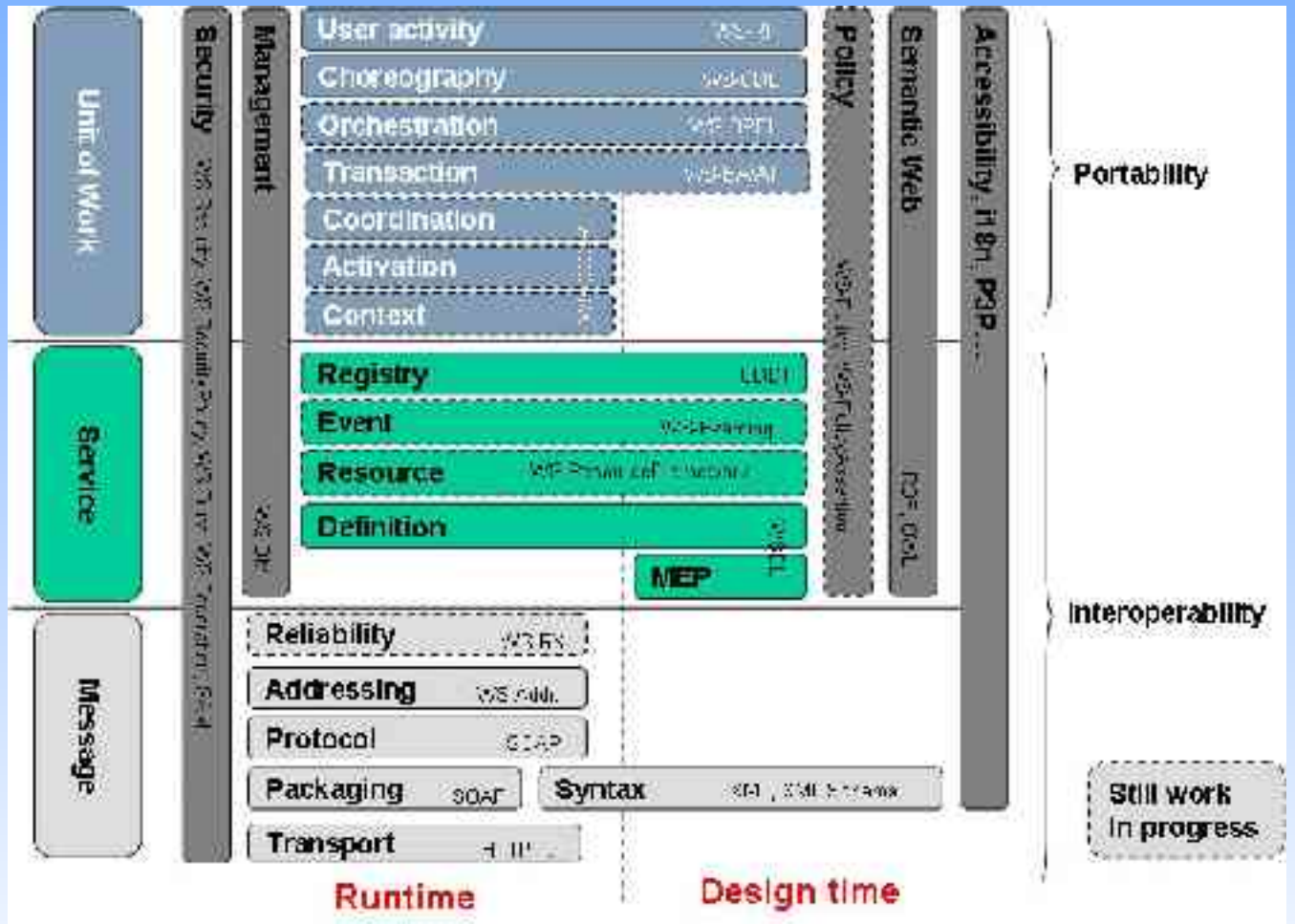
Backup Slides

Web Services Stack



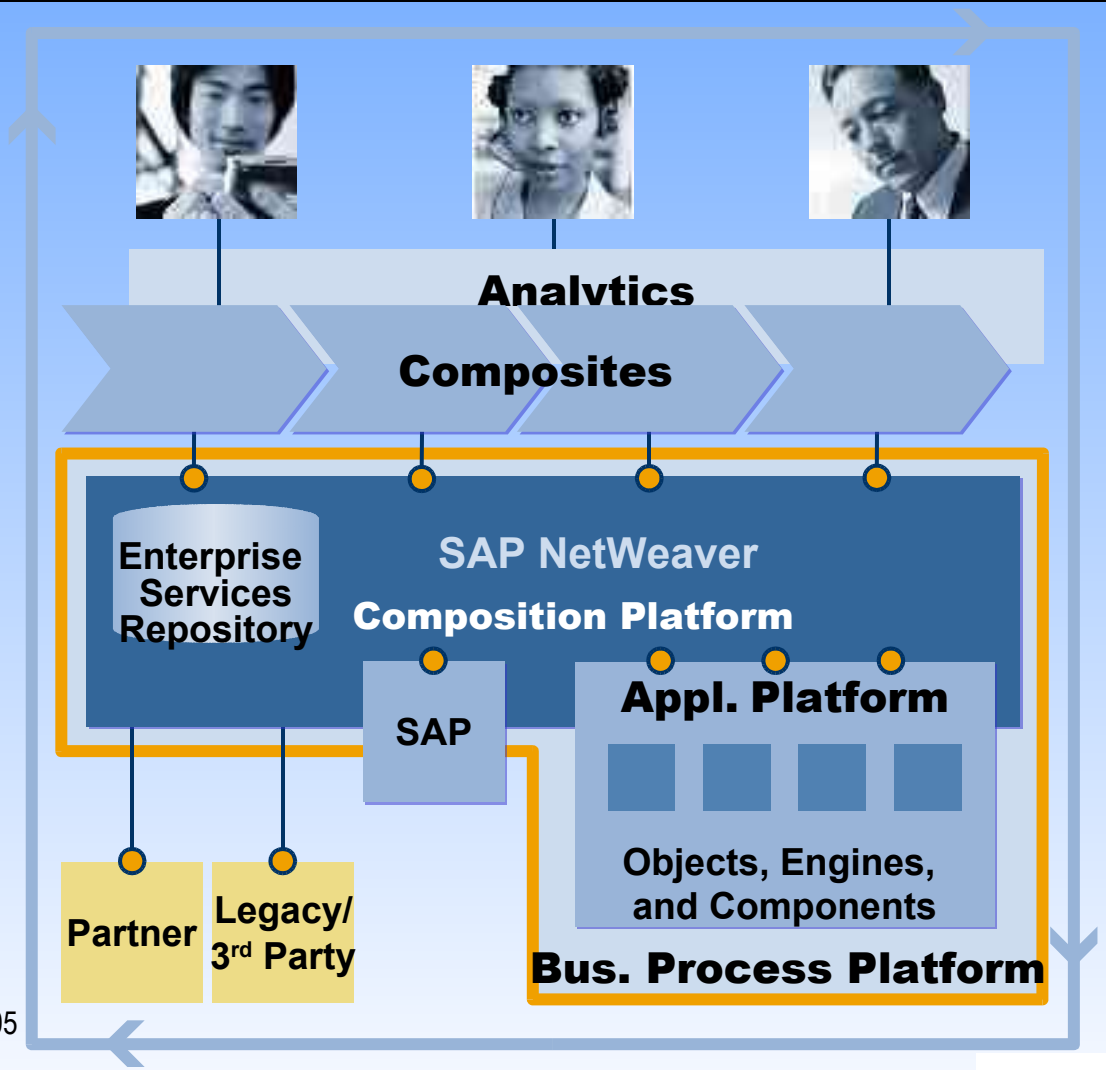
Source: http://www.w3.org/2003/Talks/1211-xml2003-wssoa/slide5-0.html, Last access: 7.10.2005

Web Services Stack, as the Foundation of SOA



Source: http://www.w3.org/2003/Talks/1211-xml2003-wssoa/slide5-0.html, Last access: 7.10.2005

Enterprise Service Architecture



Source: SAP TechEd, 2005

Definition: loose coupling

Coupling is the dependency between interacting systems. This dependency can be decomposed into real dependency and artificial dependency:

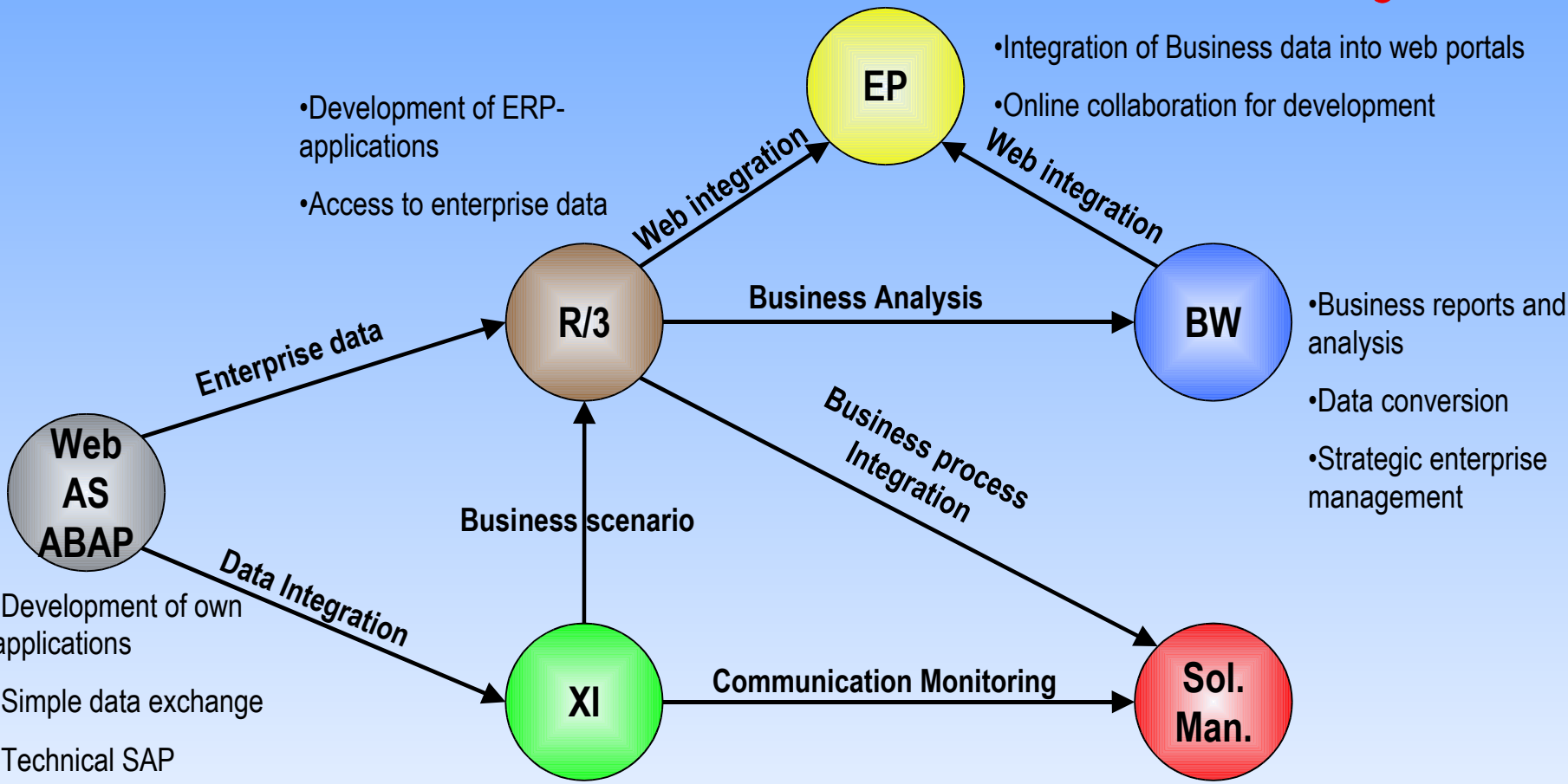
1. Real dependency is the set of features or services that a system consumes from other systems. The real dependency always exists and cannot be reduced.

3. Artificial dependency is the set of factors that a system has to comply with in order to consume the features or services provided by other systems. Typical artificial dependency factors are language dependency, platform dependency, API dependency, etc. Artificial dependency always exists, but it or its cost can be reduced.

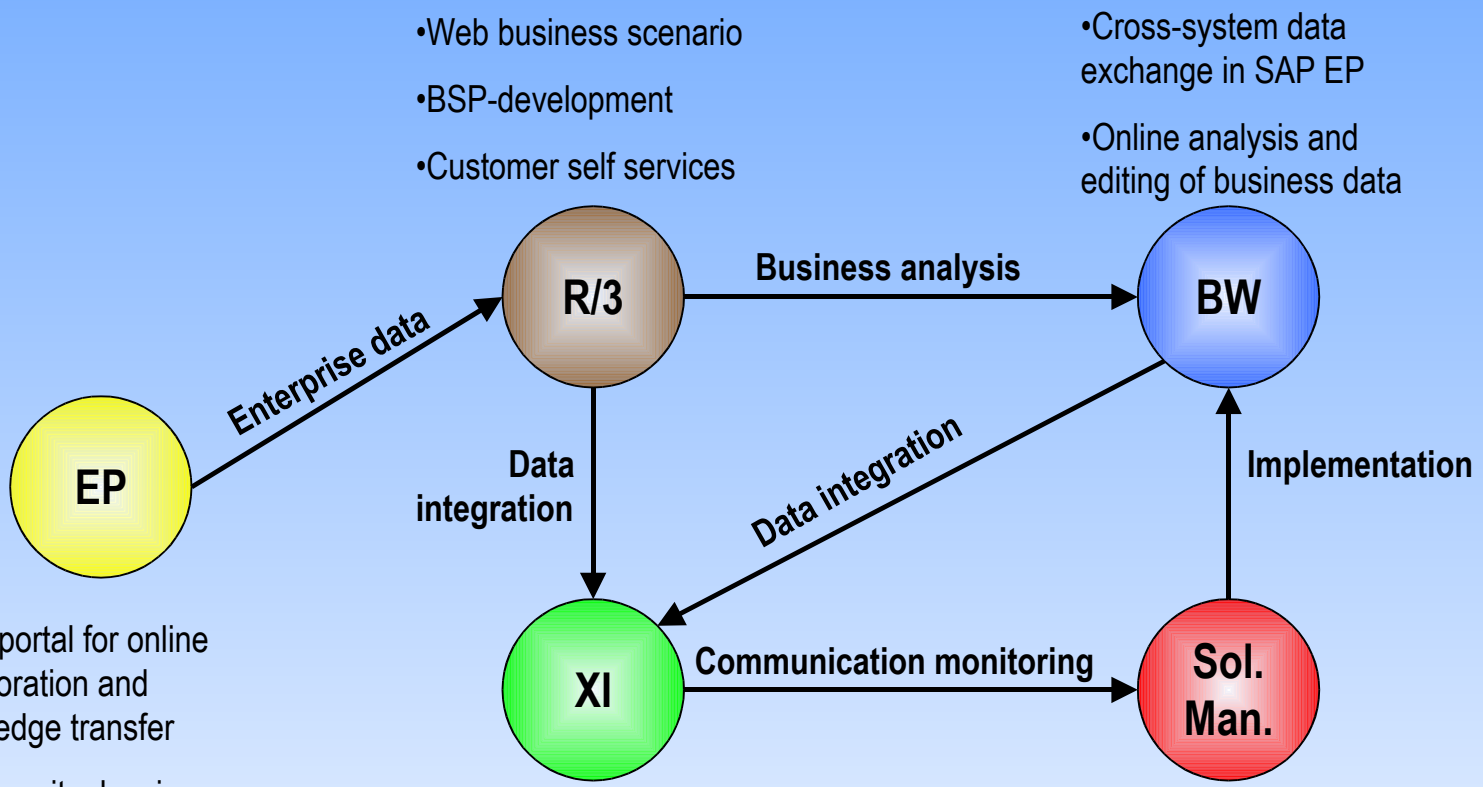
Loose coupling describes the configuration in which artificial dependency has been reduced to the minimum.

Source: http://www.w3.org/TR/ws-gloss/ Last access: 7.10.2005

Web AS ABAP: Roadmap



Enterprise Portal: Roadmap



Business Warehouse: Roadmap

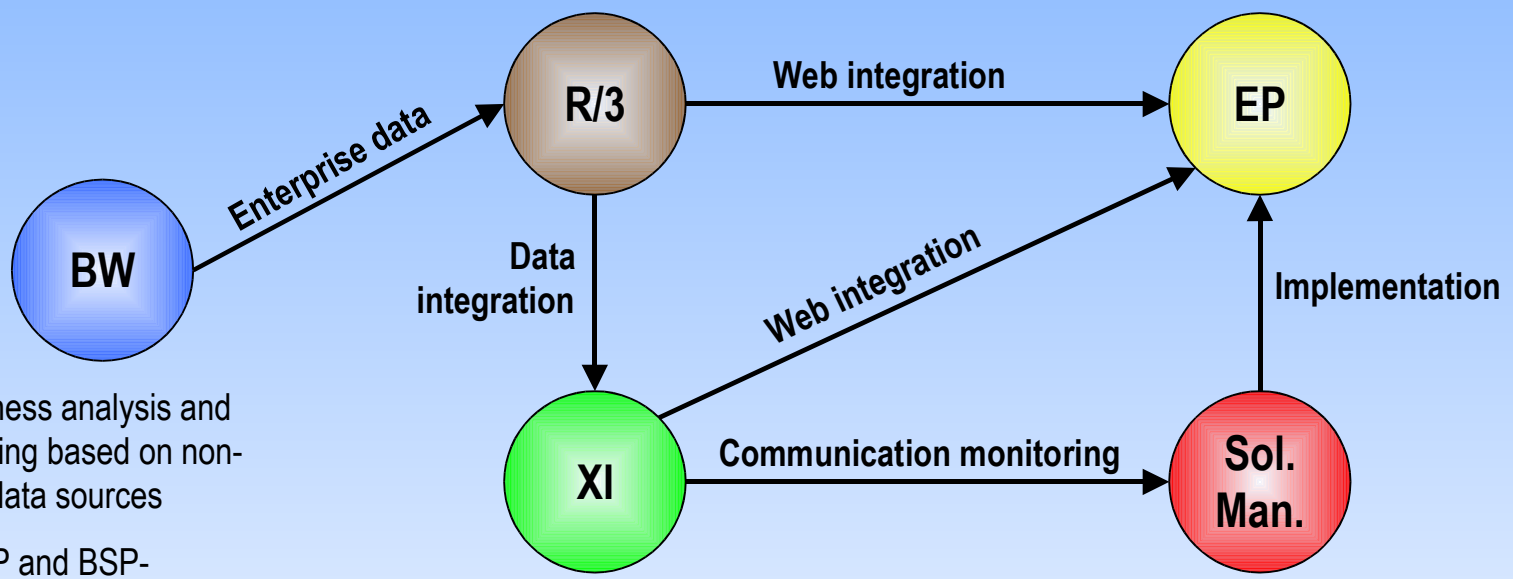
•Automatic integration of SAP data into BW

•Analysis of a large amount of enterprise data

•Business development

•Cross system data exchange in SAP EP

•Online collaboration and business analysis



•Business analysis and reporting based on non-SAP data sources

•ABAP and BSP-development

•Integrated cross-company/ cross-system data exchange

•Visualization and monitoring of business processes

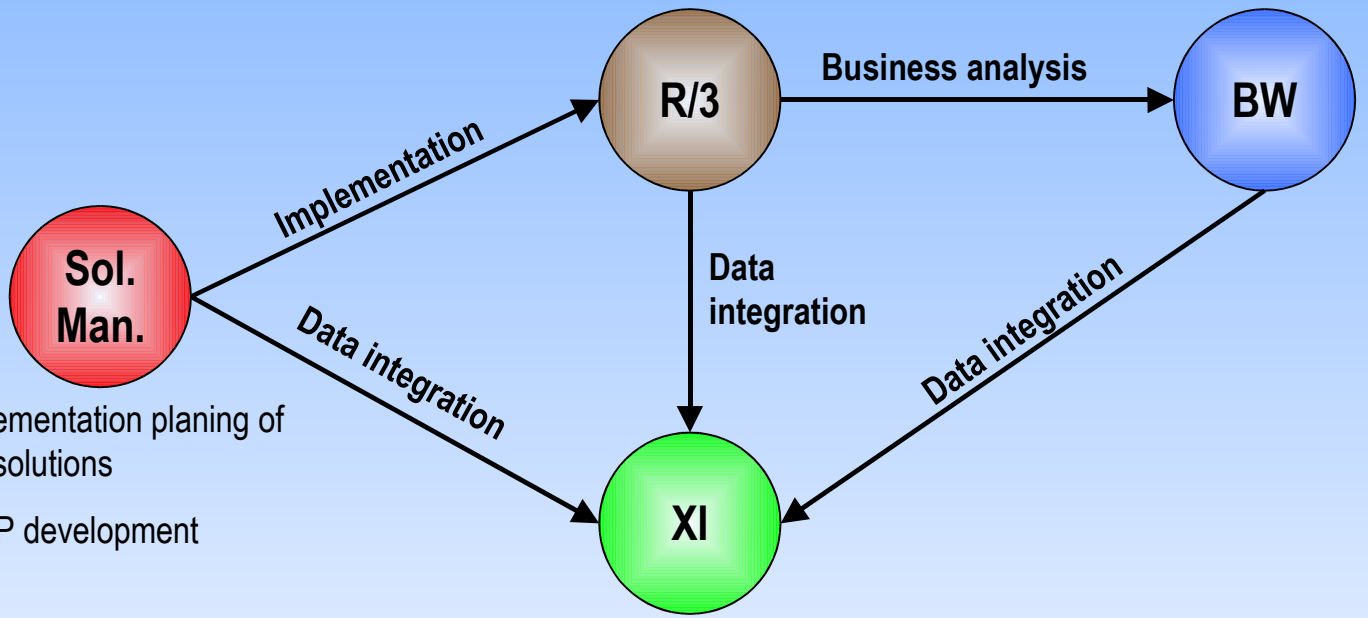
•Implementation of new SAP systems (e.g. EP)

Solution Manager: Roadmap

•Implementing and running a SAP solution (e.g. SAP R/3)

•Analysis of business data

•Strategic enterprise management



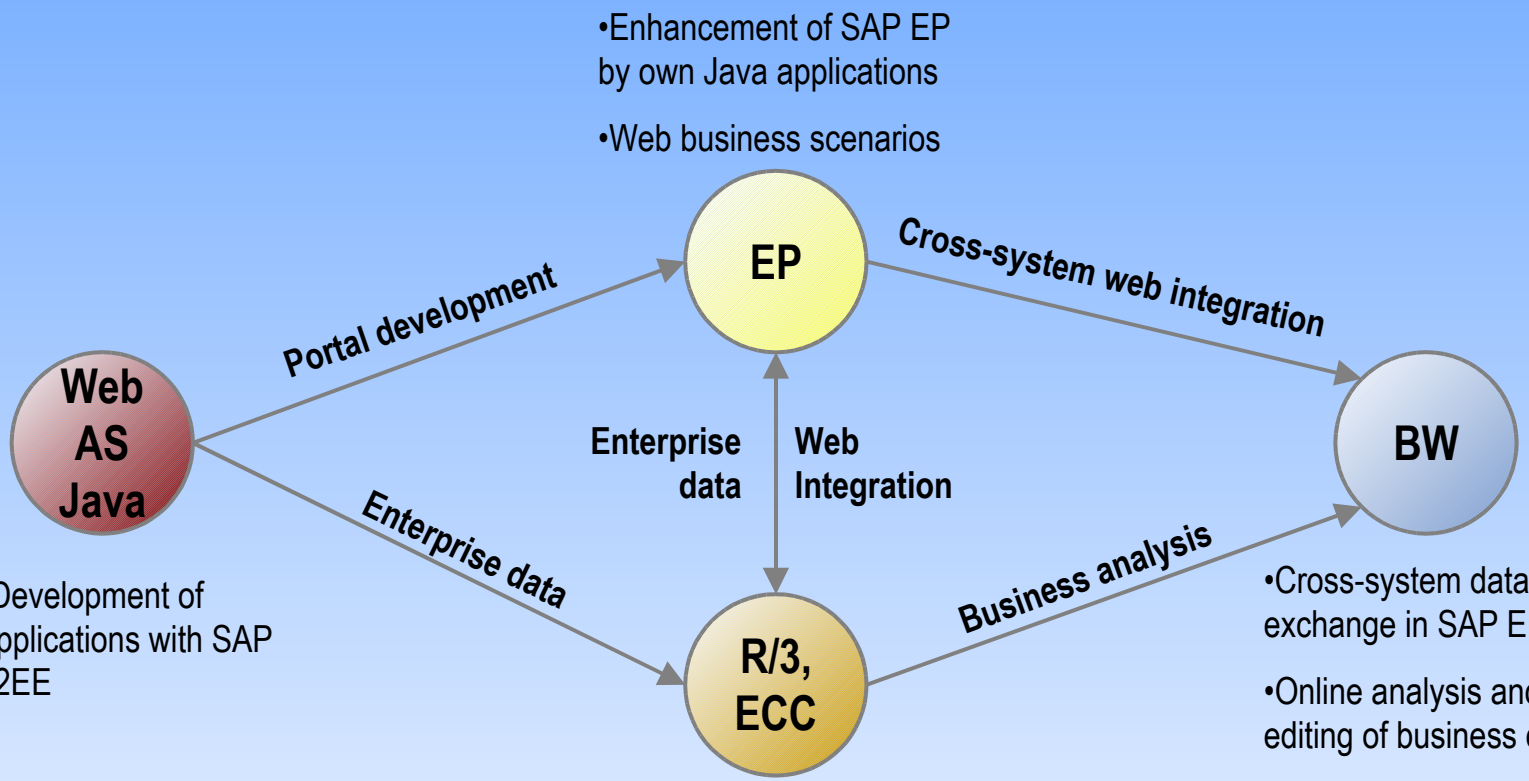
•Implementation planing of SAP solutions

•ABAP development

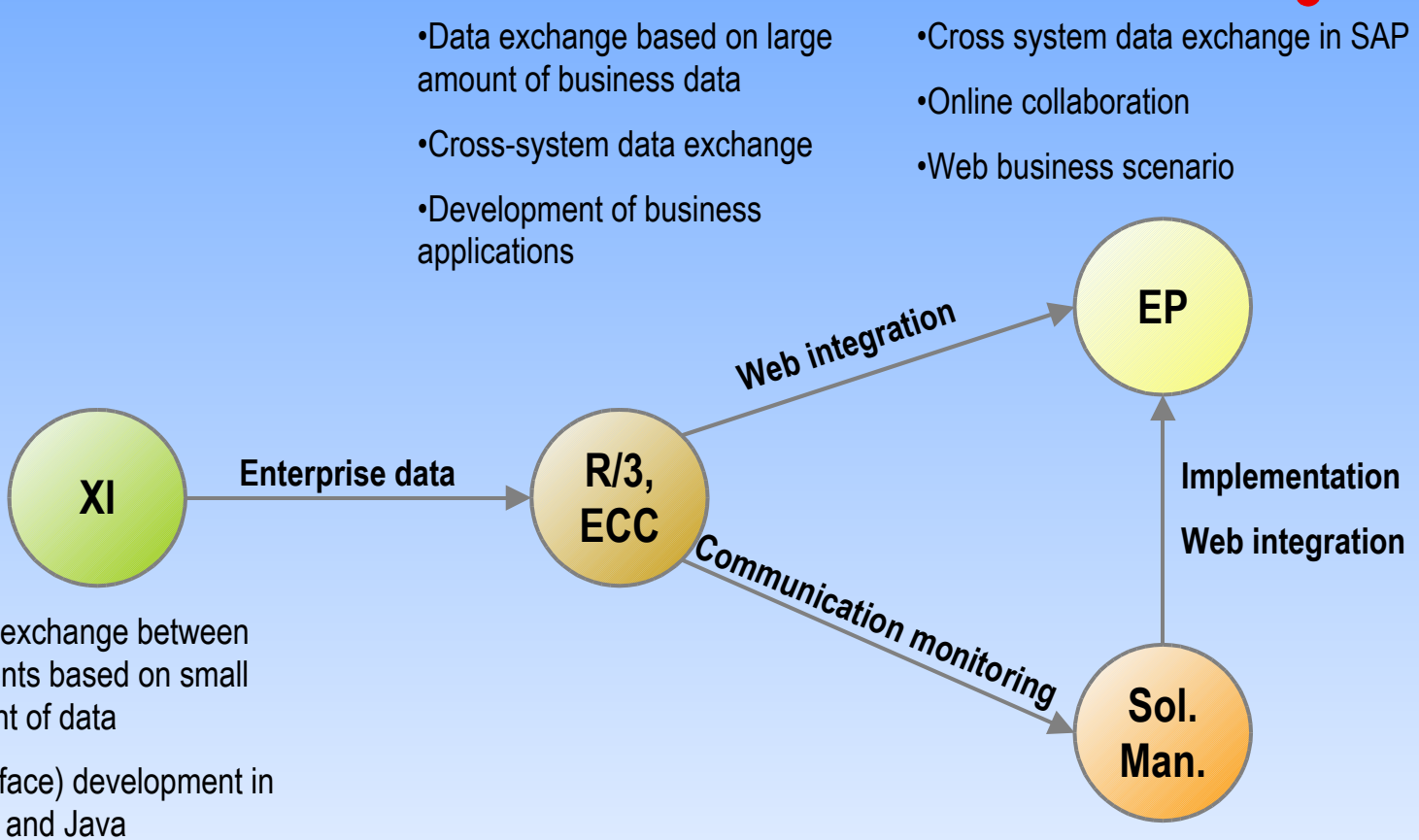
•Corss-company/ cross-system data exchange

•Visualization and monitoring of business processes

Web AS Java: Roadmap



Exchange Infrastructure: Roadmap



Dependencies

- R/3 – BW:
  - BW needs enterprise data for large dynamic analysis
  - R/3 needs an analysis tool for high level decisions
- XI – SolMan
  - Business process monitoring within SolMan works only when attached to a XI
  - Processes within a XI are difficult to visualize without SolMan
- SolMan – R/3
  - R/3 is the most suitable system for an implementation exercise as all aspects of an ERP introduction can be demonstrated
- Web AS ABAP – SAP Business systems based on ABAP
  - Any SAP Business system (like R/3 and BW) contain a Web AS ABAP and can be used for ABAP development
- Web AS Java – Portal
  - Portal contains a Web AS Java and thus can be used for J2EE development