# 21. The SAP R/3 Framework

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11-1.0, 17.12.11

Design Patterns and Frameworks, © Prof. Uwe Aßmann

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# References

▲ Thomas Aidan Curran, Gerhard Keller. SAP R/3 Business Blueprint. Addison-Wesley 1999.

▲ W.M.P. van der Aalst. Formalization and verification of event-driven process chains. Information and Software Technology, 41(10):639-650, 1999.
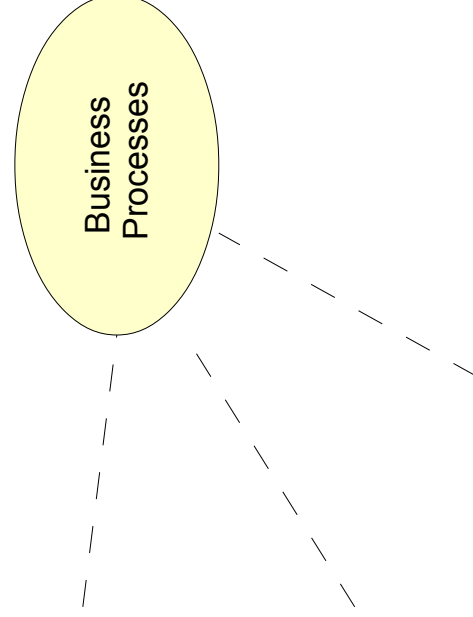
# Problem

- How to build a framework for Business Software?
- Software/Anwendungen/Produkte (SAP) Walldorf, founded 1972
  - Most of the Fortune 500 companies use SAP
- SAP R/2: Mainframe solution
- SAP R/3 1988-today. Client-server 3-tier
  - ABAP language with simple use of databases
  - Workflow specifications with Ereignis-gesteuerte Prozessketten (EPK)
  - Business blueprint: prefabricated processes for installation of the framework at the customer
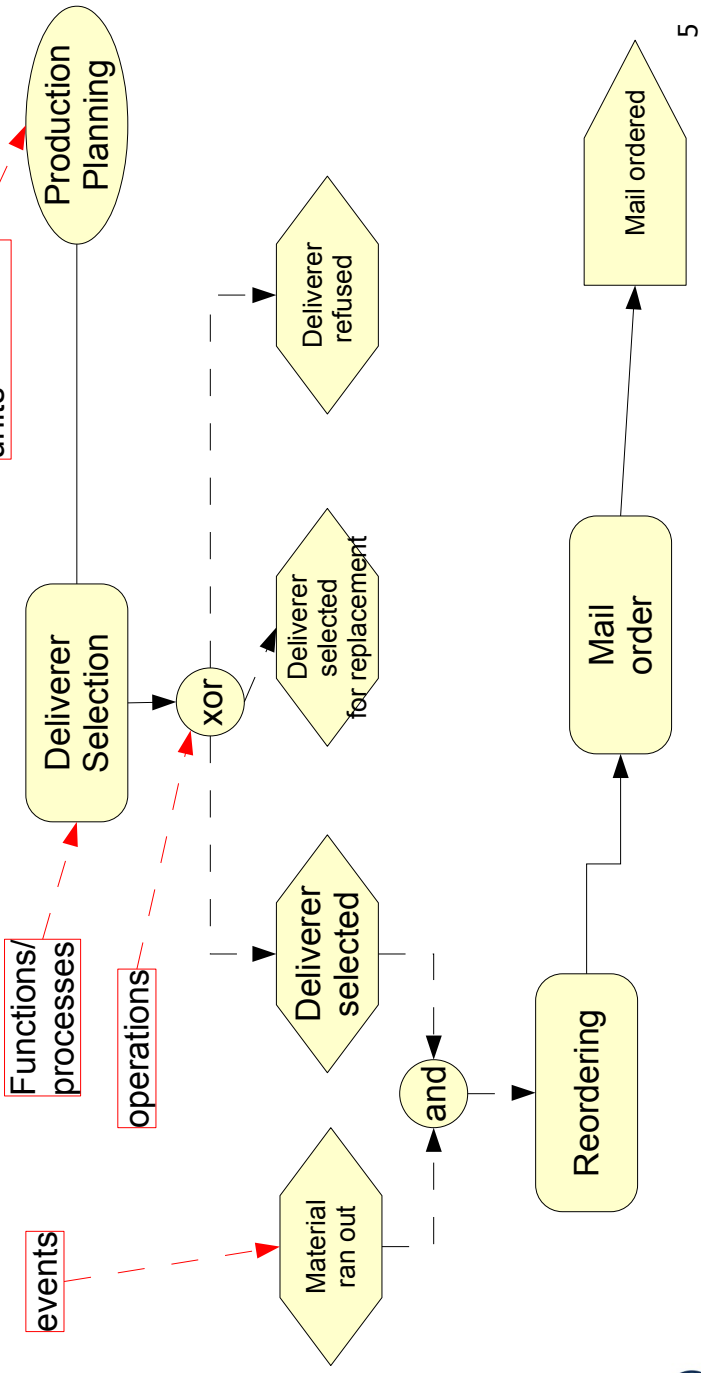- Future: SAP NetWeaver
  - Fully Java- and web-based

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# Modules of R/3 3.0

Business Processes

- Internals
  - FI Financials (Finanzwesen)
  - CO Controlling
  - AM Anlagenwirtschaft
  - PS Projektsystem
- Miscellaneous
  - OC Office&Communication
  - IS Branchenlösungen
- Core
  - SD Distribution (Vertrieb)
  - MM Materia management (Materialwirtschaft)
  - PP Production planning
  - QM Quality management
  - PM Instandhaltung
  - HR Human Resources (Personalwirtschaft)

# Workflow Specifications with EPK

- ▲ The SAP framework is steered by business workflow specifications
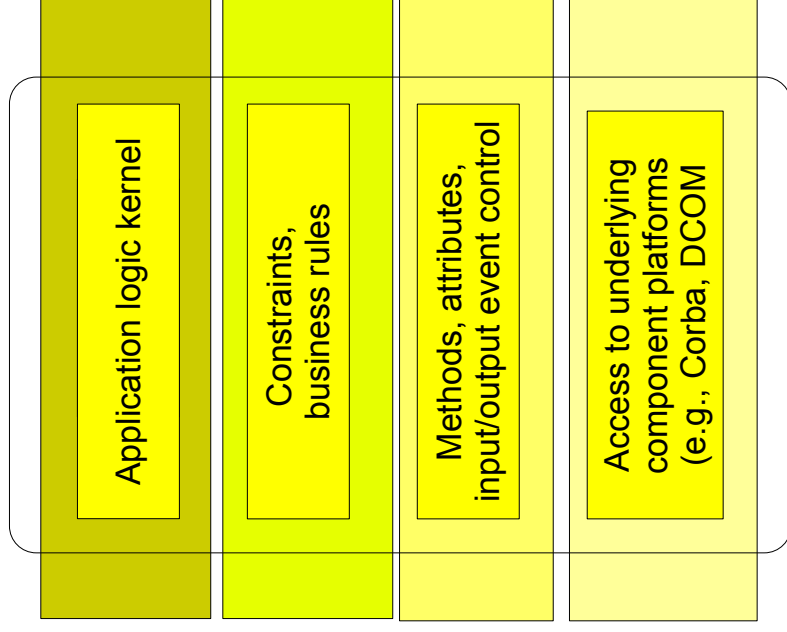  - ▪ EPK (Ereignisgesteuerte Prozessketten) specify processes that communicate with events



Diagram labels: Organisational units, Production Planning, Deliverer Selection, Functions/processes, operations, events, xor, Deliverer refused, Deliverer selected for replacement, Deliverer selected, and, Material ran out, Reordering, Mail order, Mail ordered

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# Business Blueprint

- ▲ The Business Blueprint are a collection of business process templates
  - ▪ EPK specification templates with *hooks*
  - ▪ The specifications are parameterized and adapted for concrete business processes
- ▲ They form a *framework* for business process based applications
  - ▪ They conform to the template/hook principle, but rely on substitution
  - ▪ They are invasive specification components (see *invasive composition*, CBSE in summer).
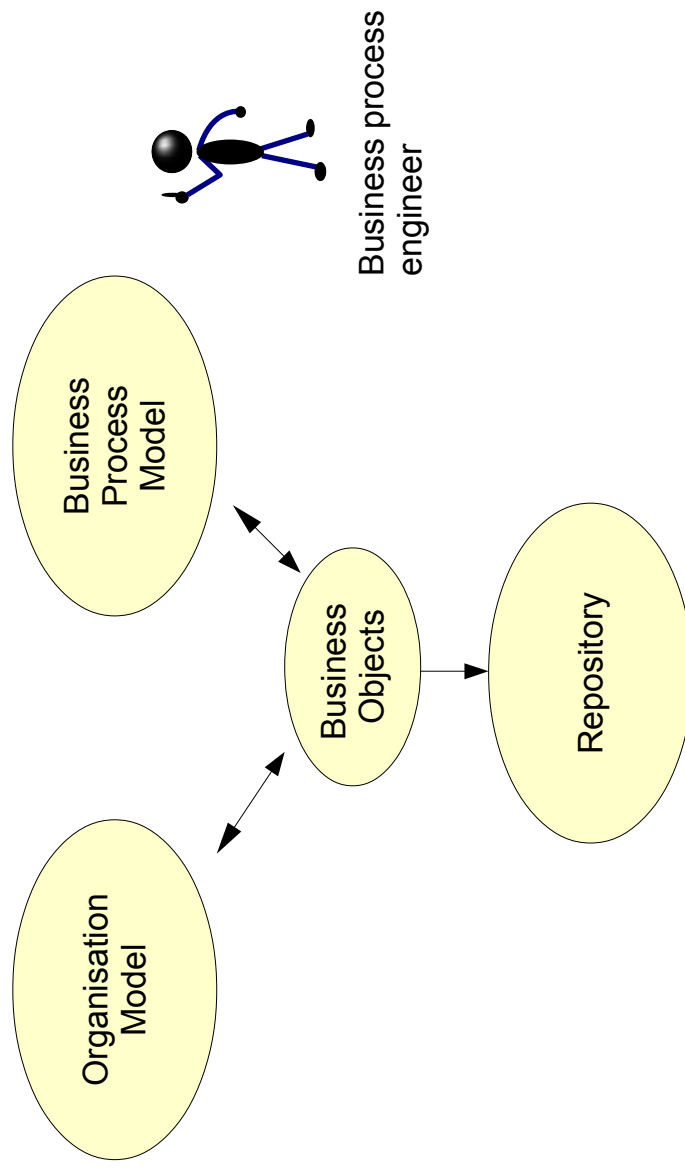
**Business blueprints are business process frameworks**

# R/3 Repository
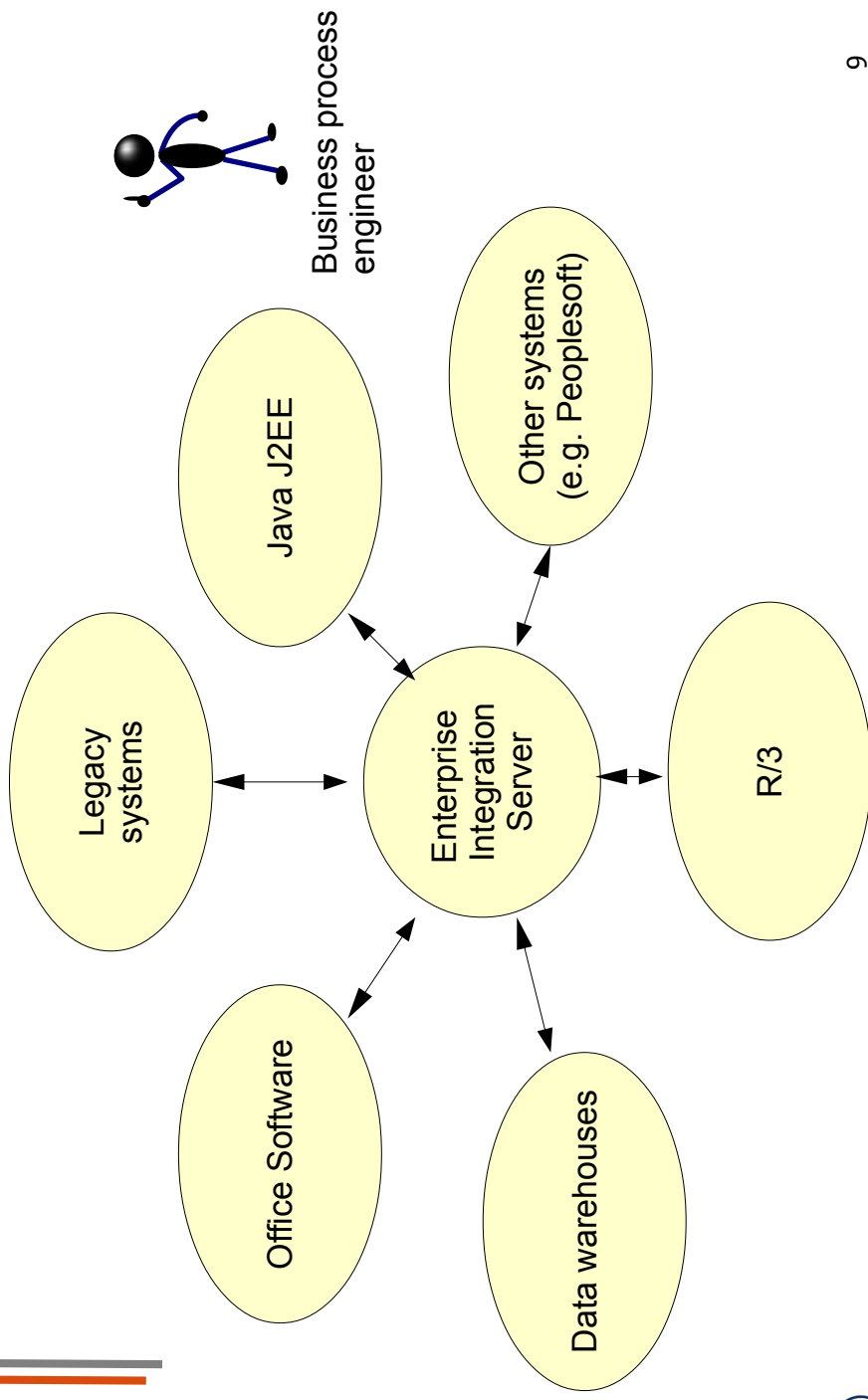
- Distributed with Application Link Enabling (ALE)
  - An intelligent middleware layer that distributes repositories over several databases
- Stores Business Objects with interfaces (business application interfaces, BAPI)
  - > 170 Business Objects are predefined
  - Encapsulate well-known business knowledge
- A business object is a layered object
  - Internally, it maintains an entire data model (business object data model)
- The set of business objects forms a layered framework

| | | | |
|---|---|---|---|
| Application logic kernel | Constraints, business rules | Methods, attributes, input/output event control | Access to underlying component platforms (e.g., Corba, DCOM) |

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# Engineering with R/3

Business process engineer

Business Process Model

Organisation Model

Business Objects

Repository

# Business Application Integration



Business process engineer

Legacy systems

Java J2EE

Other systems (e.g. Peoplesoft)

Enterprise Integration Server

R/3

Office Software

Data warehouses

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# Insight: A Process Framework needs a Process Specification Language

▲ If the framework is used for processes, we need a process specification language
  - Similar to web service area (enterprise services)

▲ Process languages
  - Petri nets (YAFL), Process languages
  - More in summer (CBSE)

**Business frameworks rely on process execution engines**

# The End

- www.sap.com
- SAP's research lab at TU Dresden
  - Director Dr. Kubach
  - Chemnitzer Str 43, 3$^{rd}$ floor
  - Thematic area "Future Manufacturing Systems"
- Course "Enterprise Software" in winter period