21. The SAP R/3 Framework

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Design Patterns and Frameworks, © Prof. Uwe Aßmann

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References (non-oblig.)

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

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

- ▲ Gerhard Keller, Thomas Teufel. SAP R/3 prozessorientiert anwenden. Addison-Wesley, 1998. Enthält die Haupt-Workflows des Business Blueprint.

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

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
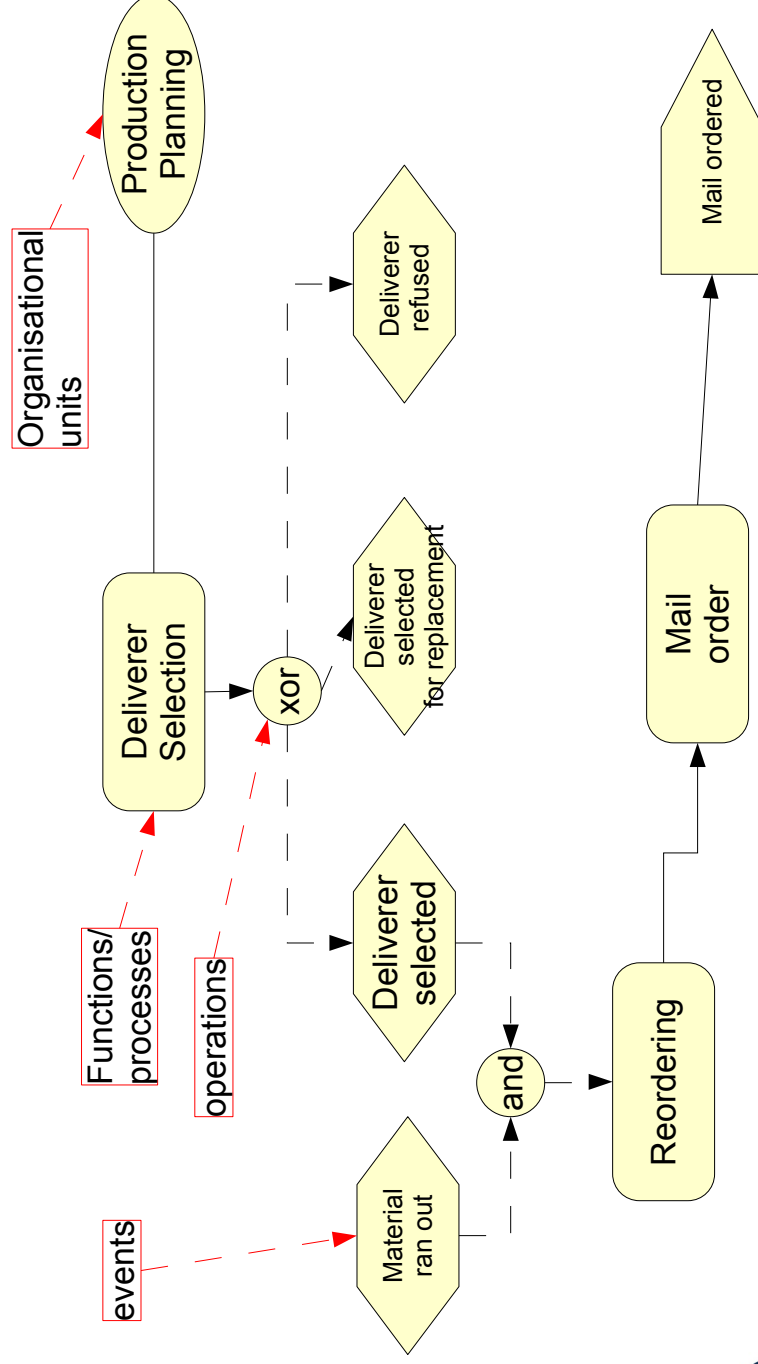- ▲ HR Human Resources (Personalwirtschaft)
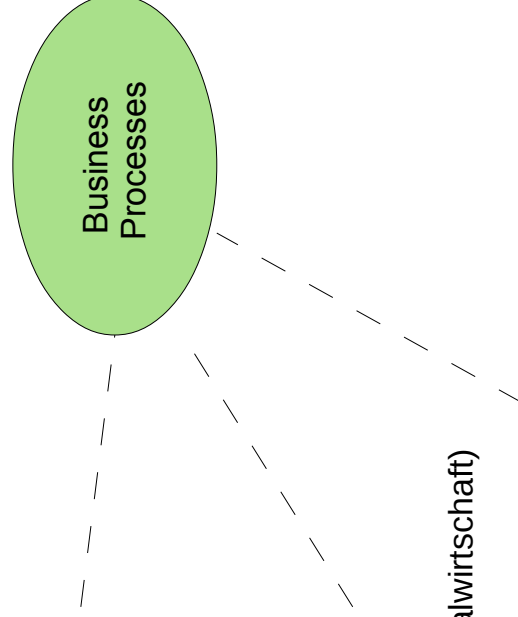
Workflow Specifications with EPK

(Ereignisgesteuerte Prozessketten)

- The SAP framework is steered by business workflow specifications
  - EPC (Event-driven process chains) specify processes that communicate with events

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

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Business Blueprint Process Framework

- 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 **process 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).
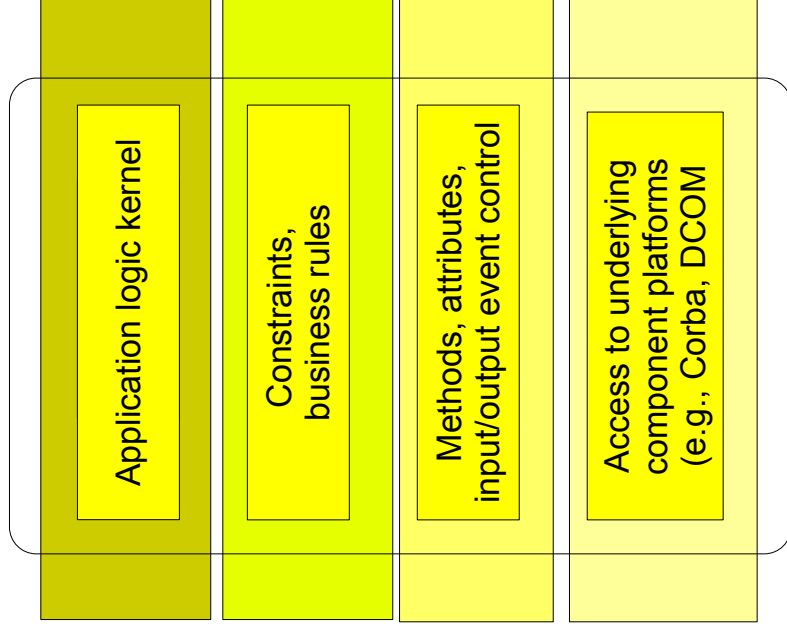
Business blueprints are business process frameworks

R/3 Repository
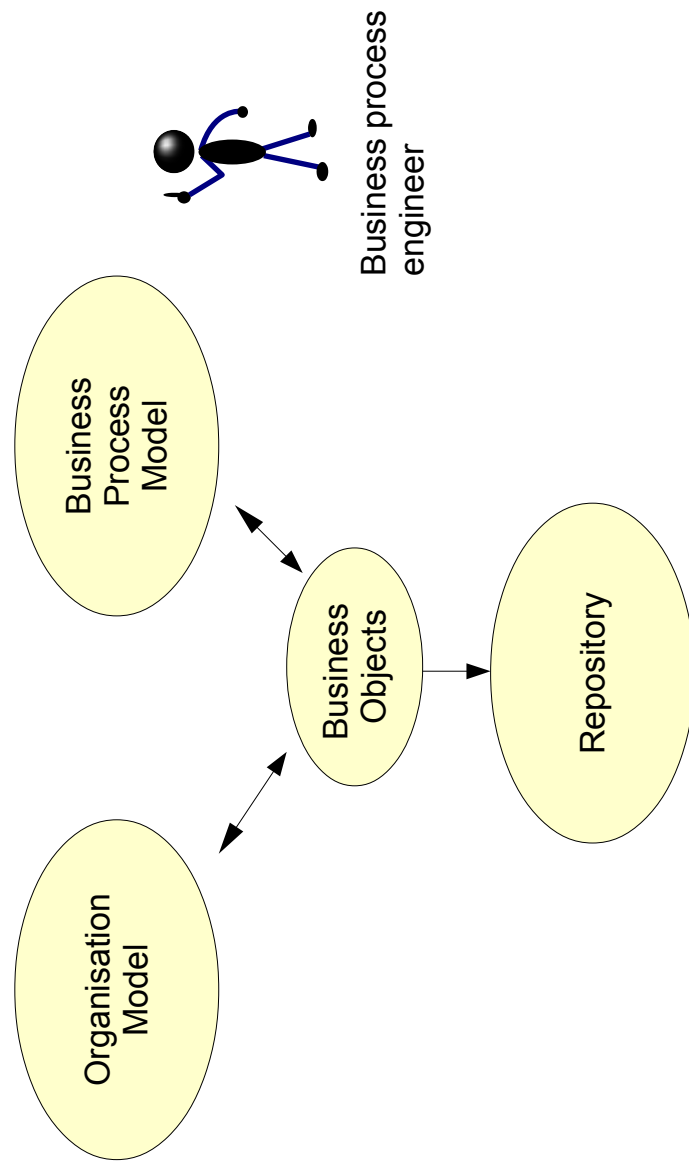
- Distributed with Application Link Enabling (ALE)
  - An intelligent middleware layer that distributes repositories over several databases
- Stores Business Objects with interfaces (business application interfaces, BAPI)
  - > 170 Business Objects are predefined
  - Encapsulate well-known business knowledge
- 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)

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

Office Software

Data warehouses

R/3
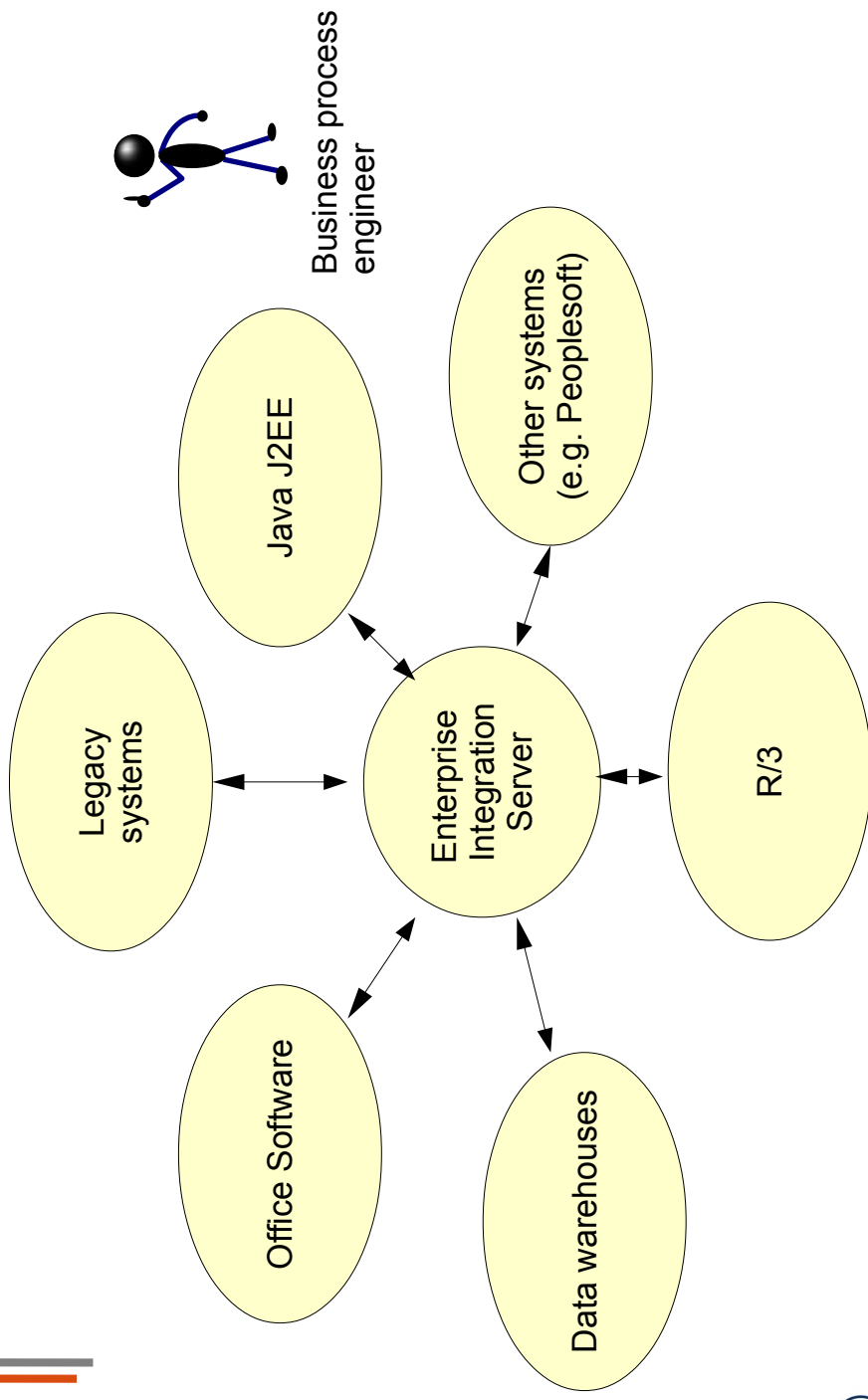
Insight: A Process Framework needs a Process Specification Language

▲ 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. Hackenbroich
  - Chemnitzer Str 43, 3rd floor
  - Thematic area "Future Manufacturing Systems"
- Course "Enterprise Software" in winter period (Prof. Dr. Uwe Kubach)

Prof. Uwe Aßmann, Design Patterns and Frameworks