21. The SAP R/3 Framework

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13-0.1, 02.01.14

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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.
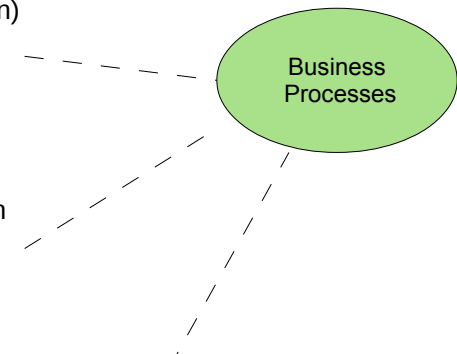
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Problem

- ► 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 plueprint: 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

- ► 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
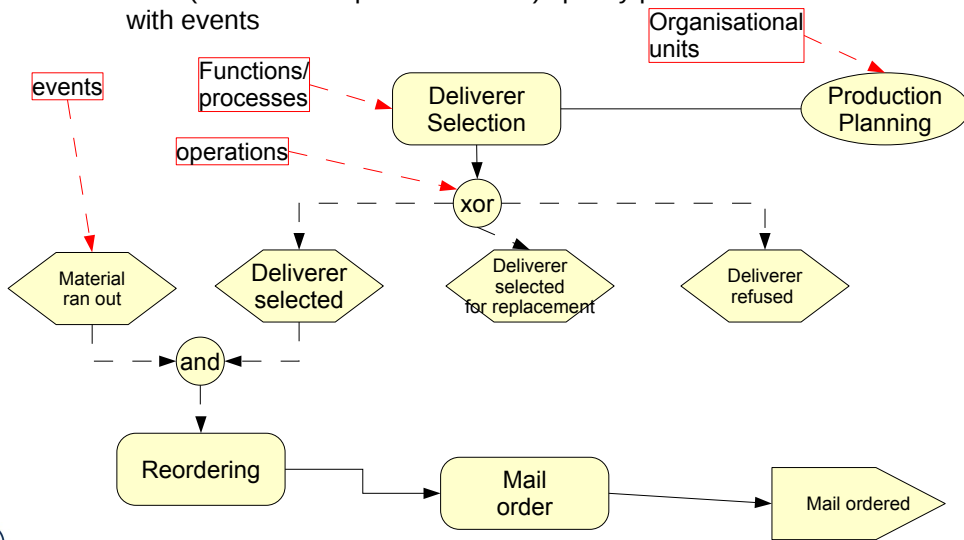- ► HR Human Resources (Personalwirtschaft)

Business Processes

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Workflow Specifications with EPK
(Ereignisgesteuerte Prozessketten)

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

Organisational units

Functions/processes

events

operations

Deliverer Selection

Production Planning

xor

Material ran out

Deliverer selected

Deliverer selected for replacement

Deliverer refused

and

Reordering

Mail order

Mail ordered

Business Blueprint Process Framework

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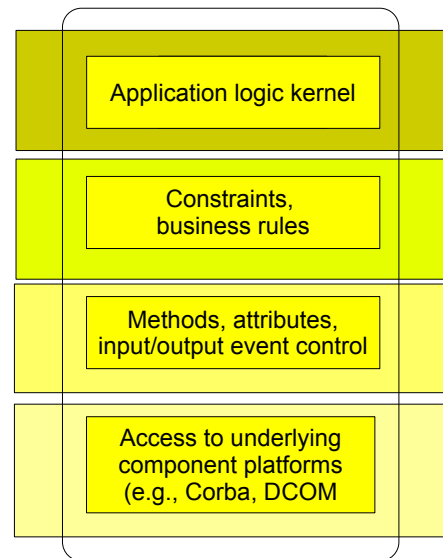
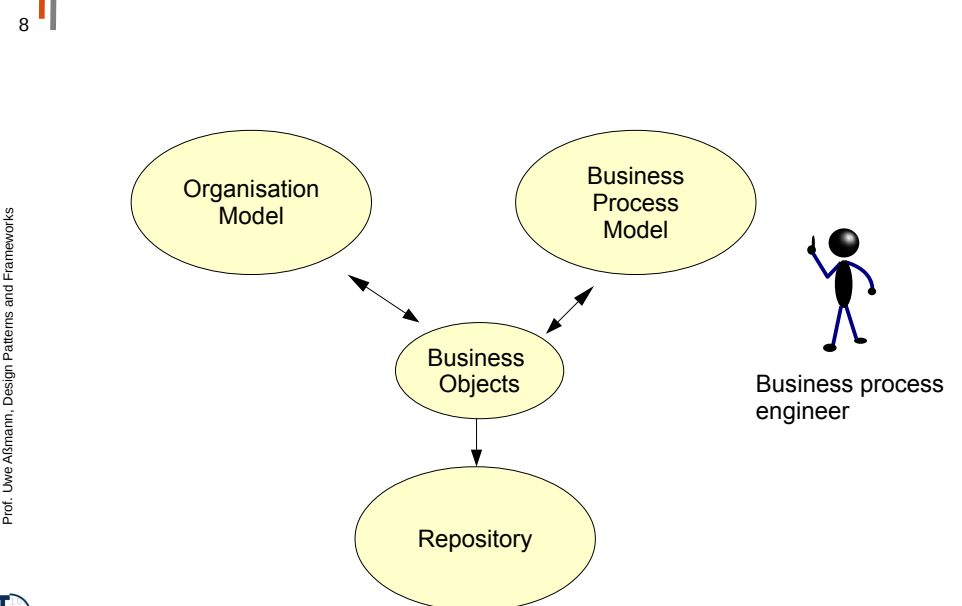**Business blueprints are business process frameworks**

R/3 Repository

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► 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

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Organisation Model

Business Process Model

Business Objects

Repository

Business process engineer

Business Application Integration

```
                    Legacy
                    systems

  Office Software              Java J2EE
                                                Business process
                                                engineer
                    Enterprise
                    Integration
                    Server
                                  Other systems
  Data warehouses                 (e.g. Peoplesoft)

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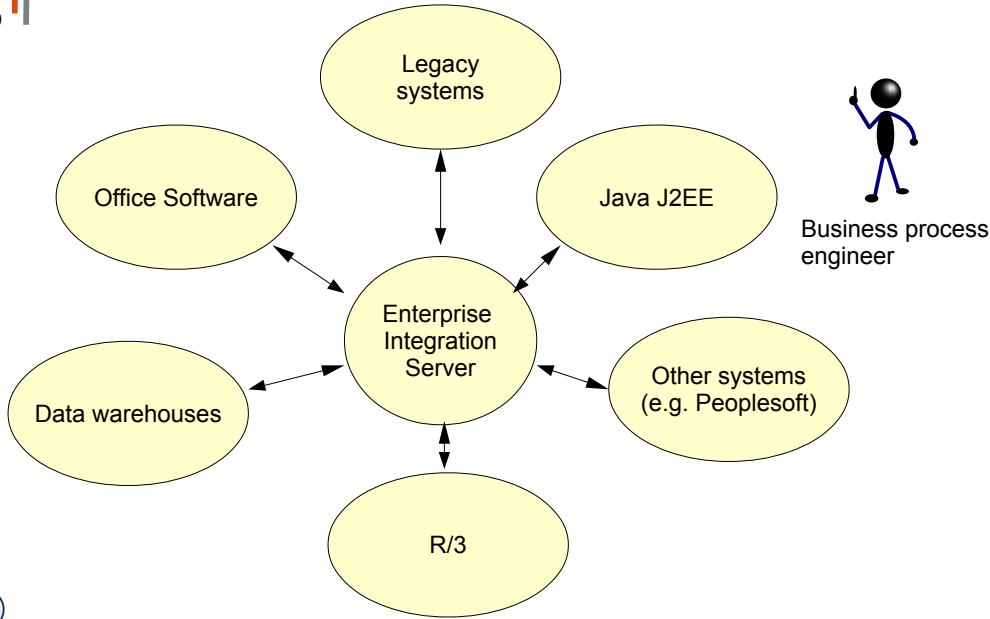
Insight: A Process Framework needs a Process Specification Language

► 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)