

Tutorial on:
Business Process Modeling as a
Method of Requirements
Engineering

(Selected snapshots)

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- Scope: requirements engineering
- Learning objectives: to understand the problems and solutions of building a new generation of business applications.
- Audience:
 - Software engineers interested in building business (enterprise) applications.
 - Business analysts interested in requirements specification for business applications.
 - Researchers interested in workflow, business process modeling, etc.



Topics

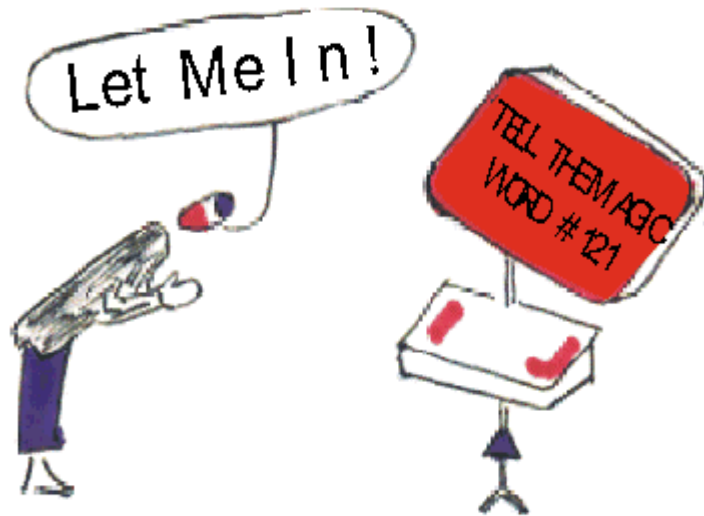
- Paradigm shift in business application development.
- What is business process?
- How to analyze, visualize and specify business processes.
- General requirements on software that supports business processes.
- How to build a system based on a business process model



Paradigm shift

Old Generation

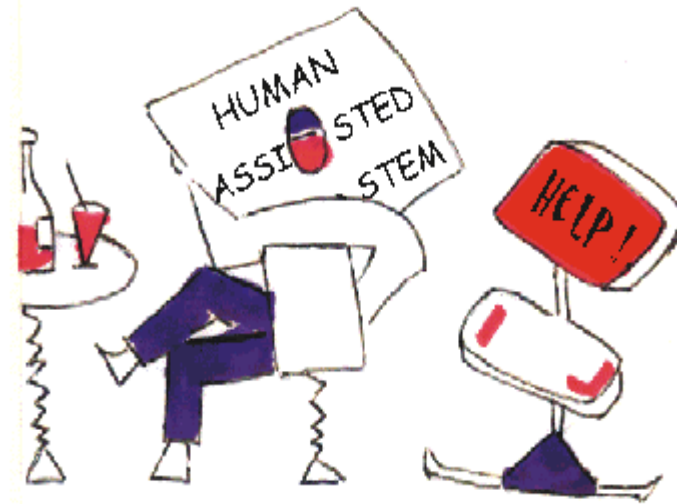
Human-Assisting System



Powerful Toolkit

New Generation

Human-Assisted System



Assembly Line



Aspects of system development

Aspect	Old Generation (Human-Assisting Systems)	New Generation (Human-Assisted Systems)
Modeling	Data Modeling	Process Modeling
Data Base	Static and passive	Dynamic (history-minded) and active
User Interface	Functional (multilevel menus)	Navigational
Organizational aspect	Follow existing management schemes	Suggest new management schemes



Business process

is a set of partially ordered activities intended to reach a goal

- Reaching an agreement in business negotiations.
- Discharging a patient from the hospital in a (relatively) healthy state.
- Closing a sale.
- Building a software system according to specifications.



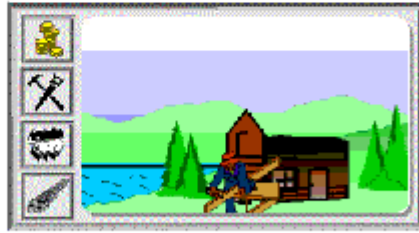
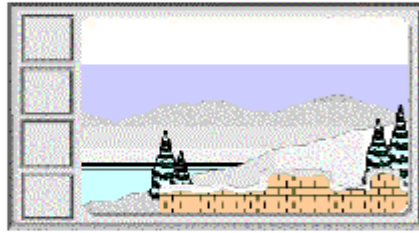


Figure 1

Basic notions

- Goal
- Activity
- Time
- State
- Change
- Event
- History
- Chronicle



Business process

- Has participants
 - Active participants, or agents - perform activities
 - Passive participants – objects that are consumed, produced or changed when activities are performed
 - Both can be human, and nonhuman
- Develops in time – focus on dynamics



Four views on process dynamics

1. Input/output flow – focus on passive participants
2. Workflow – focus on order of activities
3. Agent-related workflow – focus on agents
4. State-flow – focus on changes produced by activities in the relevant part of the real world



How to choose the view?

System mission	Process view
Integration of existing subsystems	Input/output flow
Facilitate coordination / communication	Agent-related view
Introduce strict order in production-like processes	Workflow
<i>Navigate each process to its goal – Process Control System</i>	<i>State flow</i>



State flow: state and goal

ORDER [50331651] Ibis: HRS

Deal Category: travel

Company:

Name: Lastname:

Tel: Firstname:

Fax: Job:

Pos	Article#	Article name	Ordered	Deliv	Sum
1	CS6080GR	Suitcase 60x80 green	9	9	10800.00
2	CB4030BL	Computer bag 40x30 black	20	20	6000.00

Invoiced: Disc.: Total:

Paid: Freight: Tax:

To pay:

Notes Events Closed deals Plans

- For each item $Ordered = Delivered$
- $To\ pay = Total + Freight + Tax$
- $Invoiced = To\ pay$
- $Paid = Invoiced$



State flow: state and activities

ORDER [50331651]

Deal Category: travel Ibis: HRS

Company:

Name: Travelshop Lastname: Petersson

Tel: ()08-5809090 Firstname: Ivar

Fax: ()08-5809090 Job: Manager

Pos	Article#	Article name	Ordered	Deliv	Sum
1	CS6080GR	Suitcase 60x80 green	9	7	10800.00
2	CB4030BL	Computer bag 40x30 black	20	20	6000.00

Invoiced: 0.00 Disc.: Total: 16800.00

Paid: 0.00 Freight: Tax: 4200.00

To pay: 21000.00

Notes Events Closed deals Plans

- *Ordered* > *Delivered* ➡ shipment
- *To pay* > *Invoiced* ➡ invoicing



Integrated state = state + plan

ORDER [50331651]

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To pay: 21000.00

Notes Events Closed deals Plans

To do list

Pos	DeadLine	Activity	Resp	Counterpart
1	000526	Invoicing	HRS	Petersson

✓ Execute X Cancel



State flow: introducing order via policies and dynamical planning

- Obligations
- Prohibitions
- Recommendations

Two step planning



State flow: building business process model

- Building conceptual model
 - Defining static objects (documents, people, etc)
 - Constructing a state structure
- Creating a live demo
- Describing activities
- Giving recommendations on the support system



Example: Decision-making

Live demo – a series of triads: State, ...

Decision making process

Reference # Decision Maker Start

Title Status

Origin

Initiated by

With document

Contact

Resolution

Status Meeting

Typ & Version

Document

Author

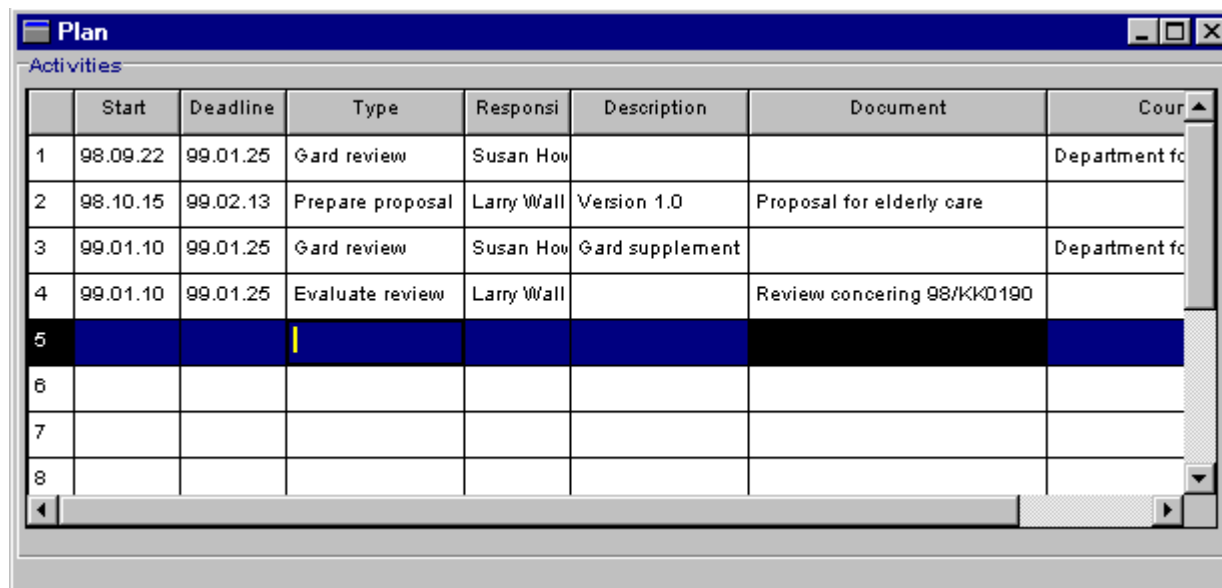
Grounds

	Type	Request	Receive	Satus	Document	Author
1	Review	Yes	Yes	Evaluated	98/KK0190 Review from	Organization for Elderly Intr
2	Review	Yes	Partly	-		Department for Culture
3	Review	Yes	No	-		Department for Elderly Care
4	Review	Yes	Yes	Unevaluated	Review concerning 98/KK0	Department for City Plannin
5	Opinion	-	-	Final	Opinions regarding 98/Kk	Municipality Lawyer



Example: Decision-making

..., Plan, and ...



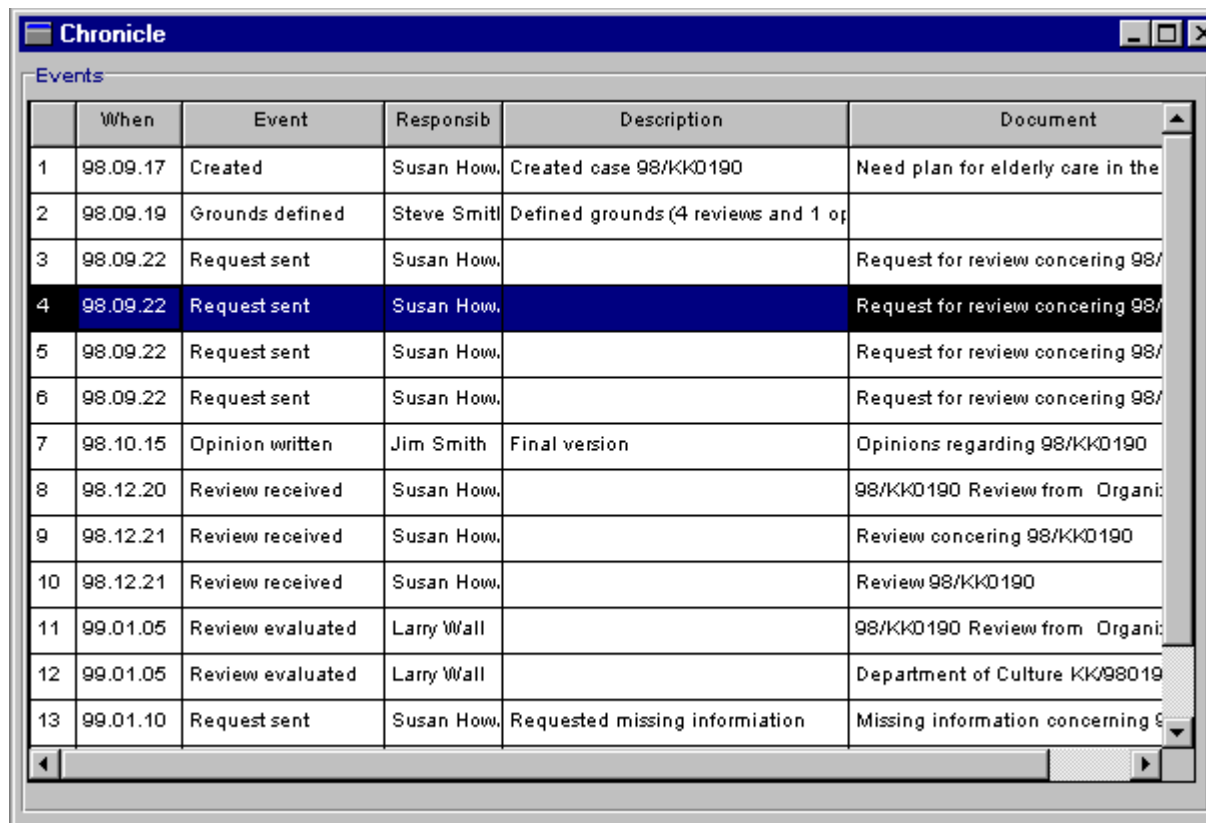
The screenshot shows a window titled "Plan" with a table of activities. The table has columns for Start, Deadline, Type, Responsi, Description, Document, and Cour. The activities are numbered 1 through 8. Activity 5 is highlighted in blue.

	Start	Deadline	Type	Responsi	Description	Document	Cour
1	98.09.22	99.01.25	Gard review	Susan How			Department fo
2	98.10.15	99.02.13	Prepare proposal	Larry Wall	Version 1.0	Proposal for elderly care	
3	99.01.10	99.01.25	Gard review	Susan How	Gard supplement		Department fo
4	99.01.10	99.01.25	Evaluate review	Larry Wall		Review concerning 98/KK0190	
5							
6							
7							
8							



Example: Decision-making

..., and Chronicle



	When	Event	Responsib	Description	Document
1	98.09.17	Created	Susan How.	Created case 98/KK0190	Need plan for elderly care in the
2	98.09.19	Grounds defined	Steve Smith	Defined grounds (4 reviews and 1 op	
3	98.09.22	Request sent	Susan How.		Request for review concerning 98/
4	98.09.22	Request sent	Susan How.		Request for review concerning 98/
5	98.09.22	Request sent	Susan How.		Request for review concerning 98/
6	98.09.22	Request sent	Susan How.		Request for review concerning 98/
7	98.10.15	Opinion written	Jim Smith	Final version	Opinions regarding 98/KK0190
8	98.12.20	Review received	Susan How.		98/KK0190 Review from Organiz
9	98.12.21	Review received	Susan How.		Review concerning 98/KK0190
10	98.12.21	Review received	Susan How.		Review 98/KK0190
11	99.01.05	Review evaluated	Larry Wall		98/KK0190 Review from Organiz
12	99.01.05	Review evaluated	Larry Wall		Department of Culture KK/98019
13	99.01.10	Request sent	Susan How.	Requested missing information	Missing information concerning 9



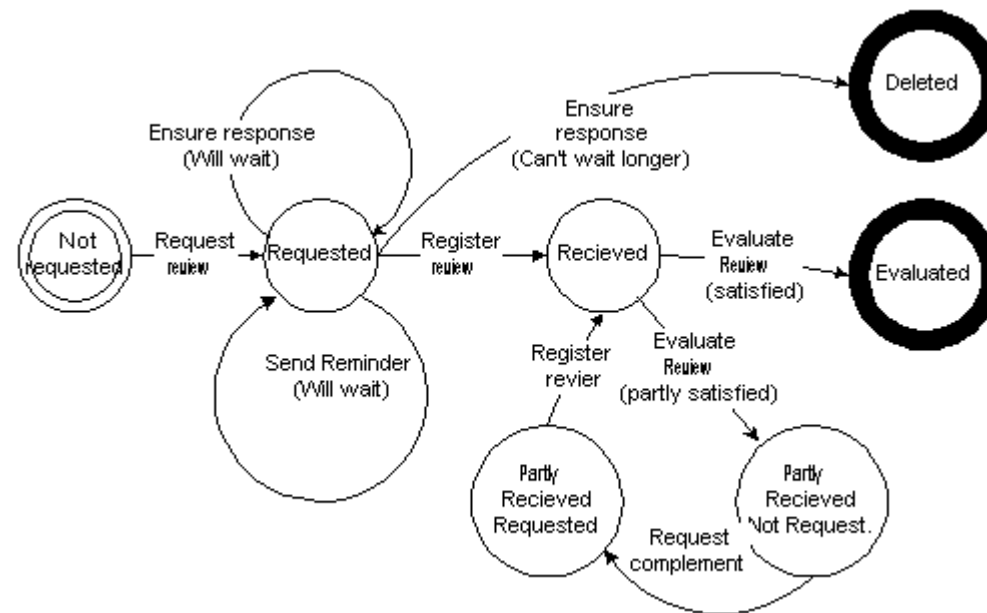
Describing activities

Define Grounds

Description	Define/redefine what documents should be included in the <i>Grounds</i>
Parameters	None
Instructions	Any hints on what should be included/deleted
Internal action	Modify the <i>Grounds</i> table, i.e. add/delete/modify rows. If a row is deleted, all activities connected to this row (i.e. <i>request review</i>) are deleted from the plan. Set <i>Status</i> to <i>Ongoing</i> (if <i>responsible</i> is set).
External action	None
Condition	The process should be initiated, i.e. should have a reference number and status <i>Initiated</i> . see <i>Initiate, Decide on permission</i>



State transition diagrams: Illustrating connection between activities via states



Control Systems

General Requirements:

- **Functionality** - What the system does
- **Properties** - How it does it
- **Quality** – How well it can work in the given business and technical environment



Functionality: control system

- Helps in execution of activities
- Keeps track of what has been done
- Helps to coordinate human participants
 - synchronously (execution of 1 activity)
 - asynchronously (execution of different act.)
- Helps to plan new activities
- Helps in distribution of resources



Functionality: control system

- Reminds
 - participants - what they have to do
 - resource managers - where resources are needed
 - managers - if there is any problem
- Provides easy access to:
 - current state of the process
 - process's history
 - old processes' histories



Functionality: control system

- Provides communication channels between:
 - participants of the same process,
 - external participants including (e.g., customers)
- Helps in enforcing organizational policies



Control system properties

- Friendly and consistent user-interface
- Flexibility in individual process handling
- Flexibility in respect to organizational structure (who does what)



Quality: Reality tolerance

- We live in the fast changing world
- Changes concern both:
 - business reality, and
 - technology
- System should be adaptable to both types of changes



Quality: How to achieve?

- Have a sound conceptual model for representing business processes (redefining the processes does not change the model).
- Have a layered software architecture (layers can be changed one at a time when technology changes).
- Have the model and the software structure separated from each other as much as possible (changes in business and technology can be handled separately).



Three layers of process control system

1. Historical object-oriented database to store static objects, processes, and activities along with their histories – general layer
2. User-interface navigational system – general layer
3. Application dependent routines for activities execution and dynamic planning – can be hard-coded in the beginning



Pragmatic approach to development of control systems

- Don't do everything yourself. Use third party tools, e.g., for storing information, and user interface.
- Build extra functionality before using the tools (the chosen tools should allow that).
- Don't be afraid to hardcode the application-dependent parts if you can't build them in a general way.



Analysis of examples while demonstrating the systems

- *DealDriver* – sales support
- *ReKo* – support for recruiting and communication
- *Utredaren* – support for inquiries/investigations



Additional reading

- Khomyakov M., and Bider, I. Achieving Workflow Flexibility through Taming the Chaos. *Journal of Conceptual Modeling*, August 2001:
<http://www.inconcept.com/JCM/>
- Bider, I., Khomyakov, M. If You Wish to Change the World, Start with Yourself: An Alternative Metaphor for Objects Interaction. *The Journal of Conceptual Modeling*, February 2001: www.inconcept.com/JCM
- More literature can be found on our website:
www.ibissoft.com/english/index.htm

