The M.A.D. Experience

Multiperspective application development in evolutionary prototyping

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Outline of Presentation

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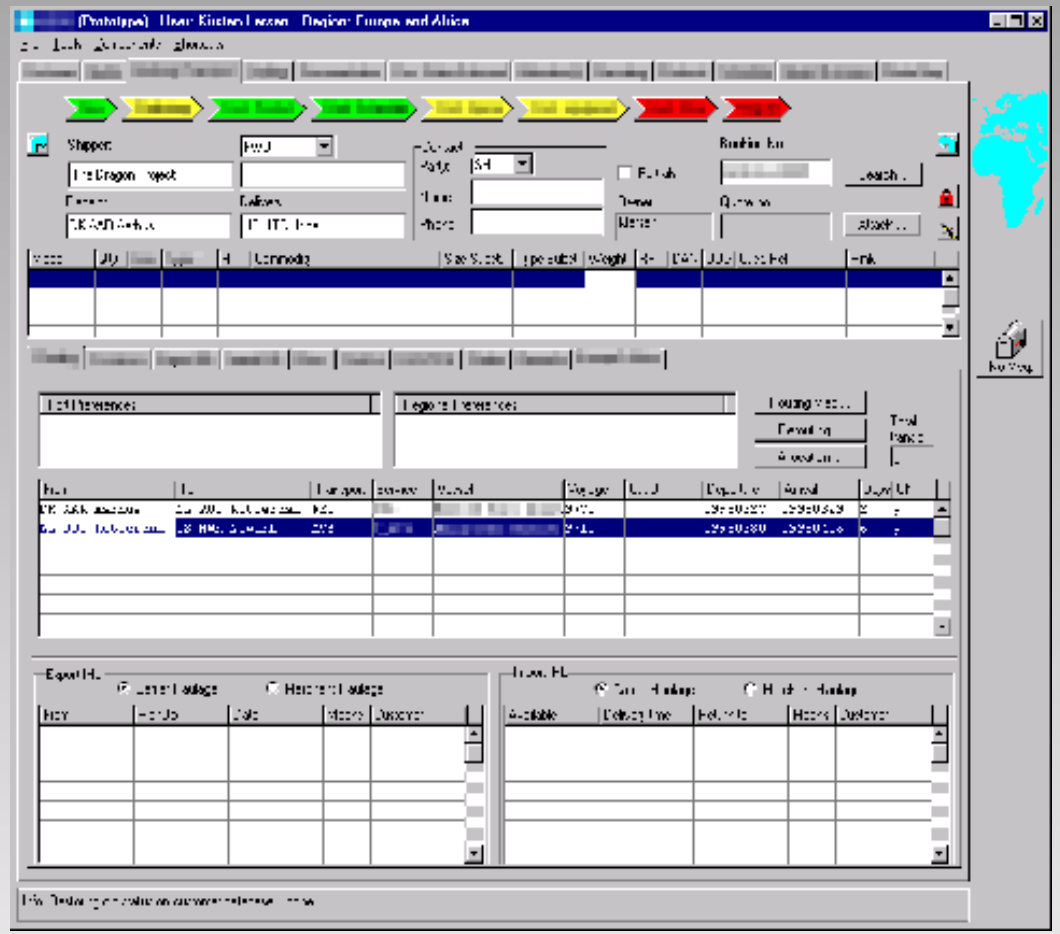
  - Major Challenges
- The Process
  - Experimentation
  - Tools
  - Going Out
  - Actual Work
  - Object Modelling
  - Multiple Competencies
- Lessons Learned

The Dragon Project



- Evolutionary prototyping of customer service system for booking of containers
- Unknown and complex problem domain of shipping
- Vague requirements and specifications from business
- 2,500 users in 250 offices in 70 countries on 6 continents
- 100,000 lines of code, 15 fully functional components, excl. Frameworks and libraries

Settings

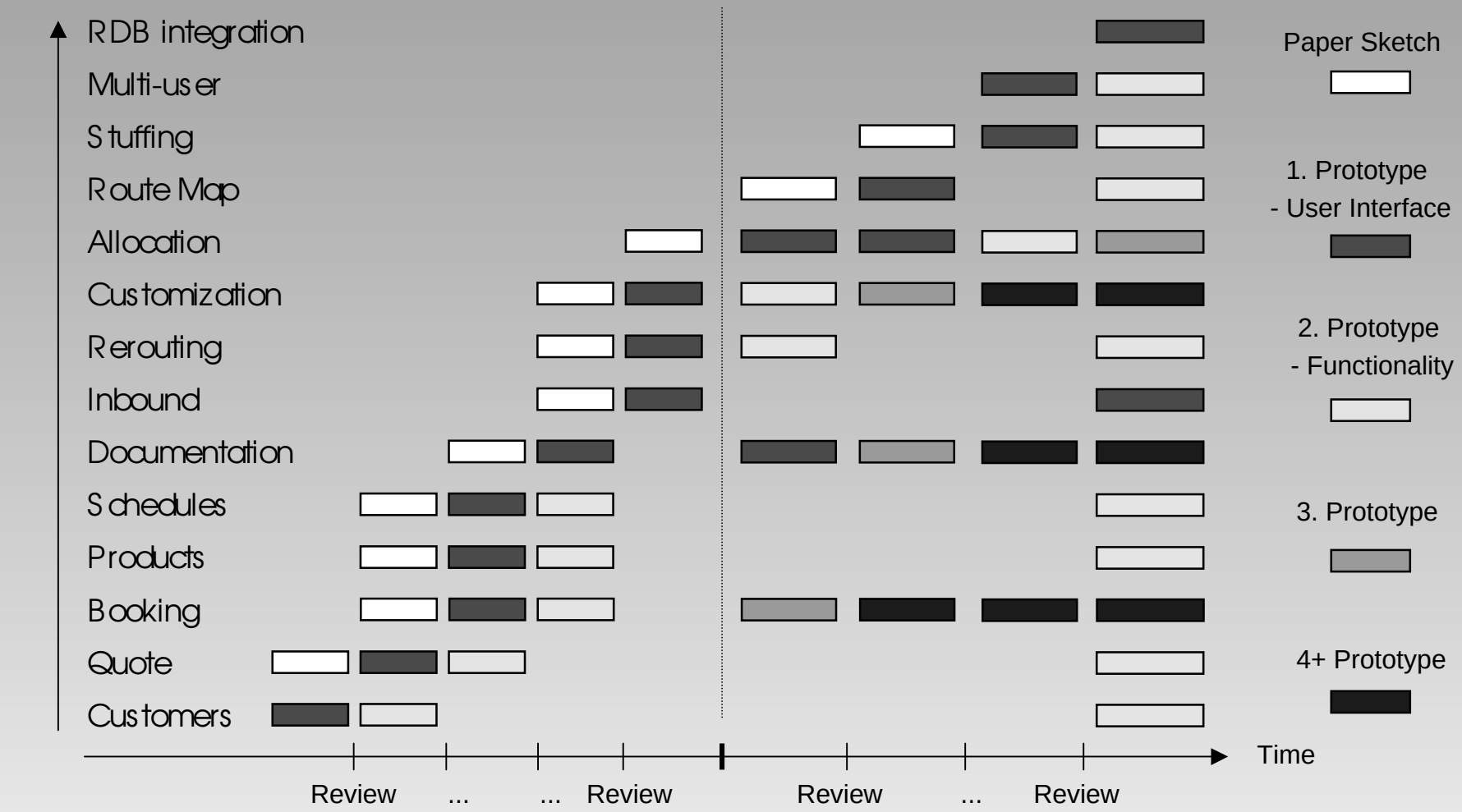
- Duration
  - March 1997 - July 1998 - …
  - Prototype appraised and approved by the company's highest executive body in May and 5 major iterations
  - Prototype major requirements specification for production system
- Partners
  - A globally distributed shipping company
  - The DEVISE research group at Aarhus university
    - Participatory design
    - Object-orientation
- Development group
  - Ethnography, participatory design, object-orientation, usability
- Objectives
  - Business: prototype for a global booking system
  - Research: experiences with tools, techniques and approaches developed by DEVISE

Major Challenges

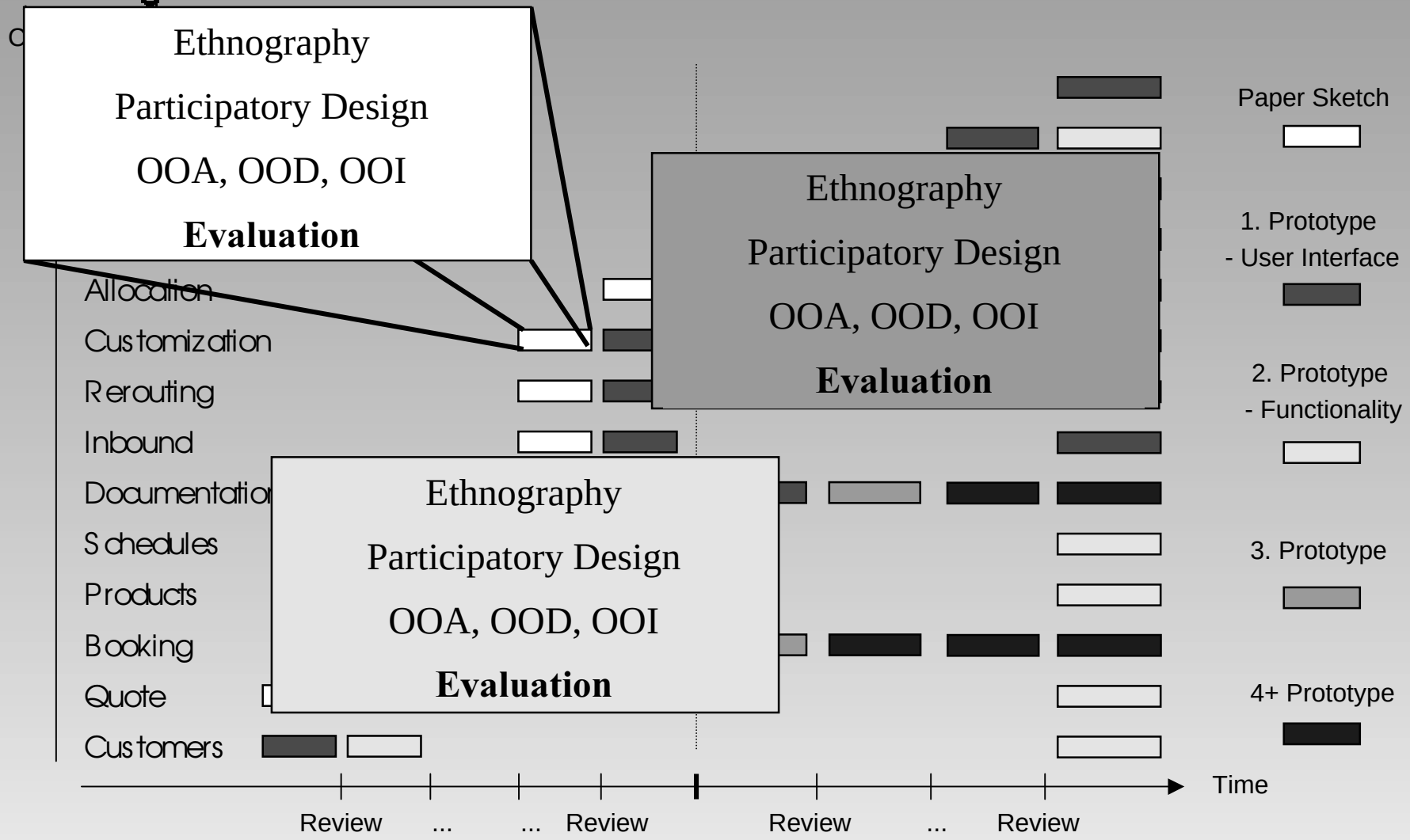
The global booking system should

- Replace several old systems
  - Currently 50+ individual systems
  - Several local variants of systems
- Coordinate distributed work
  - Customer service should be world wide and coordinated
- Respect local needs
  - The process of booking in Singapore is *not* the process of booking in Hamburg

The Process


Concerns
RDB integration
Multi-user
Stuffing
Route Map
Allocation
Customization
Rerouting
Inbound
Documentation
Schedules
Products
Booking
Quote
Customers
Time
Review
...
...
Review
Review
...
Review
Paper Sketch
1. Prototype
- User Interface
2. Prototype
- Functionality
3. Prototype
4+ Prototype

The Process


Ethnography
Participatory Design
OOA, OOD, OOI
Evaluation
Ethnography
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OOA, OOD, OOI
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1. Prototype
- User Interface
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4+ Prototype
Time
Review
...
...
Review
Review
...
Review

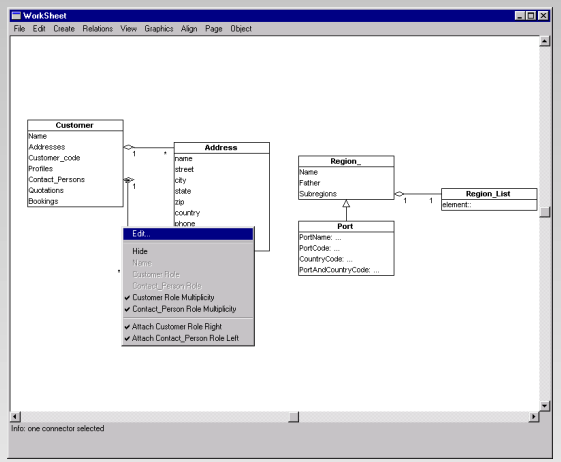
Experimentation

- Is *performance* of development in *active collaboration* with users
- Concretises visions of the future through e.g. Prototype
- Radical parallelism yet evolution towards product system
  - Code from day one - still analysis
  - Need for flexibility and robustness of prototype
  - Need for tool-support

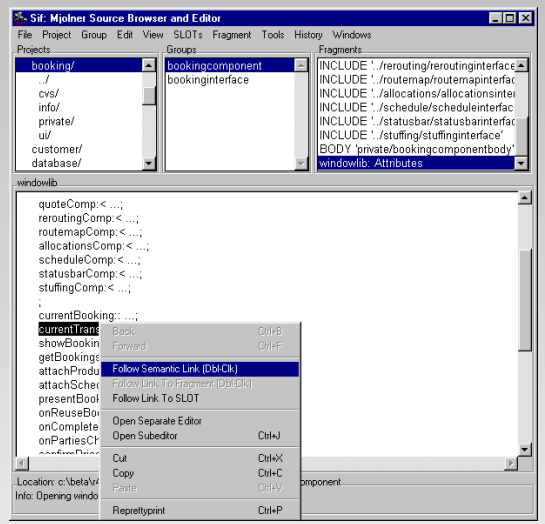
Tools

- Support for many iterations over short time
- Reengineering capabilities crucial
- The BETA language and the Mjølner System:

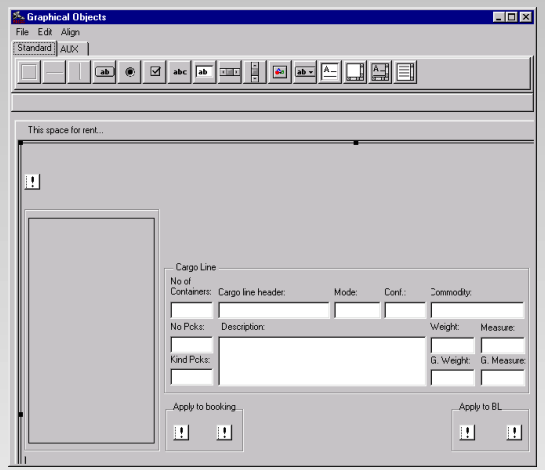
– CASE tool
  - UML notation, incremental code generation
  - Model changes mostly in code editor, diagrams reengineered



– Code editor
  - abstract overview, semantic links
  - crucial in restructuring the prototype



– GUI builder
  - interface created from start, used for discussions also
  - coordinating between OO-developers and participatory designer



Going Out

Thursday:

4 developers and 2 business representatives arrive in Singapore

Friday:

(Morning) presentation of the prototype to some 20 people

(Afternoon) developers join various people doing usual work

Saturday:

(Morning) workshop with 4 people centred on booking

(Afternoon) lessons learned & implementation/redesign decisions

Monday:

Ethnographer focuses on allocation and pricing

Participatory designer makes hands-on session with 3 users

OO-developers implement proposed changes

Tuesday:

Presentation of changes & details on next issues on agenda for prototype

Wednesday:

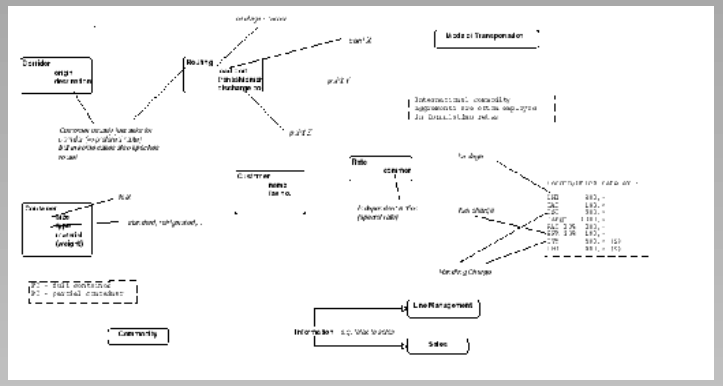
4 developers and 2 business representatives arrive in Malaysia

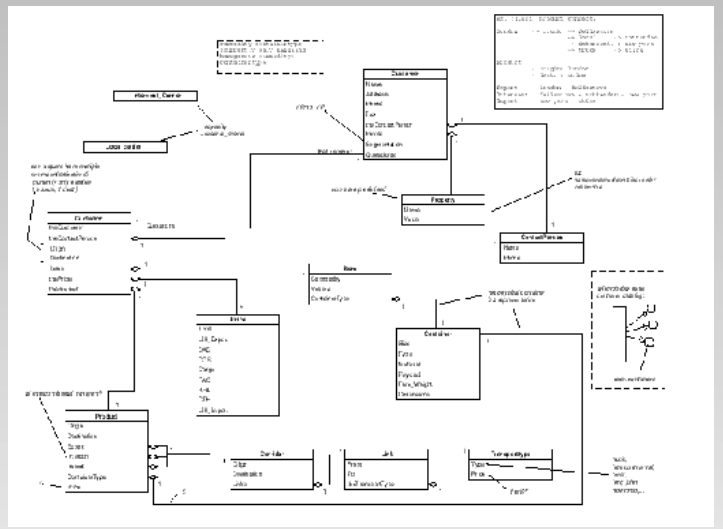
Coming Home

- Actual implementation of two major components started
- Developers experienced actual work in Asia
- Asia experienced the prototype

Actual Work

- System design *is* work design
  - System design must be based on an understanding of actual work
  - Ethnography, workshops, evaluation of prototype used to make actual work in details visible to developers
  - Ethnographer is not “proxy user”
- Bring users into development *and* developers to users
- Effective design bridges between current and future work
  - Subject of analysis, springboard for design and goal of implementation
- Prototypes, mock-ups, scenarios, object modelling complement understanding through ethnography



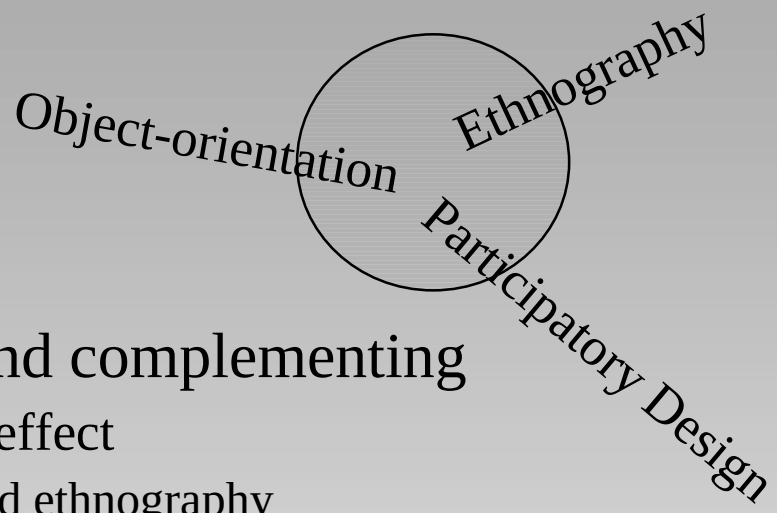


Object Modelling

- Focus on problem domain phenomena and concepts
- Done in active collaboration with users
- Blackboard snapshots, initial model, model,
- Vertical and horizontal evolution
- Almost no implementation specific details - *interpretability*
- Formal notation used throughout - *executability*

Multiple Competencies

- Use of diverse competencies



- Interacting and complementing
  - Synergetic effect
    - OOA and ethnography
    - Participatory design and ethnography
    - OOD and participatory design
  - No strict separation
  - Actual work and prototype as common frame of reference

Lessons Learned

- *OO-analysis is more than finding nouns and verbs*
  - Analysis is directed towards understanding of current work
  - Ethnography and participatory design provides a concrete understanding of actual work
  - Developers need concrete experiences from actual work
- *OO-design is more than filling in details in the object-oriented analysis model*
  - Participatory design provides concrete design visions through experimentation
  - Design needs to find “best matches” between current and future work
- *OO-implementation is more than translating design models into code*
  - Starts early - design visions *will* change
  - Implementation is the implementation of emerging design visions
- *Principles does not apply to all problems in all situations*
  - Approach applied successfully in the concrete settings: complex human work, high uncertainty, large and geographically distributed organisation

Pointers - So Far ...

The DEVISE research group at Aarhus University
http://www.daimi.aau.dk/DEVISE/

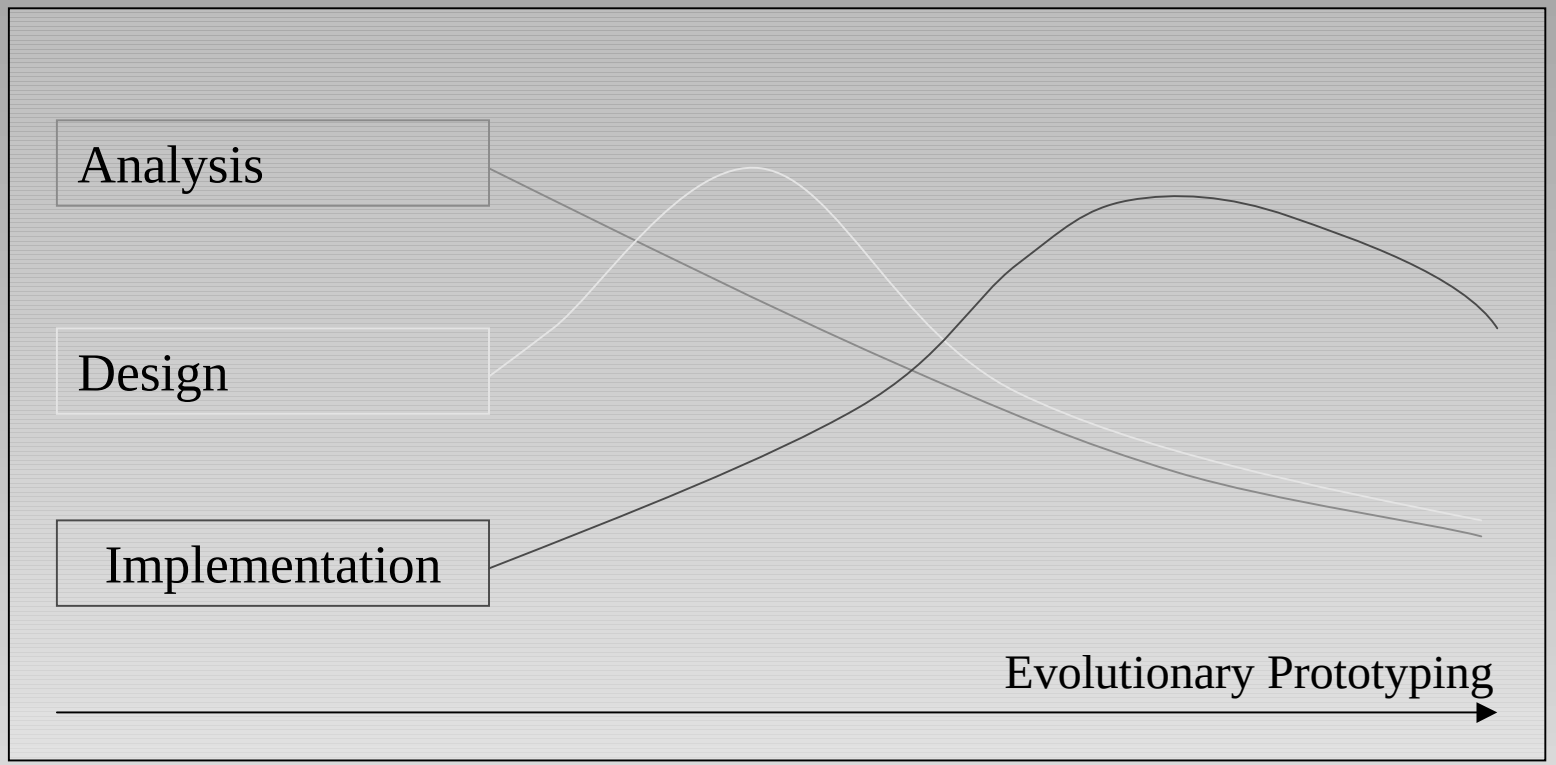
Crabtree, A., Mogensen, P. *The Relevance of Specifics and the Specifics of Relevance,* in preparation

Crabtree, A. *Ethnography in Participatory Design,* accepted for PDC'98

Christensen, M., Damm, C.H., Hansen, K.H., Sandvad, E., Thomsen, M. *Architectures of Prototypes and Architectural Prototyping - The Dragon Experience,* accepted for NWPER'98

Funded by the Danish national Centre for IT-research
http://www.cit.dk

Concerns

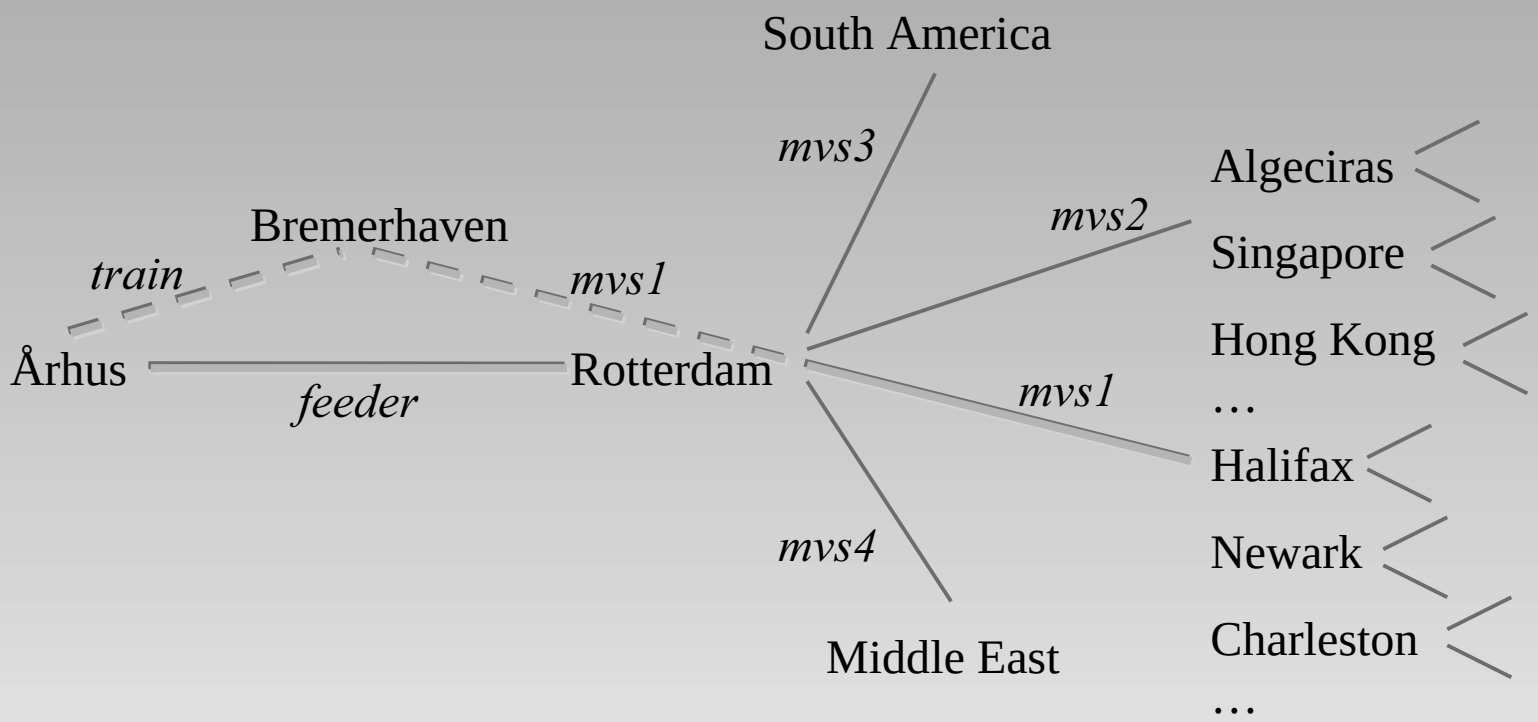


Movement of concerns of evolutionary prototyping implementation

Work Instances

- Real world instance of actual work
  - E.g. “rerouting”
  - Ethnographer collect examples, participatory designer comes up with visions, developers reiterates
  - Does not focus on how to perform the work in a final system
- Used and reproduced within development group, presentations, workshops, usability studies, …
- Does not capture all possible problems - not a final design solution
  - Compact and understandable
  - Good starting point

The Bremerhaven Work Instance



“Pipe Smoking, Anarchistic Researchers”? - Managing Development

- Not necessarily a vice or virtue
- Workshops
  - Presentations: 150+ staff from over 20 countries
  - Workshops (1-3 days): 40+ staff from 10 countries
  - Continuous workshops: 6 staff from 5 countries
- Reviews
  - On average every 2 weeks
  - Formal, informal, business representatives, executive body
  - Major reviews: March ‘97, April ‘97, May ‘97, June ‘97, December ‘97, March ‘98
- Documentation
  - Documenting OO, participatory design, ethnography
  - Documenting interaction - representation of work instances
  - Documenting decisions