

Integrated Environments for Virtual Collaboration: an Empirical Modelling Perspective

Meurig Beynon

wmb@des.warwick.ac.uk

Soha Maad

soha@des.warwick.ac.uk

Department of Computer Science
University of Warwick, UK

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- Motivation / Issues
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- EM principles, techniques, tools and notations
- EM and Human Information Behavior
- EM and Virtual Collaboration
- Examples
- Conclusion

OUTLINE

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Forms of Collaboration Environment

Project/group work collaboration

current: document centric technology for collaboration

aspiration: introduce agency and dependency in document workflow - supplement documents with artefacts

Collaborative learning

current: tools are mainly web-based centered around management of student and teacher workspaces

aspiration: - richer interaction - shared cognitive models

E-business

E-business \equiv $\left\{ \begin{array}{l} \text{e-commerce - supply-chain collaboration - online} \\ \text{trading - business-to-business online communication} \end{array} \right.$

current: many business process models supported by diverse range of tools

aspiration: overcome social and technical challenge

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Motivation / Issues (1) Sonnenwald's (1998) framing of virtual collaboration

- Sonnenwald's (1998) view of human information behaviour (HIB), discussion with reference to three basic concepts:
 - the context e.g. academia
 - the situation e.g. exam marking
 - the social network e.g. academic, administrative & technical support staff

• The Information Horizon

For each individual, collaboration within a given situation and context is bounded by their *information horizon*, as defined by the variety of information resources upon which they can draw.⁴

Motivation / Issues (2)

Challenges to be met in providing support for virtual collaboration

- **Customisation**
account for needs of the individual within a social network, situation and context.
- **Integration of electronic & human activity**
retain a situated character in virtual collaboration
- **Adaptation:**
 - account for personal, technological and social factors that are neither static nor easily preconceived
 - adaptable information horizon

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Motivation / Issues (3)

mismatch between the roles that humans and electronic devices play in communication and interaction

Traditional approach to resolving mismatch: constrain interaction between humans and electronic devices to patterns that guarantee very high level of consistency.

Not well-suited to the volatile practical demands of effective virtual collaboration.

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new principles for computer-based modelling

- computational activity / human action and interpretation
- electronic components / the external world
- interfaces / interaction with the external environment
- state/external situation
- human intervention/ computer automation

Our Aim

Context, situation and social network

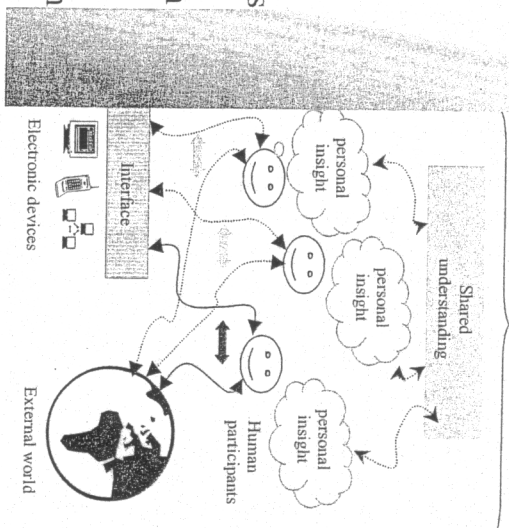


Figure 1. Correlating states in an Empirical Modelling framework

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Context, situation and social network

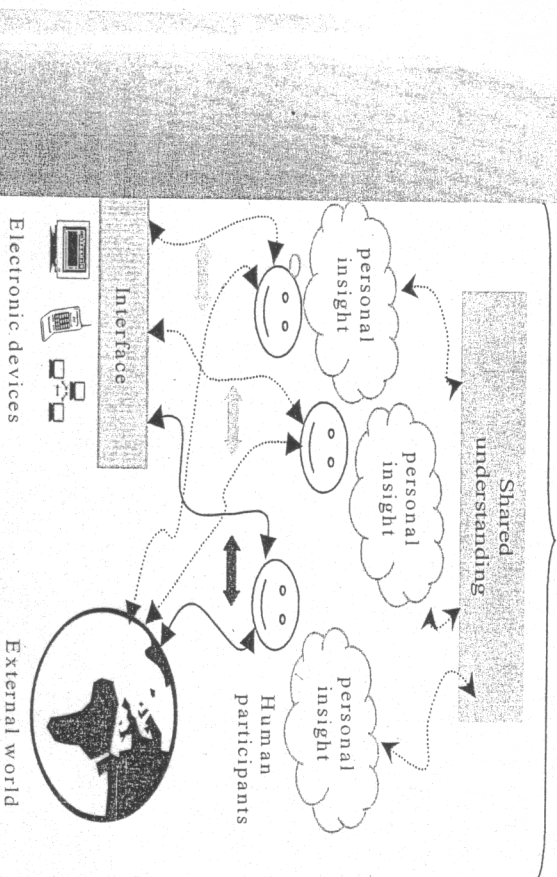


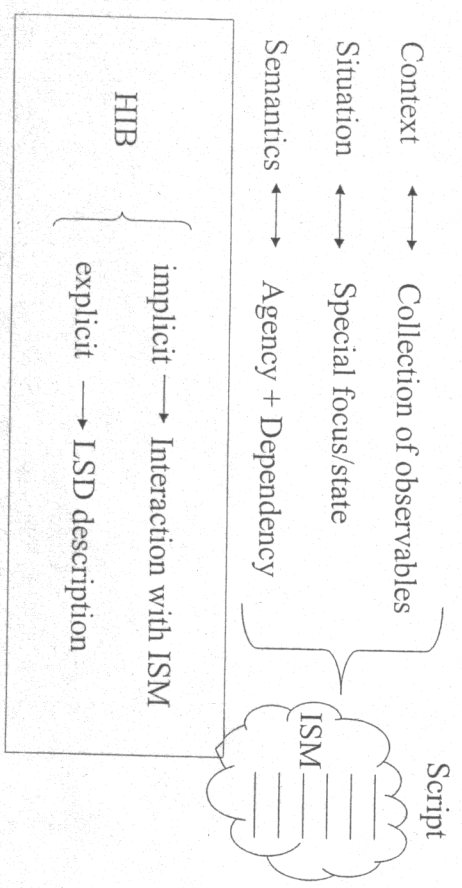
Figure 1. Correlating states in an Empirical Modelling framework

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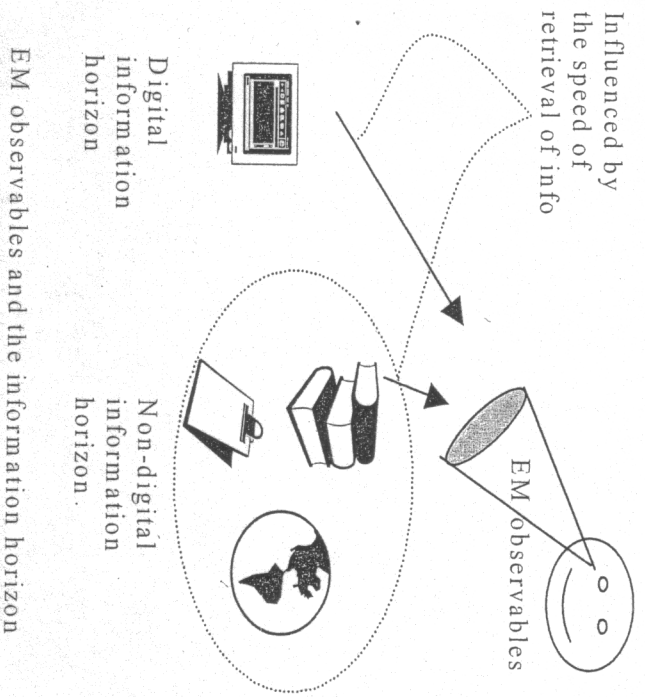
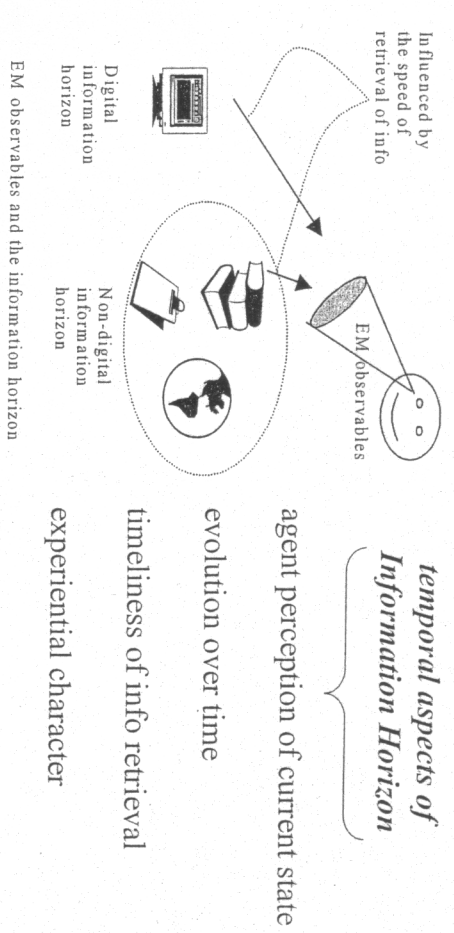
EM principles, techniques, tools and notations

Empirical Modelling principles	Empirical Modelling techniques
<ul style="list-style-type: none"> • observation • agency • dependency • definitive representations of state • <i>definitive scripts</i> • agent-oriented analysis • representation of state-transitions. 	<ul style="list-style-type: none"> • construe a situation • construct <i>interactive situation models (ISM)</i> • metaphorical representation through ISM
Empirical Modelling notation	Empirical Modelling tools
<p><i>LSD</i> account for observables</p> <ul style="list-style-type: none"> • oracles • handles • states • derivatives • protocol 	<ul style="list-style-type: none"> • EDEN interpreter • distributed variant of EDEN

EM (Empirical Modelling) and HIB (Human Information Behavior)



EM (Empirical Modelling) and HIB (Human Information Behavior)



EM and Virtual Collaboration

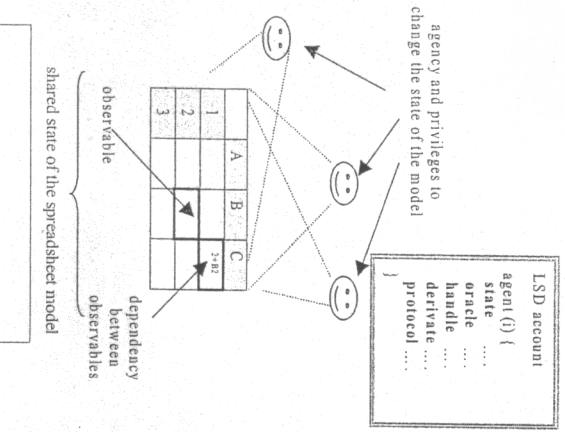
Three questions are raised

- *What agents are deemed responsible for state-change?*
- *What are the cues for state-changing action on the part of agents?*
- *What are the direct effects of agent action upon the environments of other agents?*

Keywords : LSD - Construing - ISM

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Example 1 : e-group work activity



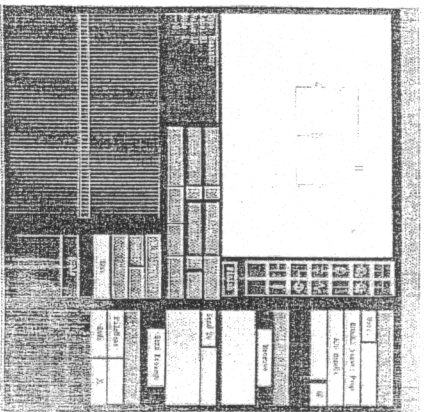
Context: academia
Situation: exam process
Observables: students marks

ISM ≡ Shared Spreadsheet

Key points:
 capturing different views
 reflecting administrative practice
 enhancing capacity to observe state

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Example 2 : e-learning

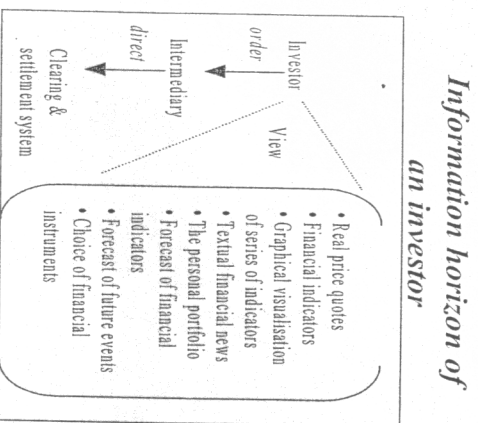


Social network: students and teacher
Context: academia
Situation: Electronic laboratory
Observables: electronic components

Key points:
 different modes of interaction
 supplement rather than substitute
 for real laboratory

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Example 3 : e-business



Social network: investor, brokers, dealers, market makers
Context: business
Situation: financial trading (special case of a retail trade in NYSE)
Observables: Bid-Ask prices, quoted prices, transaction volume, type of order, trading mechanism, market structure

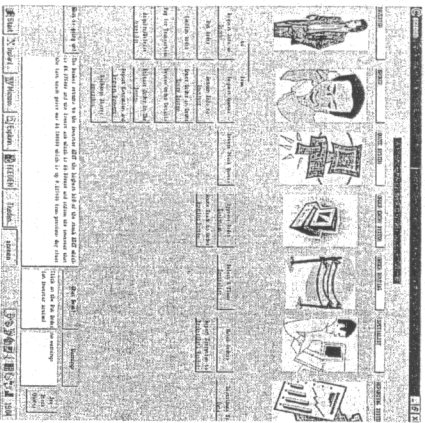
Key points:
 • competition takes precedence over collaboration
 • High-level account of workflow
 • detailed views of implementation
 • training function

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Example 3 : e-business

Workflow for

a retail trade in NYSE



LSD description of agent broker

```
agent broker {  
state  
  info_requested, quotes_info_requested, ...  
oracle  
  stage_in_retail_trade  
  info_requested  
  ...  
handle  
  quotes_info_requested=0  
  ...  
  deriveate  
  stage_in_retail_trade = F(info_requested, ...)  
  ...  
protocol  
  (stage_in_retail_trade = init_trade) and  
  (info_requested) → quotes_info_requested=1  
  ...  
}
```

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Conclusion

A new paradigm

for virtual collaboration

Principal characteristics

- artefacts
- learning and shared understanding
- human computer integration
- exploration of conceptual, technical & social perspectives
- exploratory activity (e.g for requirements)

Current tools for EM

- *sufficient for proof-of-concept*
- *unsuitable for applications that are data-intensive or require large-scale collaboration.*