

Empirical Modelling of Real Life Financial Systems:

The need for Integration of Enabling Tools and Technologies

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Trends in the Financial World

- Financial crises
- Monetary union
- Large scale change
 - increasing competition
 - much business process re-engineering
 - new global marketplace
 - higher customer requirements
 - new theories governing the markets
- The biggest demand is for electronic communication of information and the ability to transact electronically
- New challenging technology problems (e.g. euro-conversion)
- New performance measurement techniques (linking performance measurement to the company strategies and plans)
Can current technology keep up with huge and frequent change, and enable firms to remain competitive in the global marketplace?

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Trends in the Software Industry

- Many tools, hard to integrate conceptually or physically
- Major developments in modelling, intelligent analysis, and information sharing, e.g. UML/XML, 3-tier architecture, spreadsheet, OLAP, WWW, JAVA, VB.
- Problematic to provide integration, standardization, and a common technology base, e.g. OODB vs RDB, Windows OS vs Linux OS, BPM vs SDM.

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Obstacles to exploiting IT in meeting business challenges

- organizational change is not adequately managed
- alignment of software development to corporate goals: inadequate returns on investment in IT
- there is a wide gap between research and development, and target goals and current achievement (Heeks, 1998)
- business expectations and IT delivery mismatched
- pressures on the software industry to build applications with more control and higher quality at lower cost and effort
- traditional computational paradigms are not well-suited for describing the interaction between many applications and users in a shared environment

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Overview of tools

- electronic document management tools
- modelling tools
- simulation tools
- tools for the datawarehouse
- business intelligence tools
 - OLAP (Online Analytical Processing) tools
 - data mining tools
 - and financial analysis tools
- scheduling and planning tools
- web management tools

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Perspective on Integration

- Many different types of integration: economic i., horizontal or vertical i. of companies, software i., system i., etc..
- Our key focus is *human-computer* integration

Two aspects of our research:

- better understanding of integration issues (current)
e.g. linking BPM to software development
- principles for practical integration (aspiration)
e.g. s/w integration over a distributed h/w configuration

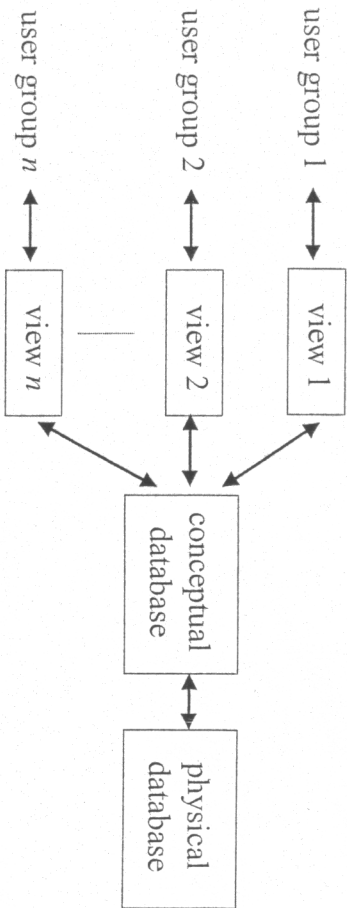
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Software Integration Issues (1) Background to IT integration

- Precedents for IT integration in relational databases of 1970s.
- Key principles *logical* and *physical data independence*.
- Key concept *functional dependency*
- Classical DB applications exploit stable local transactions, restricted agency, preconceived patterns of interaction.

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Logical and Physical Data Independence



Software Integration Issues (2)

Current approaches to software integration

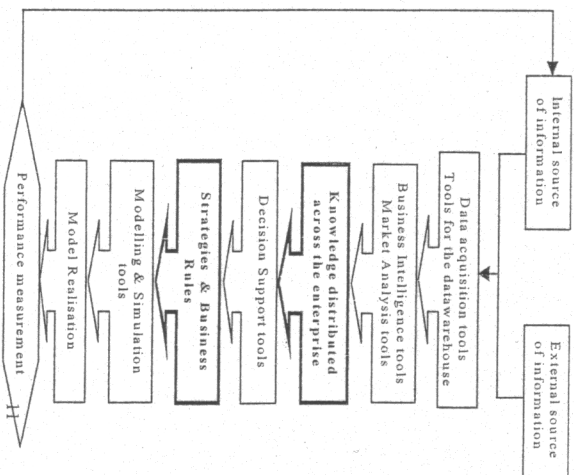
- typically combine two paradigms:
 - relational methods to construct integrated data models
 - object-oriented modelling of operational processes on business data
- functional dependencies in a relational model:
 - express conceptually indivisible propagation of change
 - supply the semantic framework for data organisation.
- object-oriented models:
 - associate collections of data with the fundamental operations that can be applied to them.
 - support distributed development and can represent the components of distributed systems.

These paradigms have complementary qualities

Software Integration Issues (3)

IT integration in financial systems

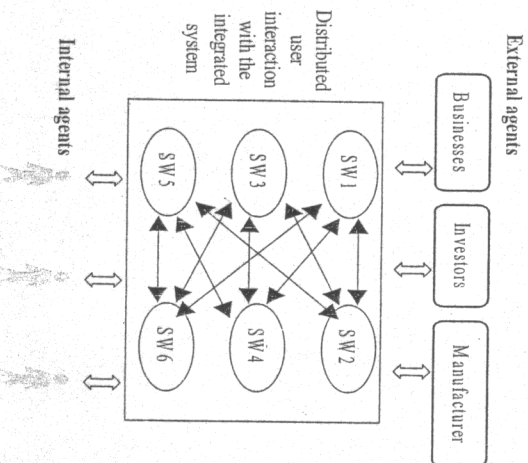
- **Aim:** coherent integration of enabling tools and technologies to establish corporate intelligence networks for intelligent information gathering, dissemination, and decision making.
- **Key concept:** turning information (abstract values associated with current state) into knowledge (observables for timely agent interaction)



Framing the challenges of software integration

Key issues to be addressed for successful software integration

- dependency and the indivisible propagation of state change
- the free association of data with operations upon that data (cf. "subject-oriented")
- the modes of agency that mediate and synchronize state changing activities



Managers and Employers ... Users and Programmers

EM principles, techniques, tools and notations

<i>Empirical Modelling principles</i>	<i>Empirical Modelling techniques</i>
<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
<i>Empirical Modelling notation</i>	<i>Empirical Modelling tools</i>
<p><i>LSD account for observables</i></p> <pre> { oracles handles states derivatives protocol } </pre>	<ul style="list-style-type: none"> • EDEN interpreter • distributed variant of EDEN

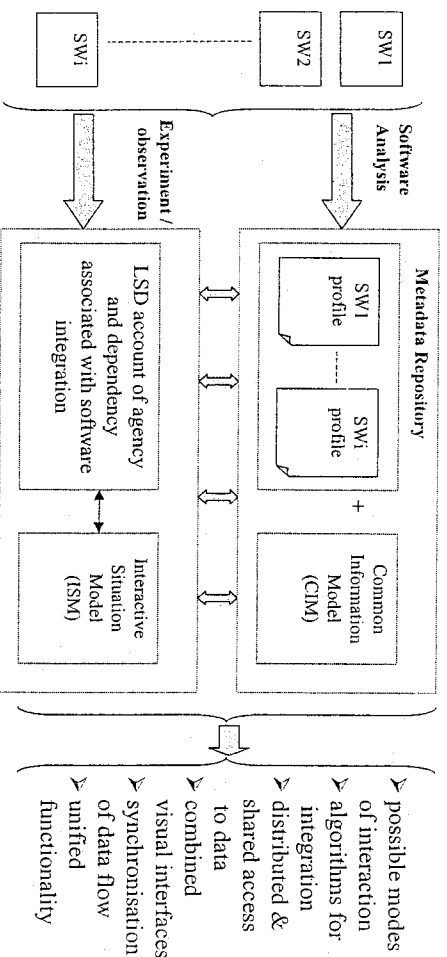
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Empirical Modelling For Integration

Research agenda:

- understanding s/w applications in agent-oriented terms
- combining agent-oriented analysis with ISM construction to assist in program comprehension
- extracting software modules from ISMs and possibly translating them into conventional procedural programs
- introducing object abstractions into definitive scripts
- using ISMs in requirements understanding for software development to supplement normal documentation.

Empirical Modelling For Integration



The use of EM to complement the conventional approach to software integration

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Conclusion

- Query effectiveness of current approaches: OO + relational DB are not enough?
- Academic vs. commercial perspective
- Prospects for EM as an approach to integration: key role for agent-oriented analysis