



Purdue University

Center for Education and Research in
Information Assurance and Security

PRISM Lab: Production, Robotics, Integration
Software for Manufacturing/Management



ASSURING INFORMATION IN NETWORKED ENTERPRISES THROUGH ACTIVE PROTOCOLS and AUTONOMOUS AGENTS

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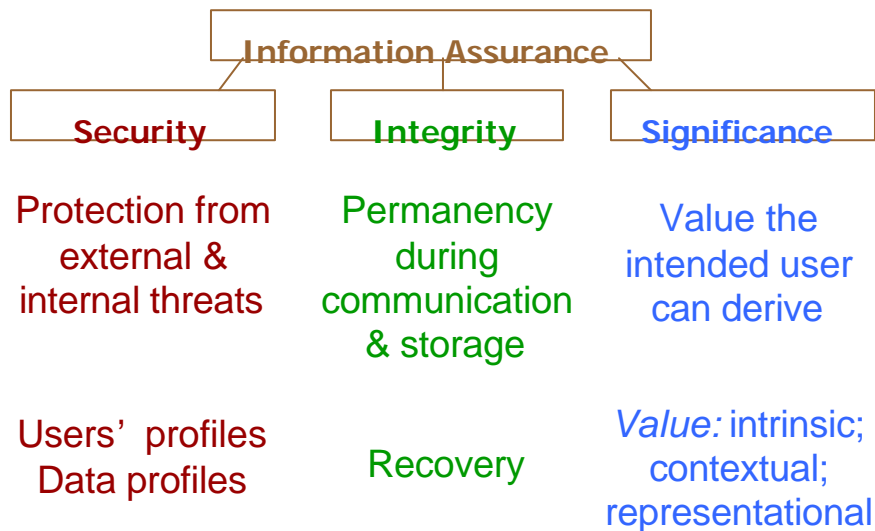
One-Year Project Overview

- 1. Organization's effectiveness** depends on "good" information; workers are overcome by complexity, overload
- 2. Information security** is no longer just a "protection" issue, especially in distributed systems, e.g., ERP, CRM, etc.
- 3. Assurance requirements** include value of decisions, and trustworthiness; TQM context
- 4. Objectives:**
 - a) Understand assurance needs – lit.; industry; lab
 - b) Design/combine protocols, agents to help automate and adjust level of information assurance
 - c) Theory development *and* experiments

Defining Information Assurance

- “Traditional” definition: Measure how security features mediate and enforce the security policy
- Industry concerns:
 - Quality and delivery assurance with cost effectiveness
 - Total information (decisions?) quality management (**TIQM**)

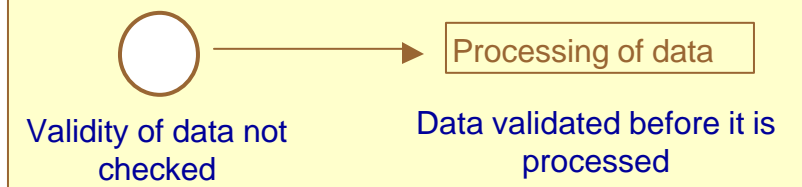
Our Definition...



Models of Active Protocols & Agents

- **Tasks:** Production; Assurance; Coordination
- Whose **role** is it? Needs-based design

Ex. Agents with both production & assurance tasks

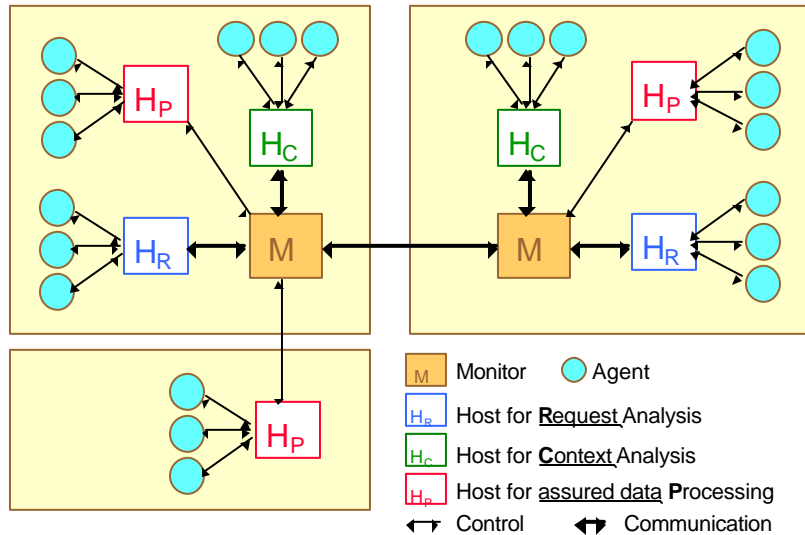


- Models:
 - Separated → $\{P_a + A_a\}; \{P_c + A_c\}$
 - Combined → $\{PA_a\}; \{PA_c\}$
 - Mixed → $\{P_a + PA_a + A_a\}; \{P_c + A_c + PA_c\}$

Models (cont.)

- **Coordination techniques:**
 - Organizational structure
 - Meta-level information exchange
 - Multi-agent planning and decision support
- **Agent design considerations:**
 - Processing time, risk assessment
 - Flexibility/Mobility
 - Robustness against subversion
 - Scalability of the system

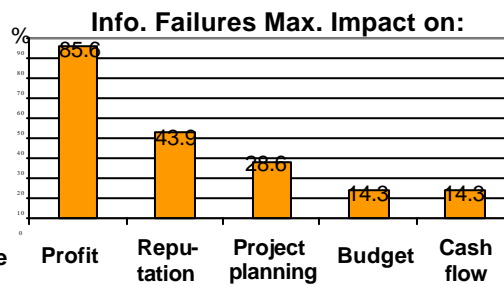
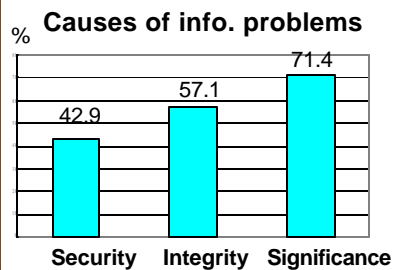
Autonomous agents for assured data processing



Survey of Requirements

- Assess the impact of *wrong* and *delayed* information on the performance of a networked enterprise
 - Relate requirements to design
- 1) **Lab experiments:** ERP simulator (MICSS/MERP)
 - 2) **Industry survey:** 15 US, EU, Asia Co. responses

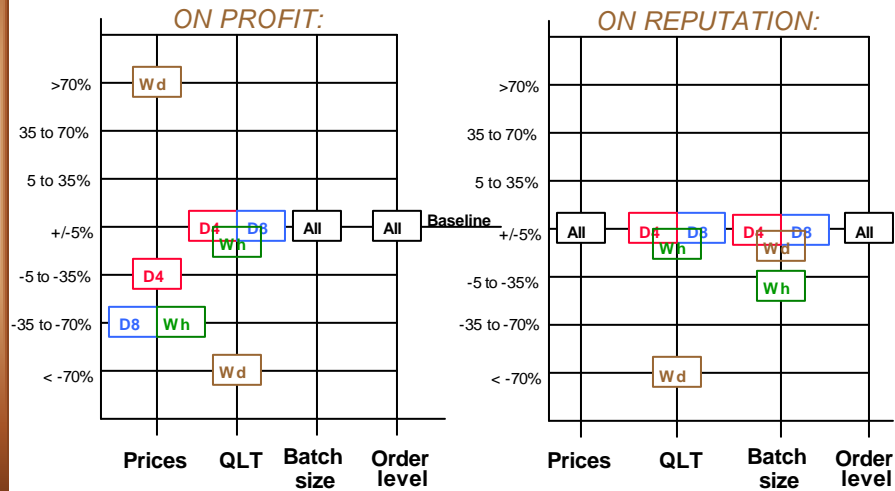
* Responses to our survey [see end of this presentation] are accepted till 12/31/2001 at snof@purdue.edu



Lab experiments

6 periods x 10 years / 16 scenarios

MAXIMUM BI-MONTHLY IMPACT :



Summary and Future Research

- Assurance requirements dictate the design
- Design and evaluate the alternative models
 - by analytic models (TIE simulators)
 - by risk analysis model
- Delivery: Initial design recommendations and survey results
- Future:
 - Focus on industry case studies [needed !!]
 - Dependency analysis; Critical Factor evaluation
 - Task optimization

Research Memos

- Bellocci, T. Ang, C.B. Ray, P. and Nof, S.Y., **Information assurance in networked enterprises: Definition, requirements, and lab experiments**, Research Memo, January 2001
- Ang, C.B. and Nof, S.Y., **Design issues for information assurance with agents: Coordination protocols and role combination in agents**, Research Memo, February 2001
- Ray, P. Bellocci, T. and Nof, S.Y., **MICSS experiments and industry survey of information assurance**, Research Memo, May 2001
- Bellocci, T. and Nof, S.Y., **Models for information assurance: Design and evaluation**, Research Memo, August 2001

* The **Survey-I** for CIO/Info Director, and **Survey-U** for COO/Manager(s) of Depts. using the information are attached next