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Dynamic on-linE intErnet Purchasing System Based on Intelligent Agents

Dealing with Security within DEEPSIA Project

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Outline

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- DEEPSIA's Overview
- Multi-Agents System (MAS) Security Analysis
- MAS Security Models
  - KQML – ACL Security
  - Split and Merge
- MAS Security Analysis Conclusions
- Future works

DEEPSIA Consortium

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USP Universidade de São Paulo
BRASIL

ICMC-USP Instituto de Ciências Matemáticas e de Computação

NUMA Núcleo de Manufatura Avançada

COMARCH

UNINOVA Instituto de Desenvolvimento de Novas Tecnologias

ZEUS CONSULTING S.A.

Atlante

ULB

University of Sunderland

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Project Objectives

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DEEPSIA Project

Dynamic on-linE IntErnet Purchasing System based on Intelligent Agents

Assist **Small and Medium Enterprises** in the e-**commerce process** of **finding** the **most suitable offer** for their needs.

SME will find a user-friendly process for overcoming:

- **Individual purchases of items at "best" costs**
- **Finding new suppliers**

Business to Business (B2B) e-commerce models usually **focus** on **SMEs** as **suppliers** (virtual shops or marketplaces).
DEEPSIA's aim is the opposite.

Generic characteristics

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Purchaser-centred solution

- Tailored to individual requirements
- User-friendly web interface based on a **purchaser-personalized catalogue**

The catalogue

- **Automatically updated** with information gathered from available e-business portals
- Set of **intelligent agents** which will look for data on the Web and process it

DEEPSIA's Architecture

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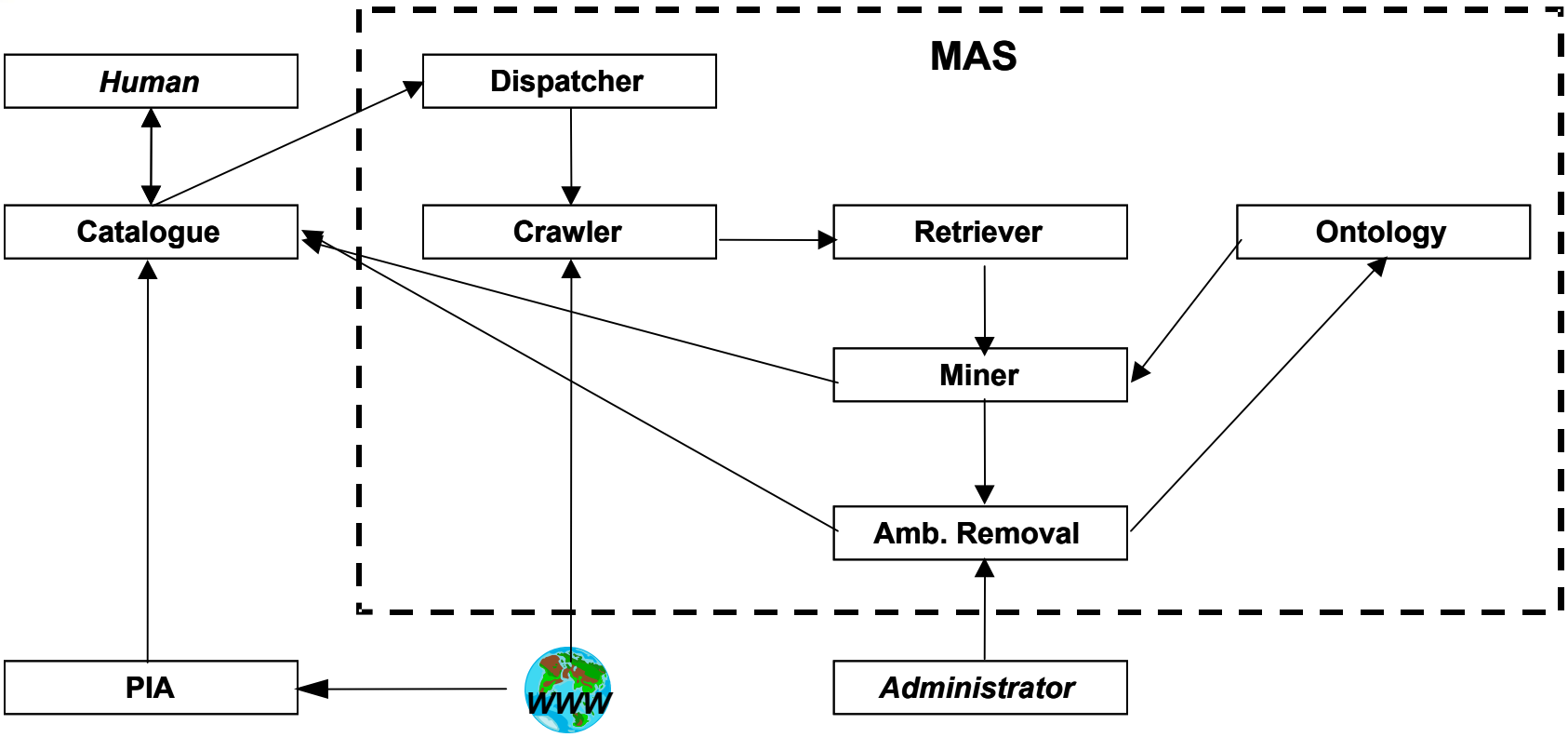

Security needs and approach

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Needs

Anonymity: the capacity to hide the final client from the queries he/she is performing;

Confidentiality: assure that the contents of the messages being exchanged remain hidden;

Reliability/Integrity: assure that the messages arrive intact as they left their origin;

Authentication of the sender: assure that the originator was who it was supposed to be;

Access Control: to the information beign exchanged;

Availability: of the whole system.

Security developments:

- *Agent Communication Lang. Security:* KQML – ACL Security, by USP
- *Message content Security:* "Split and Merge", by UNINOVA

MAS Security Analysis

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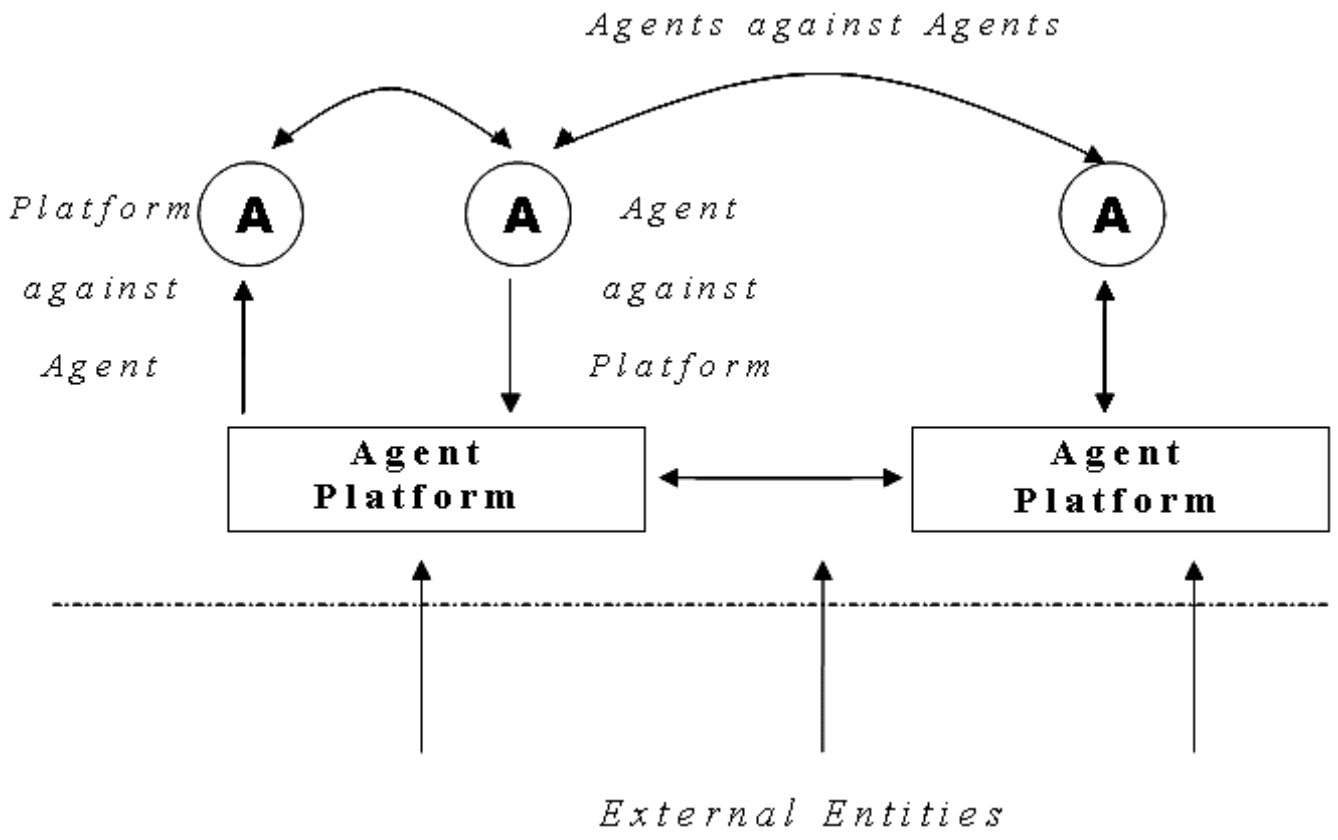
- "*DEEPSIA's MAS Security Analysis*" shown the main **threats** against **agents systems**



ACL Security approach

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- Based on ***Secret Agents*** proposal Finin *et al* (UMBC, 1995)
- Changes to **KQML Agents Communication Language (ACL)** in order to improve its *authentication of message sender*, *message integrity* and *privacy of data* capabilities
- Security functions implemented on **JATLite**, the KQML speaking agents platform

JATLite Layers focused

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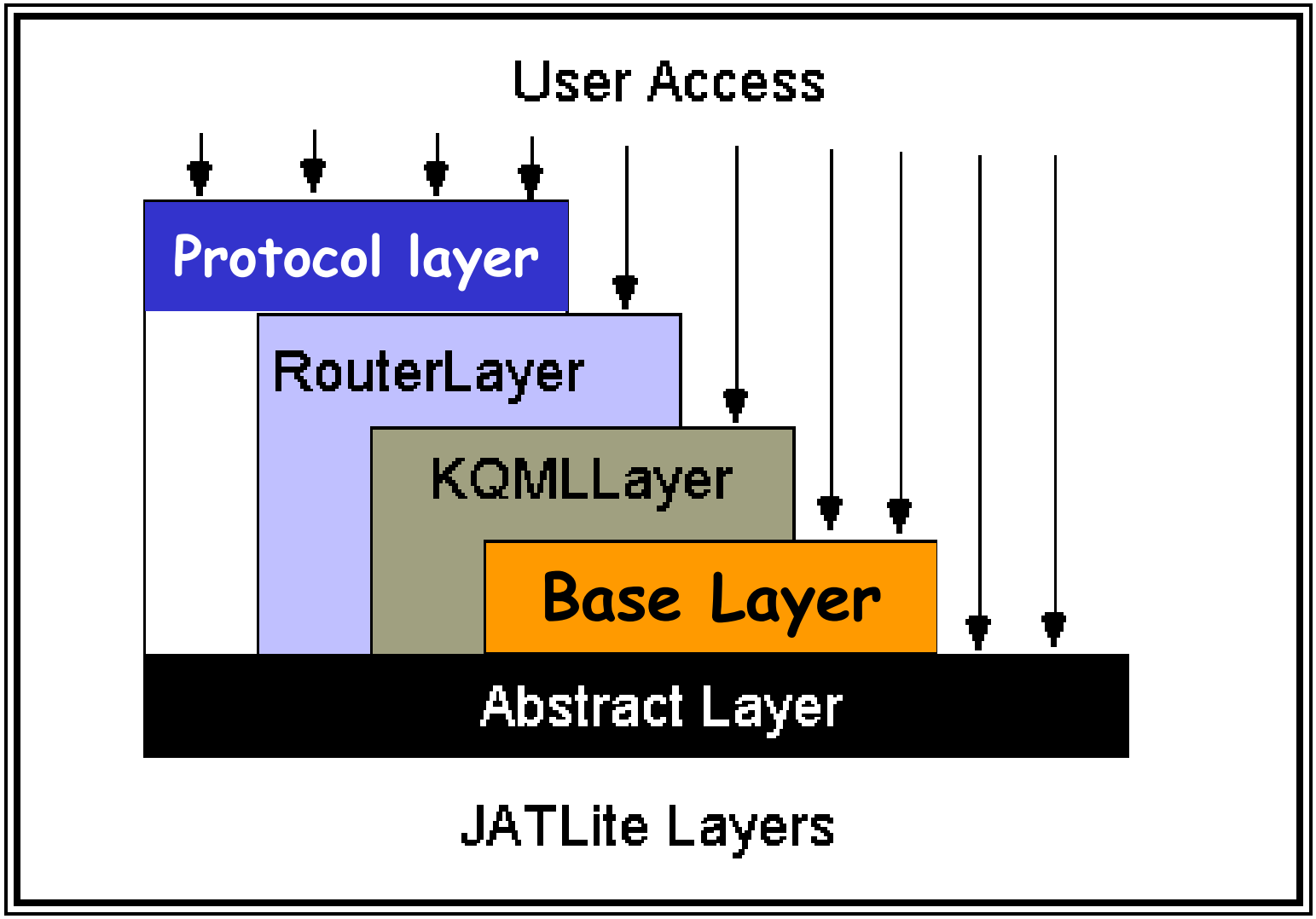

The Split and Merge approach

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In short:

- Split the message into fragments
- Send them through different paths
- Repeat the splitting at each node
- Reassemble the message at the destination

Split and Merge

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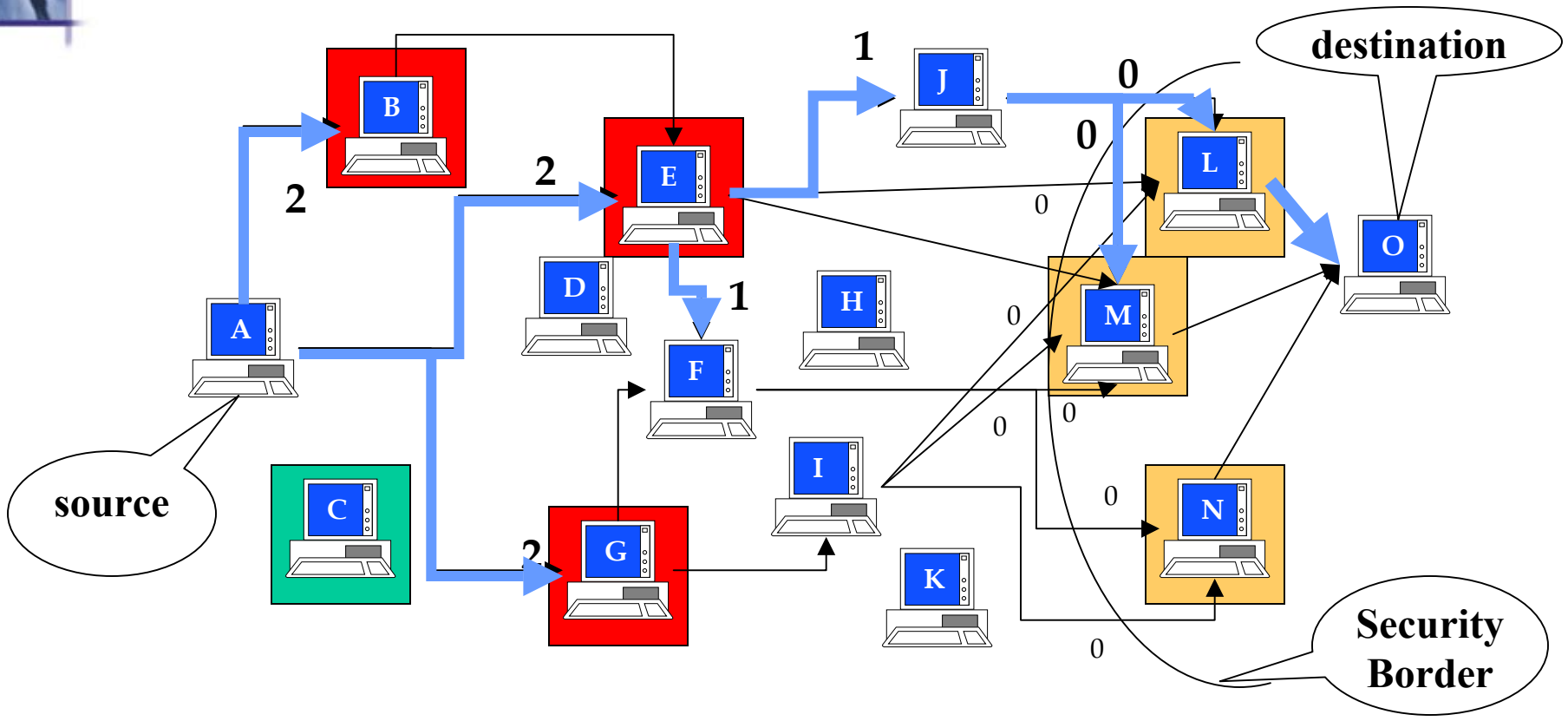

Faced problems

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- KQML Agents Communication Language is **outdated** and was supplanted by a new standard (**FIPA, *Foundation for Intelligent Physical Agents***)
- **JATLite** project at Stanford University and its researches were **stopped** and there is no new information about improvements on it **since 2000**
- Specific security requirements **were not defined** on original DEEPSIA Project

MAS Security Analysis

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- Conclusions of this analysis:
  - There are **security issues** on agents communication language that must be **reviewed**
  - The **KQML agents communication language** and its **messages router (JATLite)** are *outdated*
  - The **proposed model** for **KQML Security** is valid but not applicable if considered that **KQML+JATLite are not supported**

Security - future work (1/2)

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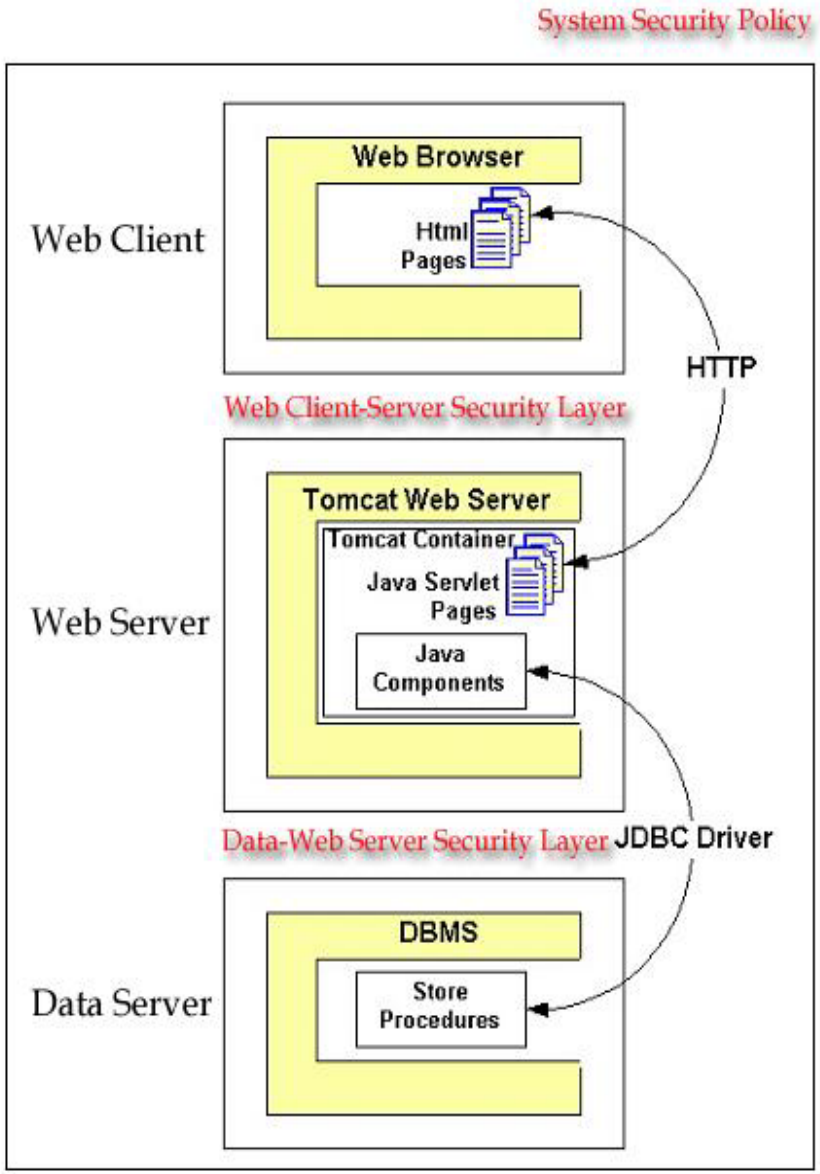
- Definition of **specific security requirements** regarding the full DEEPSIA System security and its interfaces within users and agents, using an International Security Standard (**ISO 17799**)



Security - future work (2/2)

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- **Agents Communication Language** (ACL) ***substitution*** for a better security management (**FIPA** instead of **KQML**)
- Implementation of a **hybrid security model** with a default and secure ACL in partnership with other Research Groups (e.g. **AgentCities.NET** — IST-2000-28384)

Further information

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