Hybrid Collaborative Information Environments (CIE) for Enhanced Decision Support

13th International Command and Control Research and Technology Symposium
C2 for Complex Endeavors

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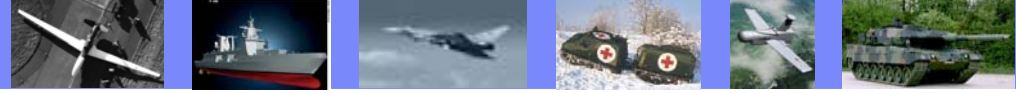
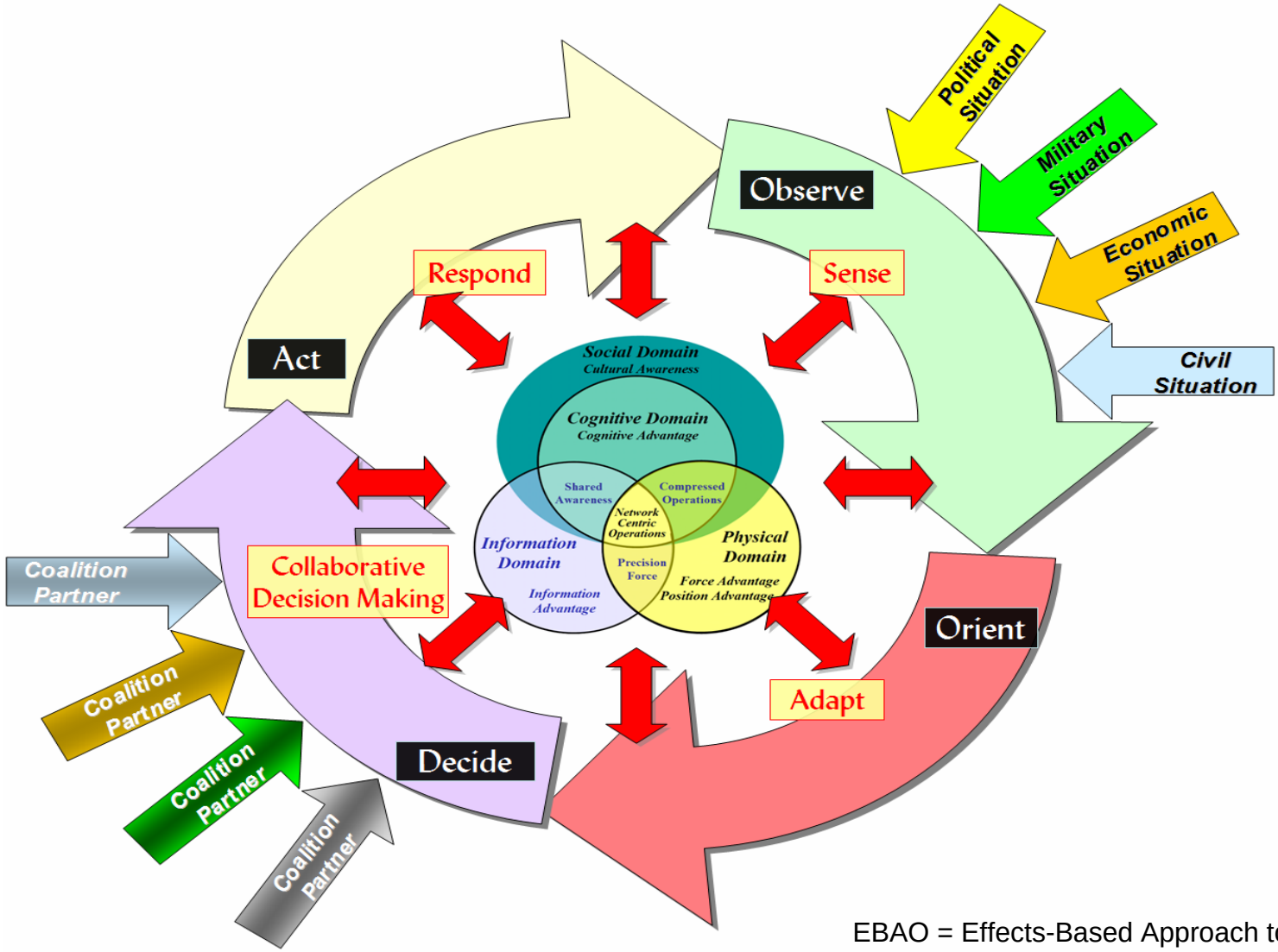


Agenda

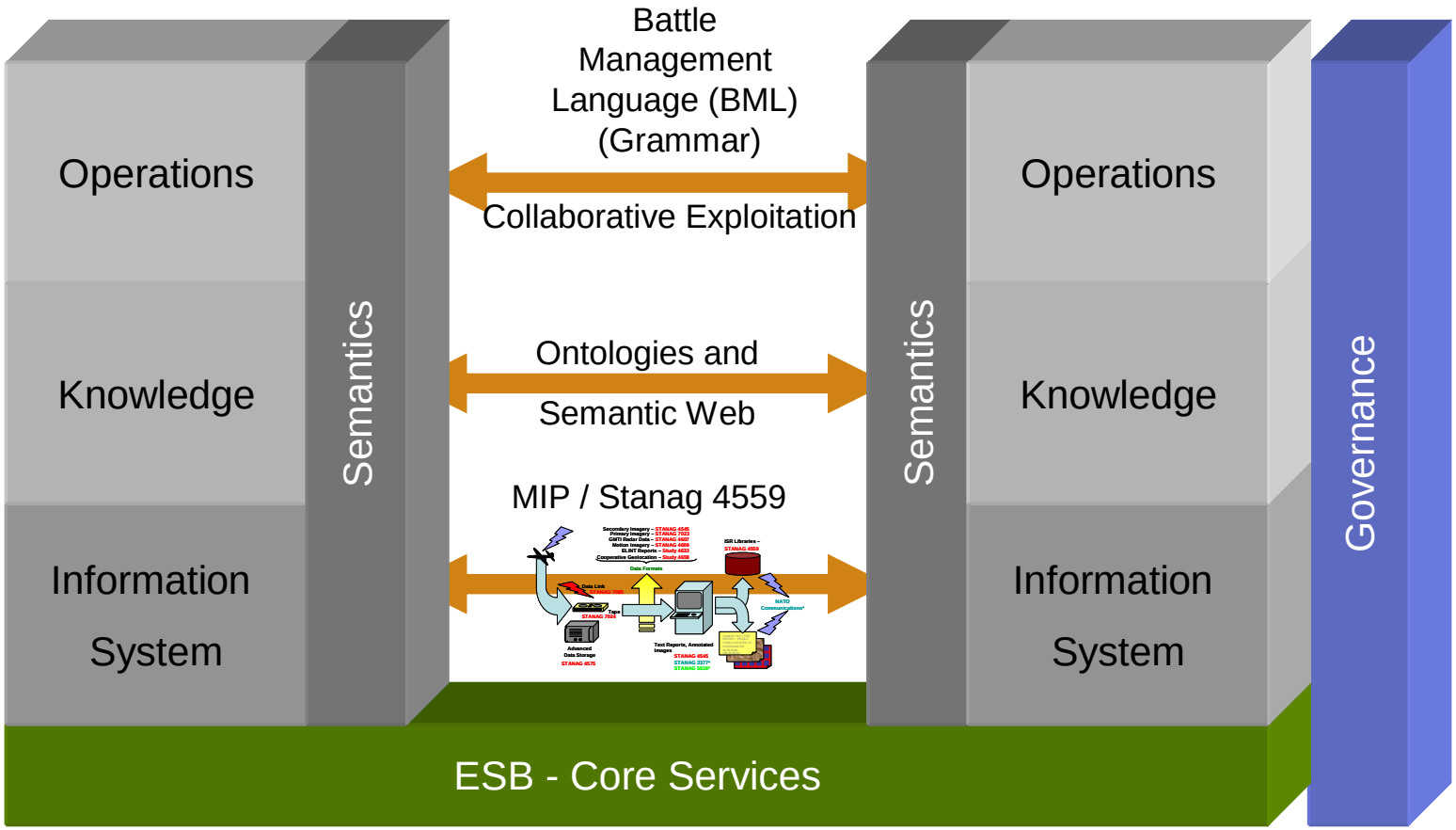
- C2 Process in NCO using the Effects-Based Approach to Operations
- Enabling Semantic Interoperability
- High-Level Enterprise Architecture & Business Model
- Model-Driven Lifecycle Managment & Levels of Business Integrity
- Event-Driven Applications, Complex Event Correlation & Processing
- Configurable Entity Analytics Module
- Web 2.0 and Beyond – some leading Edge Experiences
- Q&A

C2 Process in Network-Centric Coaliton Ops using EBAO



EBAO = Effects-Based Approach to Operations

Layers of Semantic Interoperatiblity



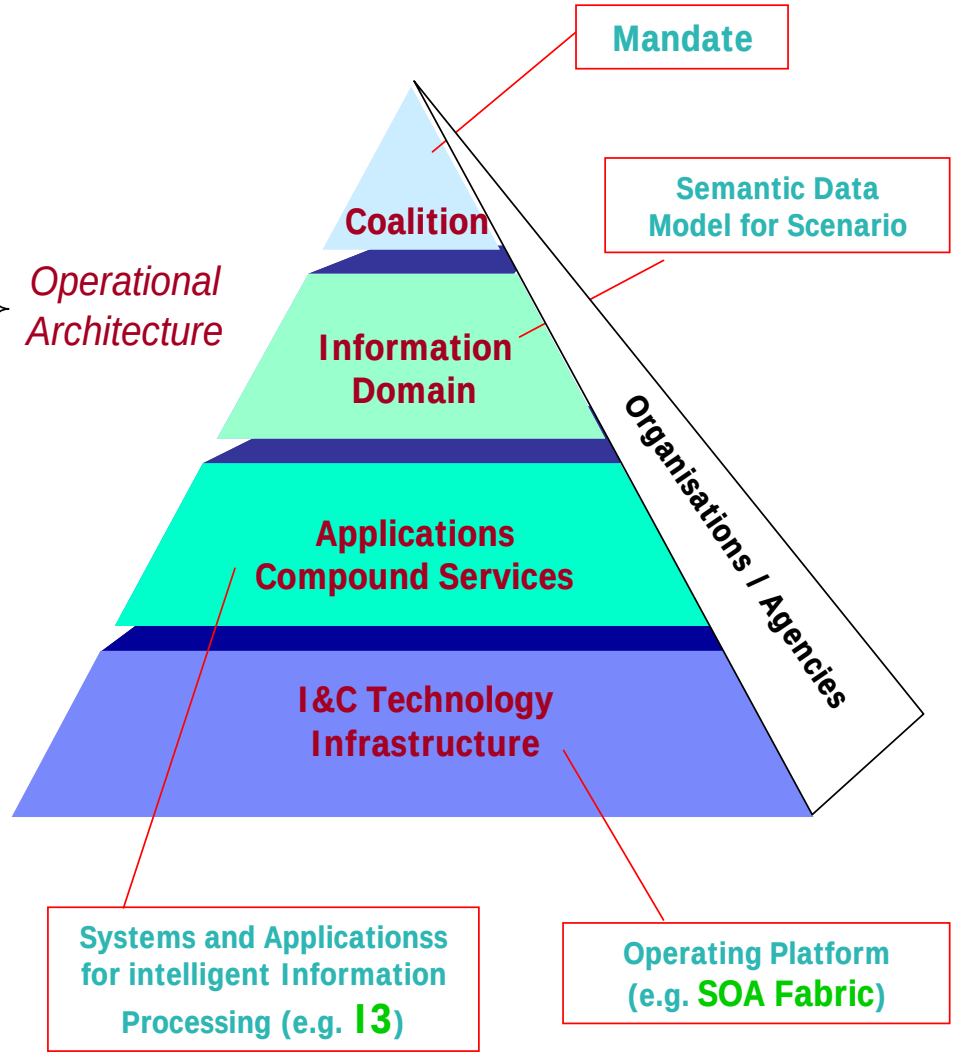
MIP = Multilateral Interoperability Programme
Stanag = Standardization Agreement
ESB = Enterprise Service Bus

Enterprise Architecture Model

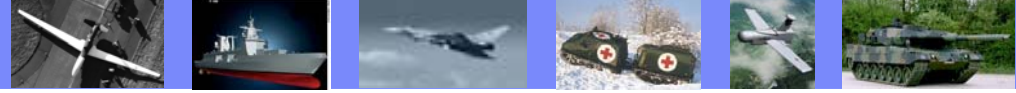
- *Organisational Architecture*: Doctrine, Strategy, Organisation Management and Processes
- *Knowledge Architecture*: semantic Data Model and Relationship Model for the Information and Data Resources

Operational Architecture

- *System Architecture*: individual Application Systems, their Interactions and their Relations to the Processes of the Organisation
- *technical Architecture:* Implementation Platform for the Applications



I3 = Integrated Information and Intelligence
SOA = Service Oriented Architecture

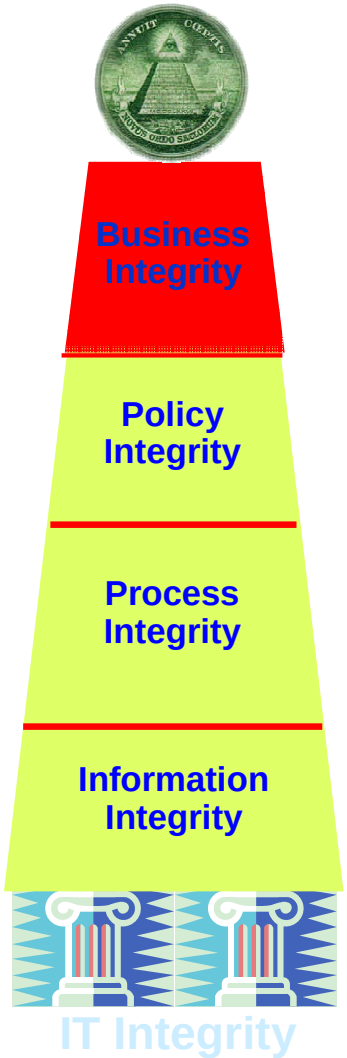


Defense Component Business Model

CBM Defense

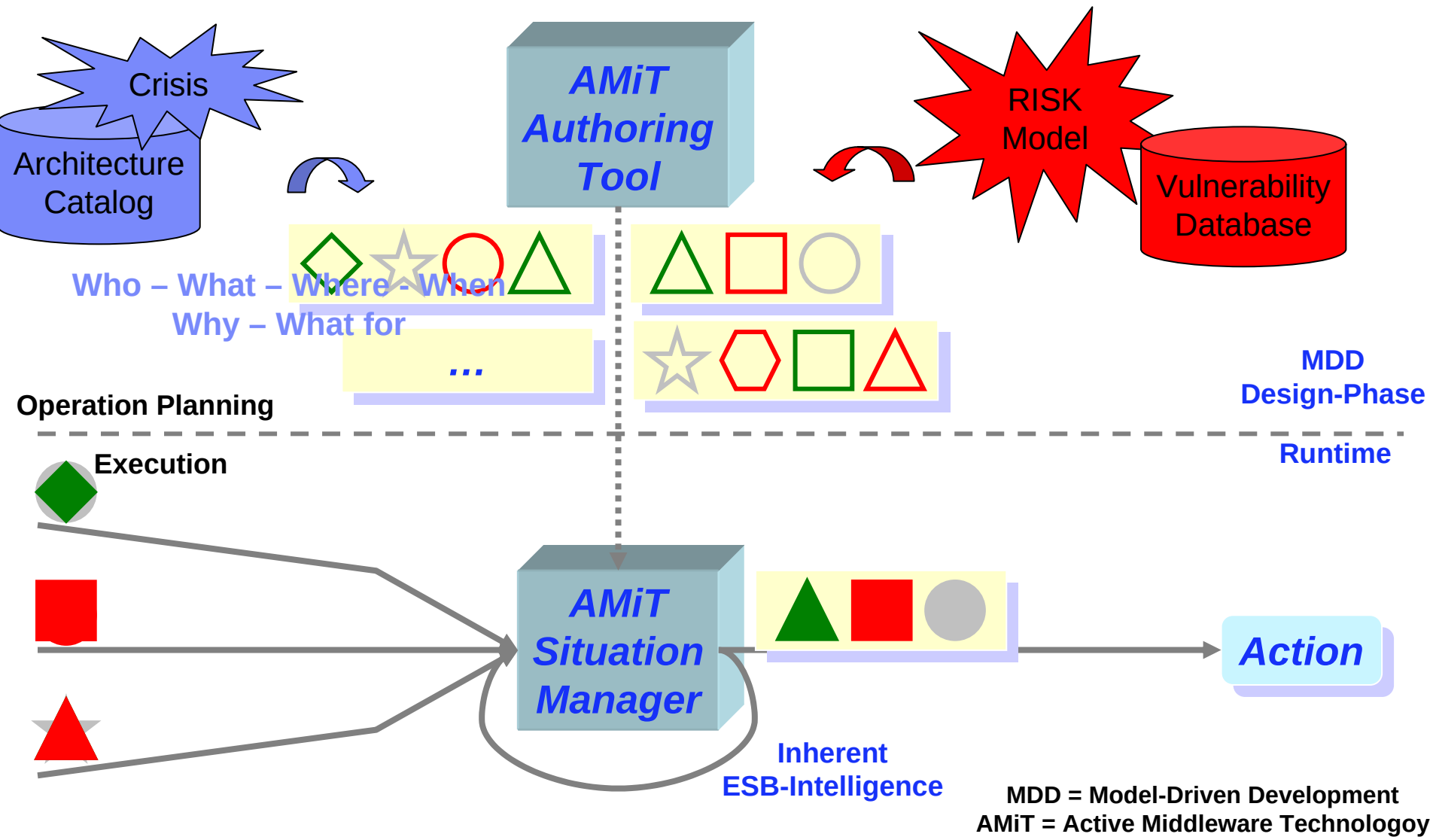
	Command & Control	Intelligence Surveillance Reconnaissance	Mobility	Operations' Effectiveness	Support & Sustainment	Surviveability & Protection
Direct / Planning / Strategy	Acquisition Strategy, Modeling & Simulation, Concept Development & Experimentation, Customer Product Management					
Control / Manage-ment	Governance: Capability / Gap Analysis, Monitoring & Management of Aquisition Performance					
Execute / Operations	Coalition Spectrum C2 Organisation C2 Metho-doligies Information Management + Assurance Communica-tion + Colla-boration Secure, cohe-rent coalition network Decision Sup-port (M&S) Public Rela-tionship Mgmt	Surveillance + Intelligence Collection Reconnaissance: world-wide Area of Interest Area of Operations Integrated Infor-mation + Intelli-gence (I3): Shared Situational Awareness	Strategic Move-ability Operational Deploy-ability Tactical Maneuver-ability	Target Impact: - Ground - Air - Surface - Sub-Surface Information Impact: - Electronic Warfare - CNO: Defense Exploitation Attack	Personal Recruiting, Edu-cation, Training + Development Social Affairs Medical Support Logistics: Demand/Supply Inventory,Asset, Maintenance, Transportation Infrastructure+ Facilities Mgmt Regulatory Compliance: Legal, Coalition Agreements, Executive Power CIMIC Humanitarian Aid	Personal Protection Facilities, Platforms + Infrastructure Protection Identifcation CBRNE Operations Assurance Protection of Eco-logy, Environment, Society, Safety at Work Military Security

Model-Based Operational Integrity



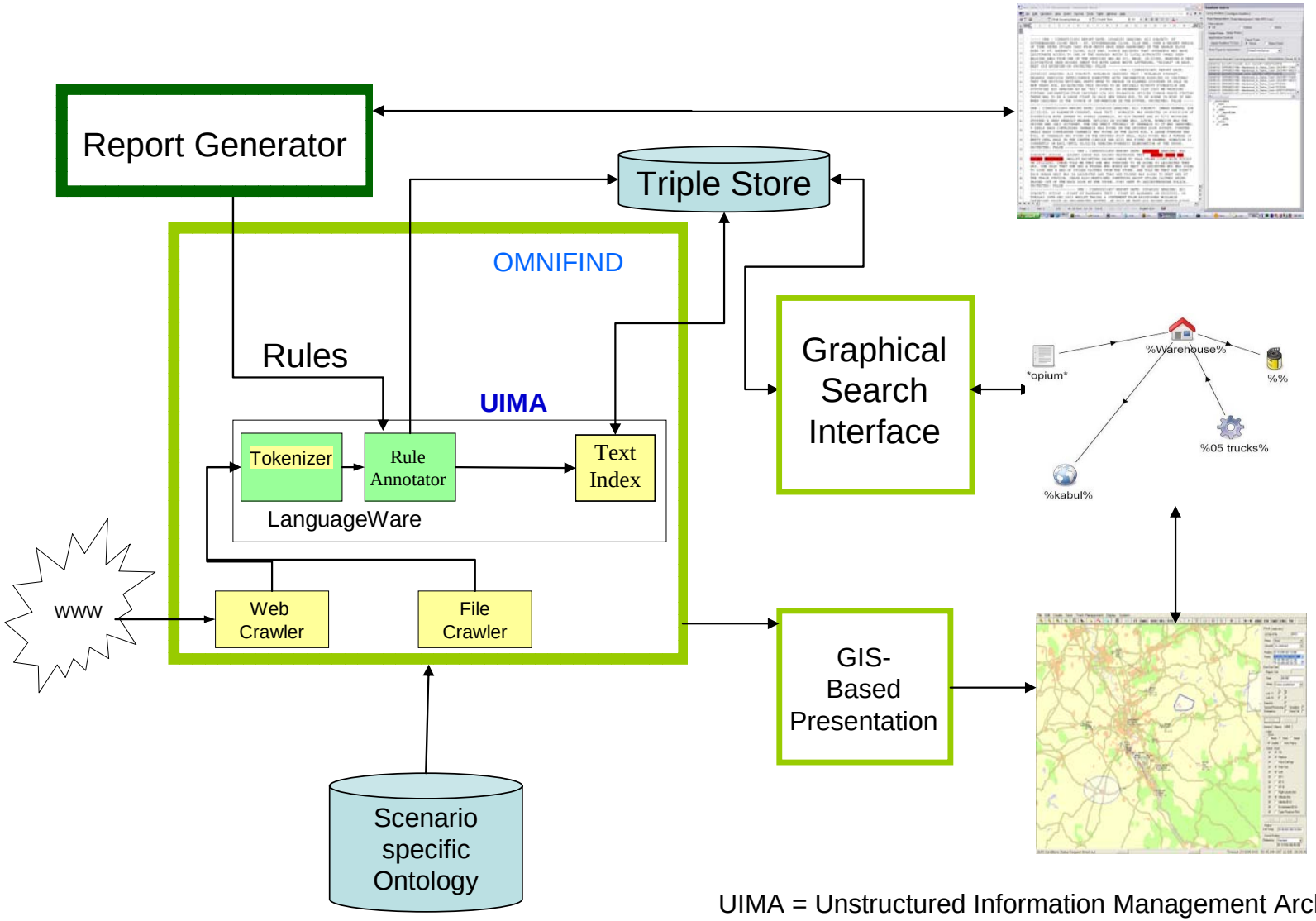
- Business Rules & Process Formalization Standards:
  - Semantics of Business Vocabulary and Business Rules (SBVR)
  - Business Process Modelling Notation (BPMN)
  - Business Process Definition Metamodel (BPDM)
  - Extensible Business Reporting Language (XBRL)
- Rules Automation Tools (e.g., Complex Event Processing)
  - Business Process and Performance Management
- Operational Risk Quantification & Management Framework
  - Master Information Management
  - Information Provenance Management.

Model-Driven Operations Dynamics



MDD = Model-Driven Development
AMiT = Active Middleware Technologoy

UIMA compliant Entity Analytics Module



UIMA = Unstructured Information Management Architecture

Web 2.0 - What is a Mashup?

- A “mashup” is a lightweight web application created by combining information or capabilities from more than one existing source to deliver new functions and insights.

iGoogle

Zillow.com

Competitive Mashup

•What typically characterizes a mashup?

–“Widgets” and feeds that are mashed together often come from independent sources **and** do not change when mashed

- New applications deliver new insights and capabilities (1+1 = 4)

–Built on a web-oriented architecture (REST, HTTP) and leveraging lightweight, simple integration techniques (AJAX, RSS, JSON)

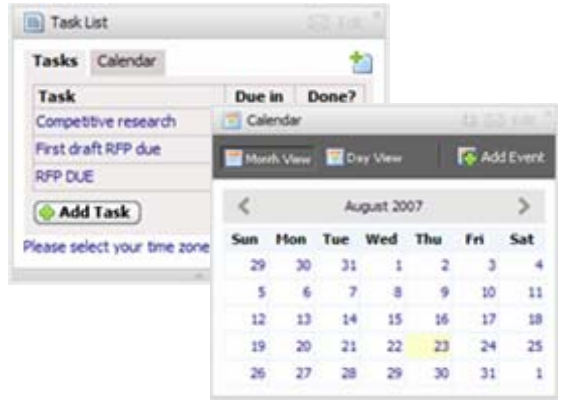
- The result is fast creation of rich, desktop-like web applications

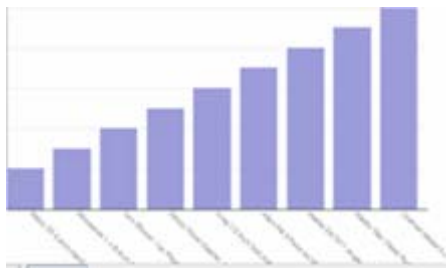
–Simple applications that solve niche problems (i.e. satisfies the long tail)

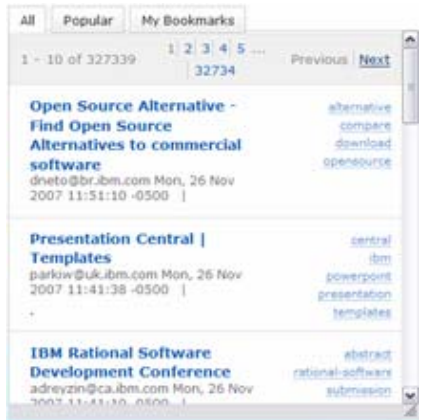
REST = REpresentational State Transfer
HTTP = Hyper Text Transfer Protocol
AJAX = Asynchronuous JavaScript & XML
RSS = Really Simple Syndication
JSON = JavaScript over the Network

Web 2.0 – What are Widgets?

- A **widget** is a small program or piece of dynamic content that can be easily placed into a web site.
- Widgets are called different names by different vendors: gadgets, blocks, flakes.
- Widgets can be written in any language (Java™, .NET, PHP, etc.) and can be as simple as an HTML fragment.
- Widgets can be non-visual.
- Widgets often encapsulate an application programming interface
- "Mashable" widgets pass events, so that they can be wired together to create something new.







PHP = Hypertext PreProcessor
HTML = Hyper Text Markup Language

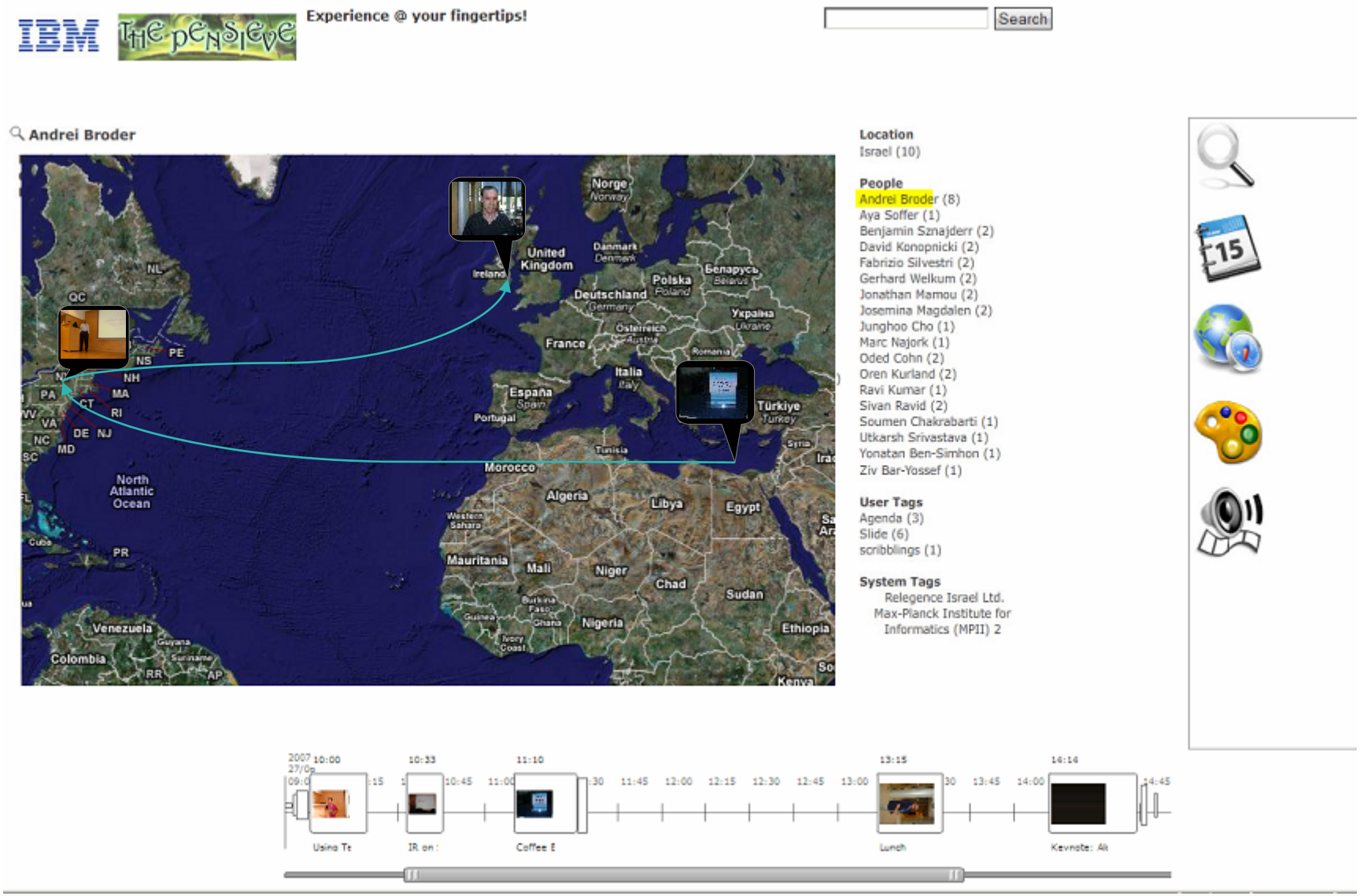
IBM Haifa Research Lab: Augmenting Human Memory

Research question: Can modern technology help capture, process, and retrieve memories when we wish to revive them?

- **Capture** memory cues as they happen via high quality ubiquitous mobile phone cameras, audio recording, Global Positional Sensing (GPS), date and time, Bluetooth, etc.
- **Process** memory cues by extracting meaningful information from captured data via text, audio, and image processing augmented with contextual information (e.g., location, calendar, social networks) and human annotations.
- **Retrieve** memory cues when they are needed via associative search and serendipity (timeline, map, show related items) and by integrating into day to day activities such as Personal Information Management (PIM) tools
- **Share** memory cues across an organization or other social network

- **Interdisciplinary Signal Processing: image, audio, collaboration&social, …**
- **Intentionality: selective Capture**
- **Contextual Information: time, location, calendar, www, …**
- **Automation**
- **Feasible Retrieval: multi-faceted search – partially-erroneous, incomplete text, graphics and image features**

User Experience Vision Look & Feel - Map



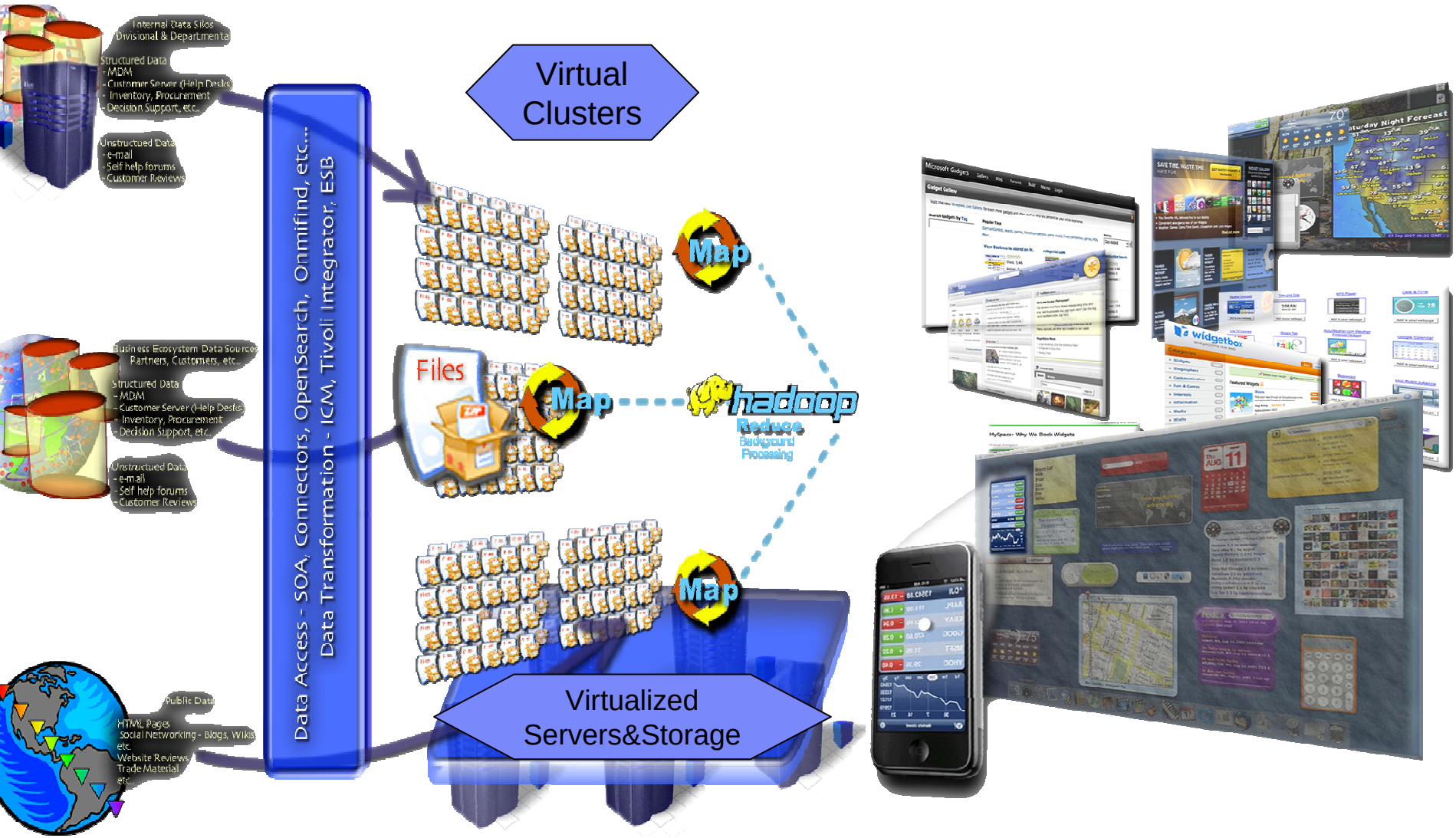
Disruptive Technology Wave – Inside Web 2.0

Emerging Self-Service Business Pattern:
Simplicity, Data-Driven, Combination, Collaboration, Rich Experience, User-Generated Content

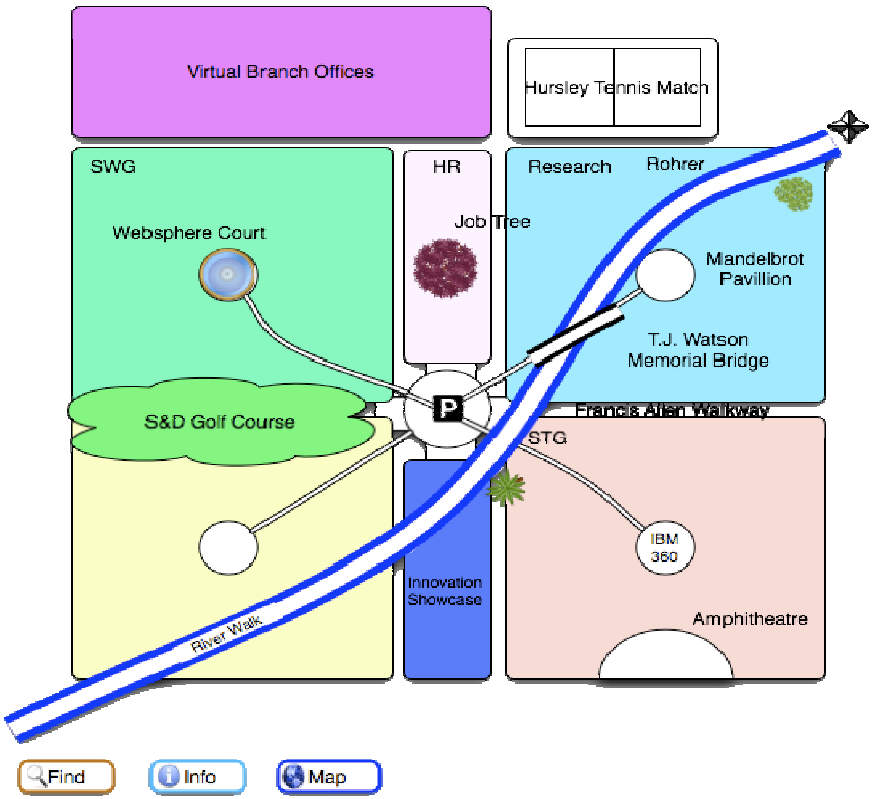
Emerging Mash-up Ecosystem

- ease of access to the data that can be combined in different ways for ad hoc business requirements
- designing for *re-mixability*
  - Combine data for diverse information services
  - Transforming into portable, remixable content
  - Discover-ability of content both internet & intranet
- exploiting *emergent* business opportunities
  - enterprise *web-apps* - enabling "web apps" creation by operational units & subject matter experts

Informational Widgets & mobile Enterprise Mash-Ups

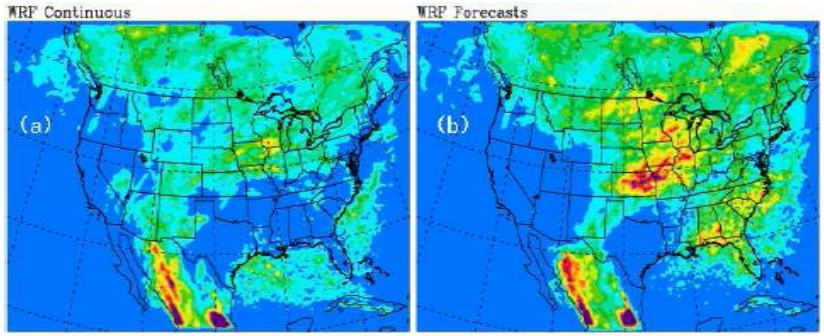


A Virtual IBM City - METAVERSE Initiative



- Can we improve distance collaboration – especially where community is a critical success factor?
- What usability factors allow for efficiency in world, how are they similar/different than real world design architecture?
- Can we simplify (and improve) the experience of getting into and using these worlds for collaboration and work?
- Can we identify the basic compelling reasons for any given business interest to use this medium over 2D and real world alternatives?
- Can we create a learning environment where the environment does not get in the way of the learning process?
- Can we establish an IBM economy?
- What are the implications of a reputation system in IBM? Can we use this paradigm to establish one?
- Can we create a frameworks for modeling, that is compelling and useful?

Q. Can we create a framework for modeling, that is compelling and useful?



- Basic physics modeling is inherent in these environments, can we plug in other advanced modeling features ?
  - Market simulations
  - River basin simulations (The Nature Conservancy)
  - Climate simulations (Latin America Grid)
  - Business process simulation ?
  - and ….
- We have the opportunity to investigate a simple modeling interface and extend it to common research and engineering modeling activities

METAVERSE

Virtual Reality – Second Life – Emerging IBM Offerings

HCM Opportunity

Virtual Recruiting Center, MyPod-Virtual Office, Blue Circle, Virtual Mentor Model, Aging Workforce Mentor Model, Wiki-Tecture Modeling

Mass Collaboration

Open "Event In a Box" (Facilitated or Hosted Service), Modelled Culture and Visual Co-Creation , Massive Collaborative Help or Innovation Jam 3.0

Immersive Simulations

Large scale simulations with dashboards, Mini-Simulations (Avatar Actor Model), Enterprise Second Life (ESL), Learning Pods, Rehearsal Spaces, On-Demand Learning Spaces, Sensory Extension Tools, Virtual TV

Learning Ecosystem

Virtual Learning Object exchange, 3D Internet Learning Affordance Best Practices, Coordinated Research Model, Partner Connection Service, External Learning Community Registry

Cross Industry

Summary

- **Enhanced Decision Support** is about getting to grips with the **Semantics of** the **Information Domain**.
- Insight can be gained through **Collaboration**.
- **Modelling and Simulation** underpin flexible and effective operations.
- **Security and Information Assurance** are gained via a model-driven holistic **Risk Mananagement** approach.
- **Social Computing** is enabled by leading edge internet technologies.
- 3D, Web 2.0 and **Second Life** (SL) arrived the **Enterprise** level.

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