WebGIS Interoperability for Disaster Management

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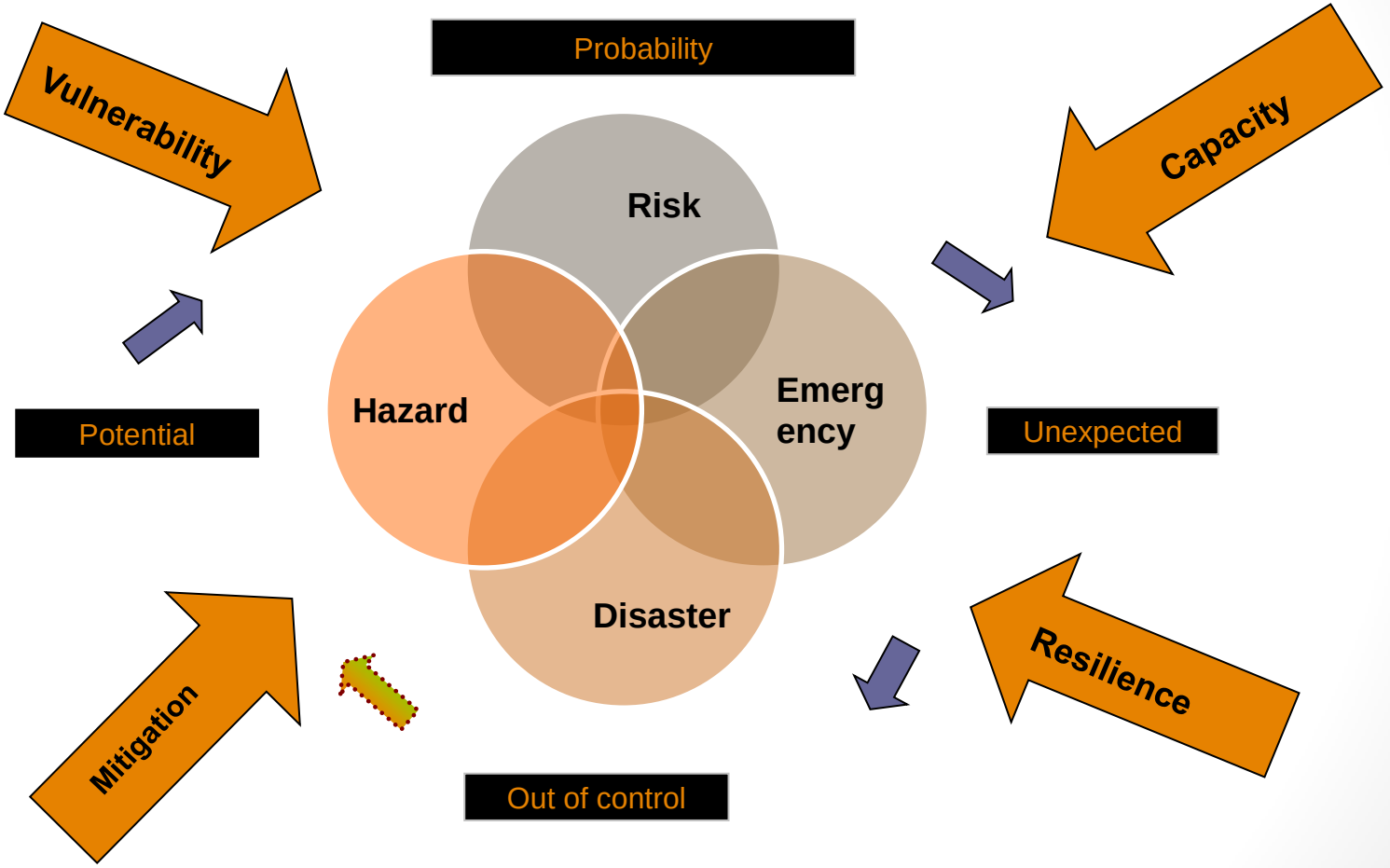
Outline

- **Basics of Disaster Management Science.**
- **The Spatial Factor.**
- **Disaster Management Requirements.**
- **Current Challenges.**
- **What the Web has to offer?**
- **How Interoperability Can be Achieved?**
- **Levels of Interoperability.**
- **Interoperability Standards.**
- **Research Priorities.**
- **Conclusions**

Disaster Management

- **The bottom line in disaster management is that loss of life and property should be eliminated or minimized;**
- **Basic needs should be ensured;**
- **Business continuity should be secured;**
- **Undertaken by interdisciplinary approaches.**
  - **Science**
  - **Anthropology**
  - **Sociology**
  - **Engineering**
  - **Public Administration and Policy**
  - **Medical Sciences**
- **Disaster Management is still not a well organized discipline.**

Evolution of Disasters



The Spatial Factor in DM

How big, fast, powerful

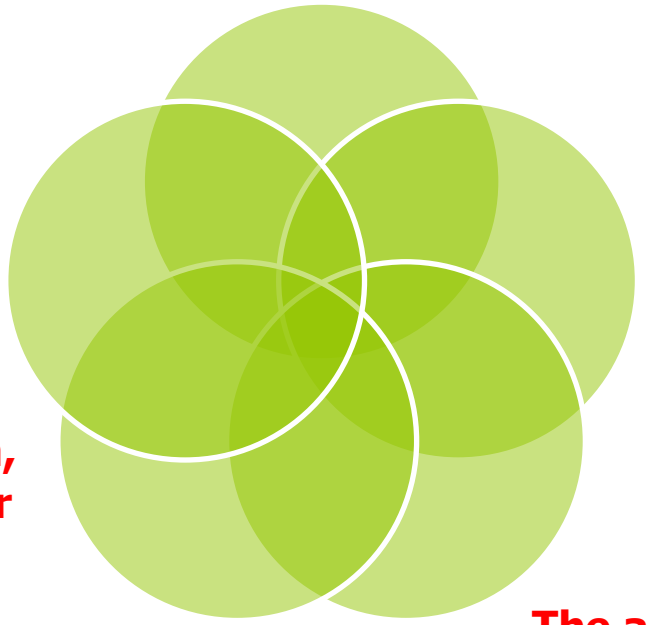
Intensity

Manageability vs. preparedness

What can be done about it

Likelihood vs. Location

The chance of a hazard causing an emergency or disaster



warning time, duration, time of day/week/year

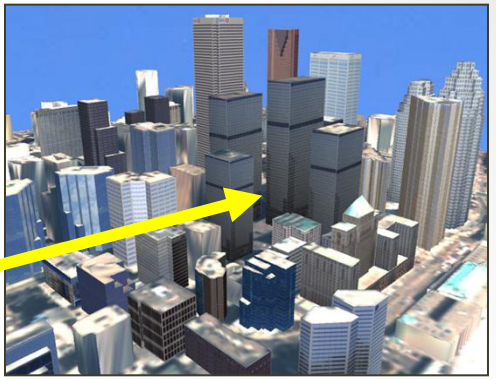
Time-frame

Extent

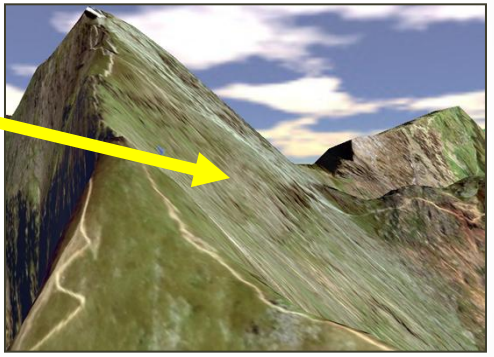
The area that a hazard may affect

Areas of Applications

- **GIS can generally help with:**
  - **Assess risks to community and infrastructure.**
  - **Establish specific mitigation/protection plans.**
  - **Determine the scale of the emergency**
  - **Estimate the direct rescue efforts**
  - **Provide accurate damage assessment**
  - **Prioritize recovery efforts**



Cityscape



Landscape

Traffic sensing

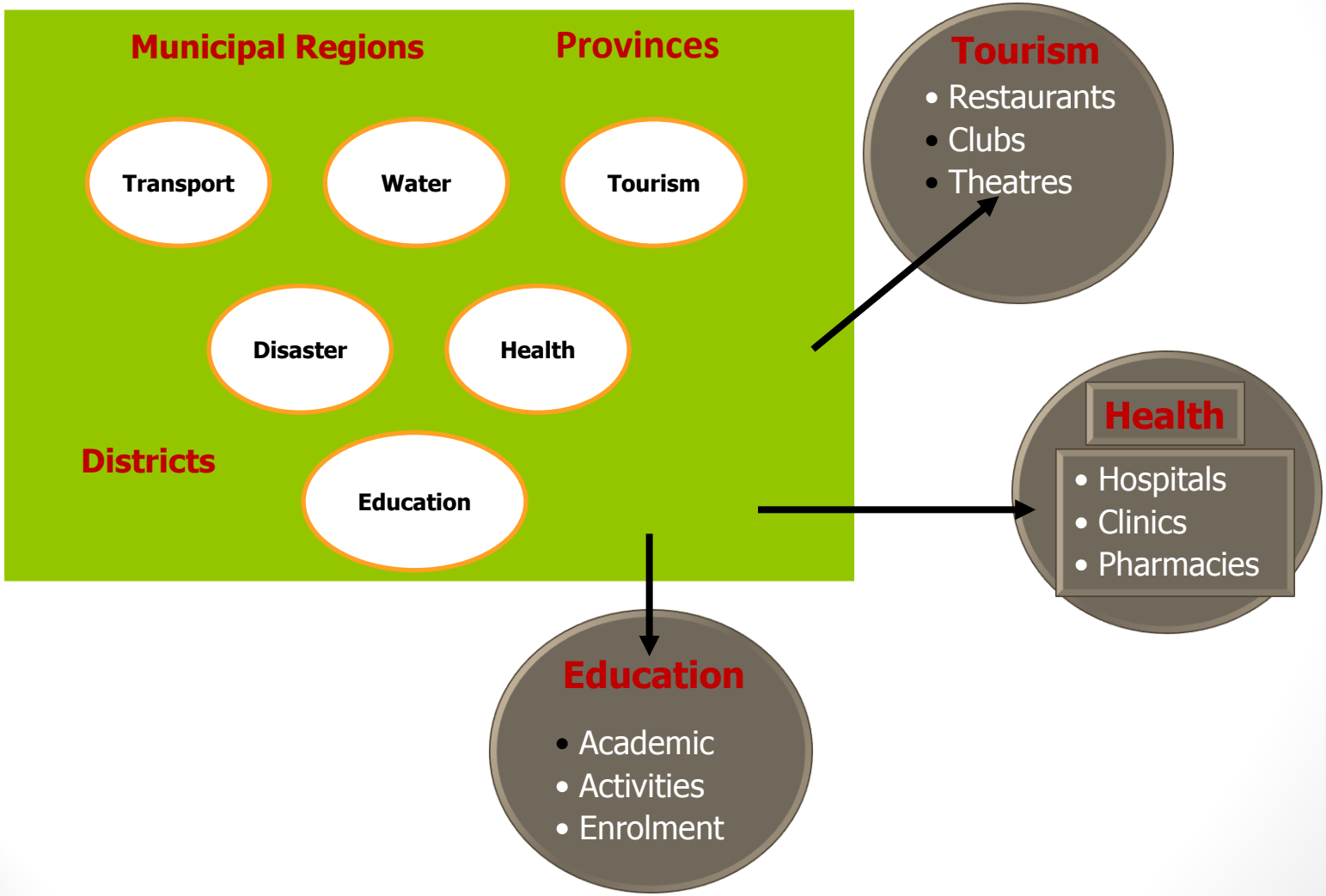
Driving direction

Satellite image

Fundamental Needs for Interoperability

- **Integration and Coordination**
- **Institutional Commitment**
- **Policies to enhance flow and integration of information**
- **Involvement of all stakeholders**

Policy Implementation Tool ?



Types of Requirements -1

- **Data requirements**
- **Technology requirements**
- **Communication infrastructure requirements**
- **Information sharing and services among communities and sectors (e.g. public, private, NGOs, etc.)**

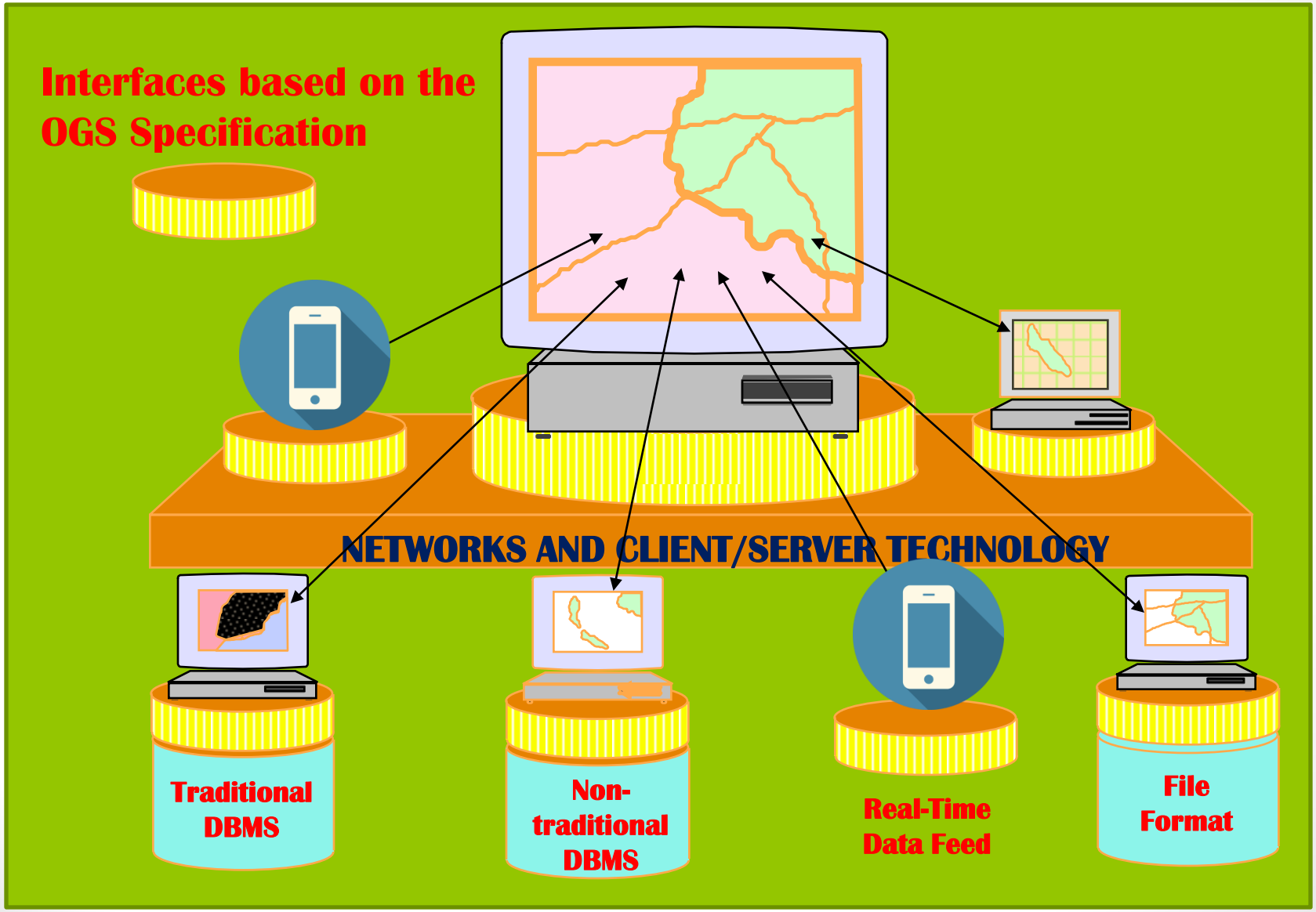
Types of Requirements -2

- **Functional requirements of the DM community articulated as components in the abstract specification of the OGC.**
- **Interface requirements to support both the architecture and the assumptions made in regard to the functional capabilities of that architecture, are also addressed.**

Functional Requirements

- **Ability to see spatial data.**
- **Ability to search for features based on the attribute database and locate them.**
- **Ability to navigate through attribute data items and view them spatially.**
- **Ability to identify features.**
- **Ability to add data.**
- **Ability to interchange maps with commonly used programs.**
- **Ability to customize the way a layer is rendered.**

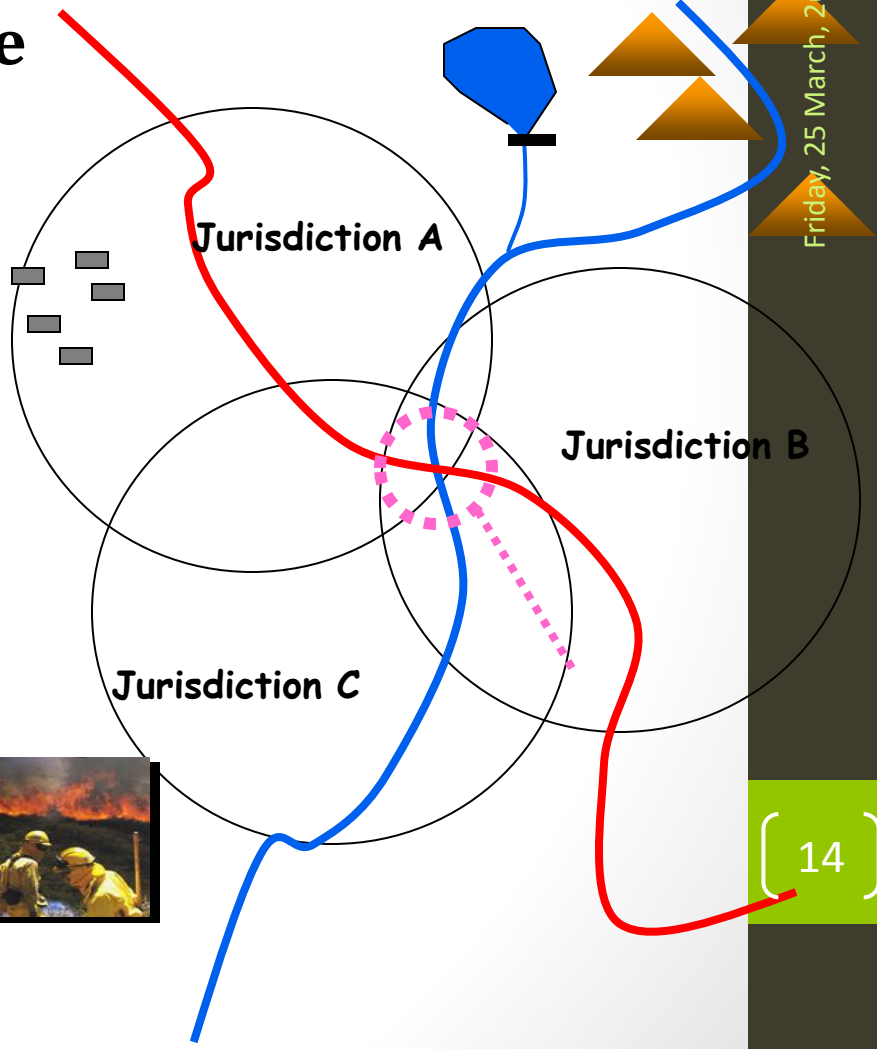
Functional Requirements



Challenges – Tech. Integration

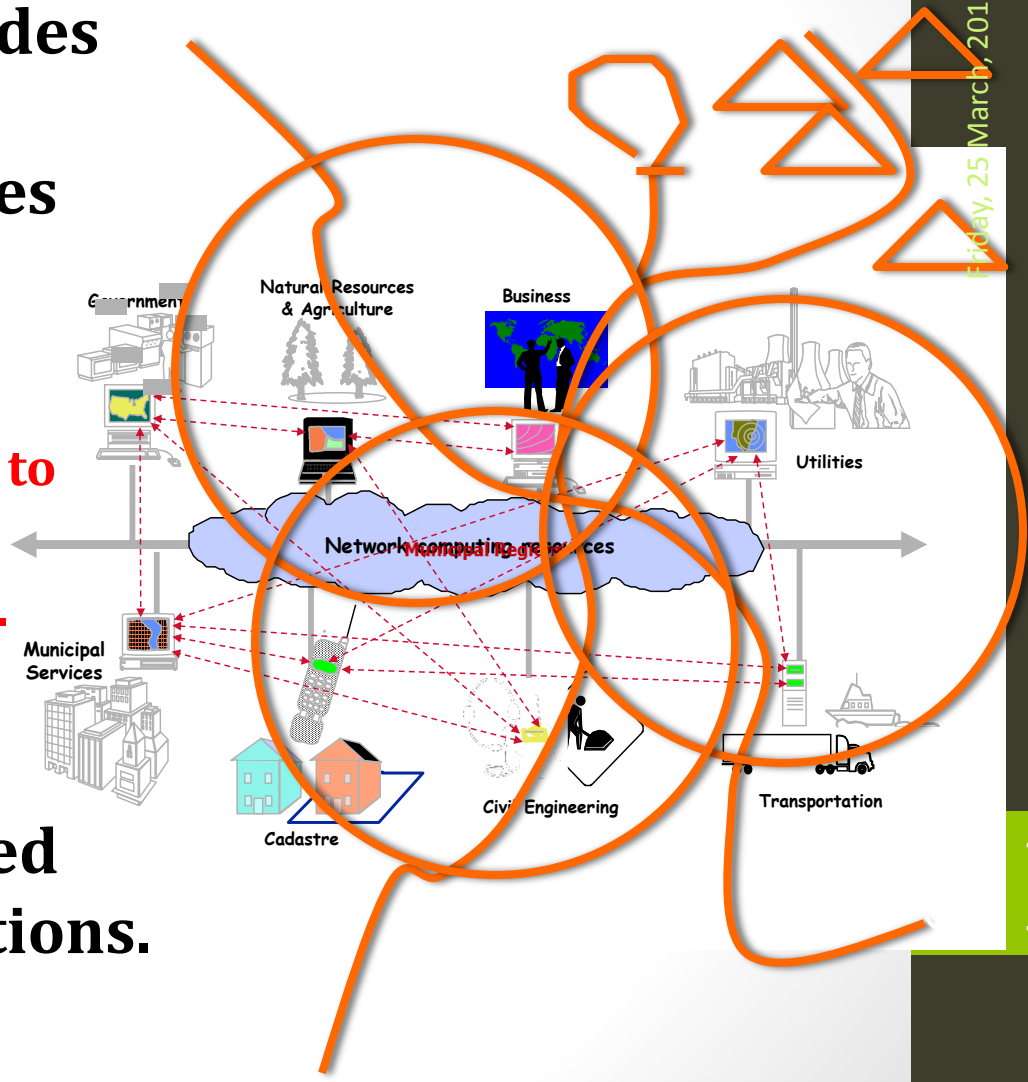
- **Emergency managers must be able to not only integrate information from multiple sources and sensors, but also information from multiple jurisdictions and agencies.**

- **Investigation of the level of heterogeneity systems and procedures might have?**



Challenges – *Ontologies*

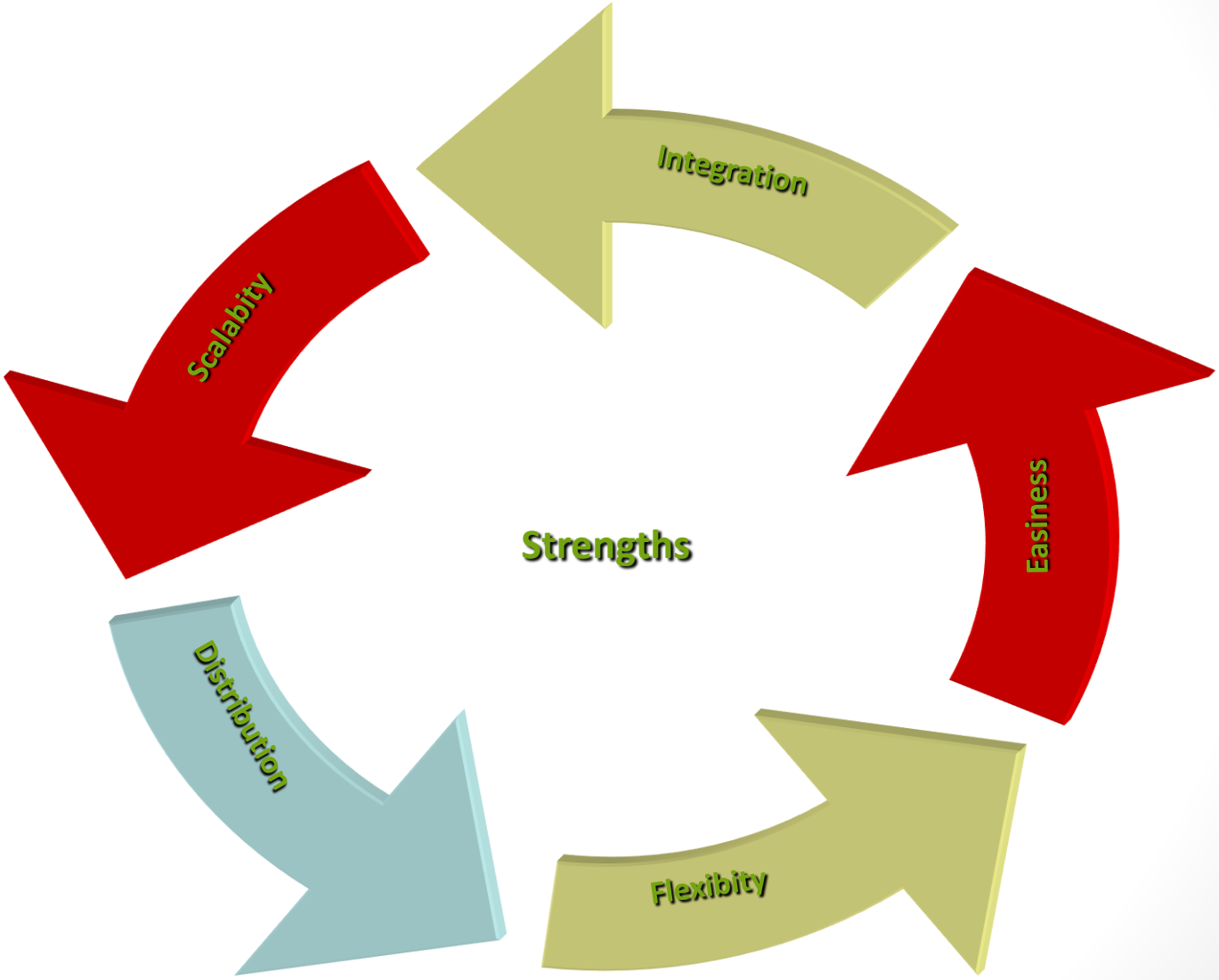
- **There are semantic divides between multiple information communities**
  - **Need translatable methods to express symbology.**
  - **Need Semantic Translation.**
- **Common Networks-based procedural communications.**



So, what is it anyway?

- **Multiple systems exchange of information for common purpose.**
- **Allow end-user applications work with different types of computer systems, operating systems, and application software, interconnected by different protocols and networks.**
- **It is the openness in the software industry, to allow GIS users to build applications that integrate software components from different developers.**
- **It is the market share among vendors of competing products that are interchangeable with existing components.**
- **It is the semantics that allow efficient data sharing.**

What the web has to offer ?



How Interoperability Can be Achieved

- The bottom line is that basic requirement that wildly diverse, often divergent data are integrated, consumed and moved seamlessly, in near real-time across a vast audience with differing hardware, software, expertise, expectations and needs.

OGC 2002

Levels of Interoperability from DM Perspective

- Technical
- Operational
- Management and Decision-making

Interoperability Standards

- OGC Initiative
- The ISO Standardization Efforts for Big Data
- The IHO Standardization Efforts for Hydrographic Data
- The IEEE Standardization Efforts for Networks and Hardware Technology
- W2 and W3 Standardization Efforts on Web Services
- Web 3D Standardization Efforts

Research Priorities

- Crowdsourcing Data Integration and Interoperability.
- Public Participation in Disaster Management.
- SDI Initiatives, Policies and Requirements.

The important legacies of WebGIS Interoperability in DM effort can be in the ability for allowing more:

- ***Resilient communities;***
- ***Safer places to live;***
- ***Effective, efficient delivery of tailor-made disaster information to the right people at the right time;***
- ***Well protected properties and resources.***

Thank you!