ONTOLOGY DRIVEN ARCHITECTURE FOR WEB GIS: *STUDY OF SEMANTIC GEOSPATIAL INFORMATION RETRIEVAL SYSTEM*

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AIM: ONTOLOGY DRIVEN ARCHITECTURE FOR WEB GIS

✓ **Aim of this paper is to introduces Semantic Web as an extension of the current web technology, which extends the capability of Web GIS system to incorporate geospatial information as per the well-defined meaning of their feature sets, better enabling computers and people to work in integration.**

"Lead the Web to its full potential".

---- Tim Berners-Lee, 2004

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- ✓ GIS
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Geographic Information System (GIS)

✓ **A unified visual representation that combine spatial, temporal and attribute information for each and every object of interest and lets us question, analyze, interpret, understand, and simulate data in many ways that reveal relationships, patterns, and trends in the form of maps, reports, and charts is known as GIS.**

✓ **A Geographic Information System (GIS) is a computer-based system including software, hardware, people, and geographic information.**

WWW: information highway

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GLOBAL DATA SNAPSHOT

7,095,476,818
TOTAL WORLD POPULATION

52% URBAN   48% RURAL

2,484,915,152
INTERNET USERS

35%
INTERNET PENETRATION

1,856,680,860
ACTIVE SOCIAL NETWORK USERS

26%
SOCIAL NETWORKING PENETRATION

6,572,950,124
MOBILE SUBSCRIBERS

93%
MOBILE PENETRATION

We Are Social · Sources: US Census Bureau, InternetWorldStats, CNNIC, Tencent, Facebook, ITU, CIA   wearesocial.sg · @wearesocialsg · 5

Rather than moving through geographical space, it moves your ideas and information through cyberspace – space of electronic movement of ideas and information.

Web - GIS

World Wide Web has revealed the immense value and unique ability of GIS to analyze large integrated spatial and non-spatial data with its sophisticated analysis functions and introduced flexible architectures to make distributed geographic information (DGI) available to a very large worldwide audience with modern IT infrastructure.

WEB GIS

GIS   The Web

Harnessing the Web and the power of GIS
Going Far Beyond Mapping and Visualization

Client – Server Architecture
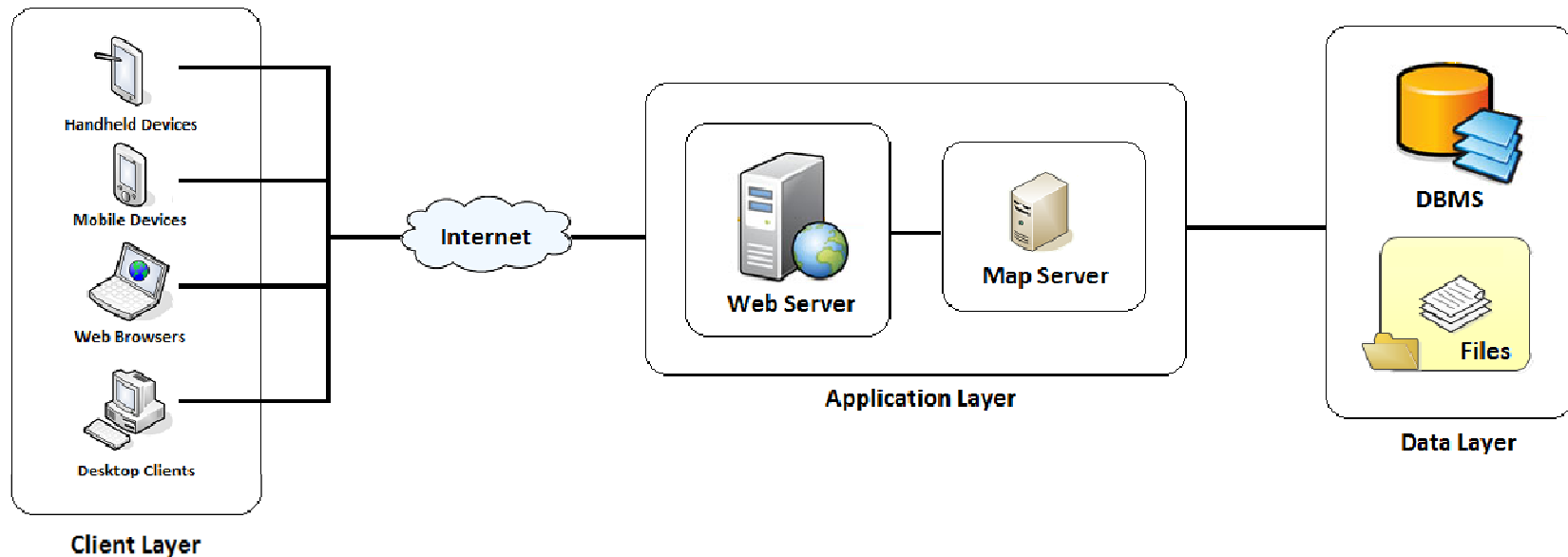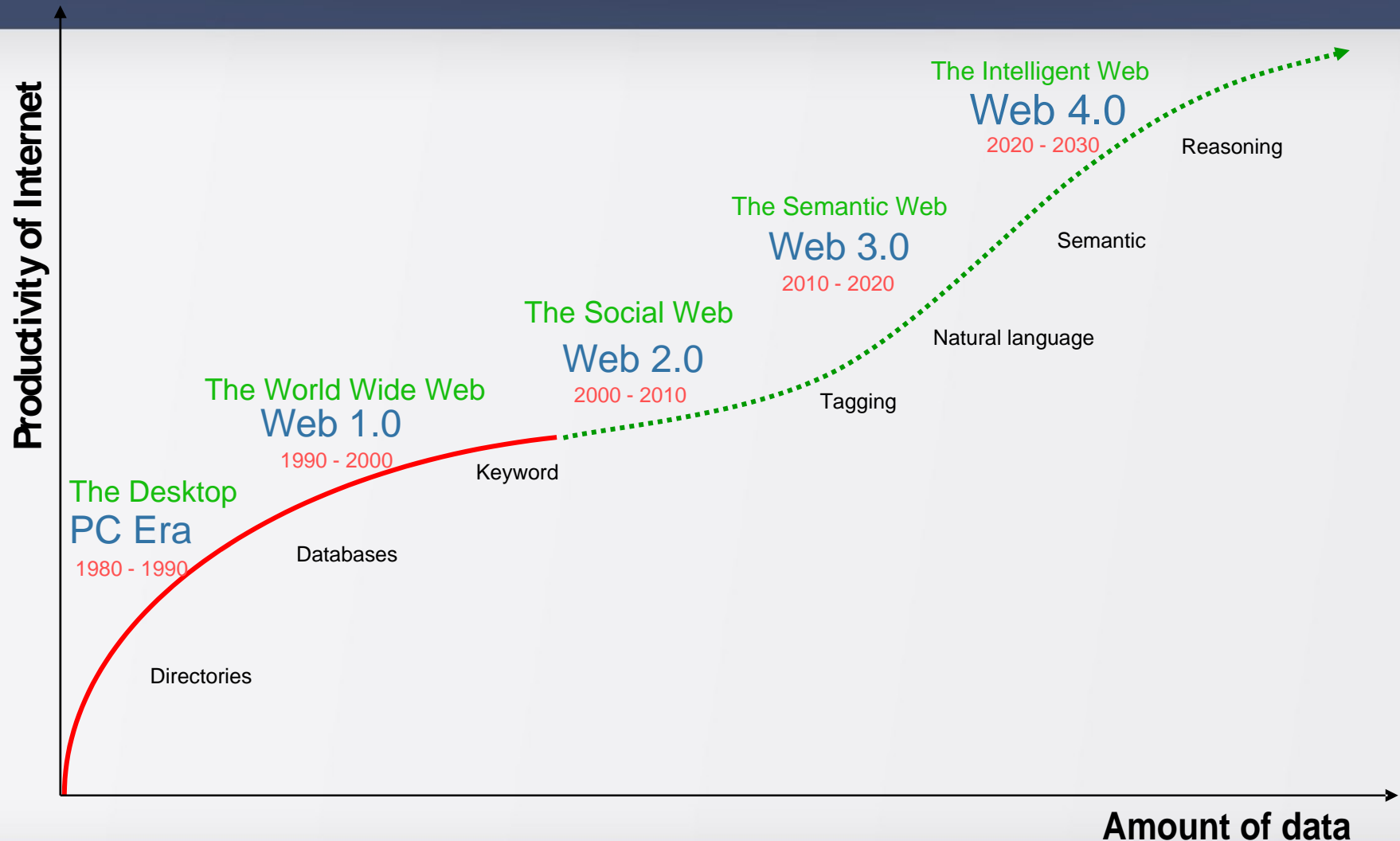

Figure. 3-tier Web GIS Architecture.

Semantic Web

Syntax: How you say something.
Semantics: Meaning behind the **Syntax**.

"I love GIS". or "I ♥ GIS".

Syntax Different or **Semantic Same**

Syntax + Semantics = "Communication"

Semantic Web….

✓ Internet gave **Voice** to computers.

✓ Internet created standards way for computers to communicate with each other and with its users.
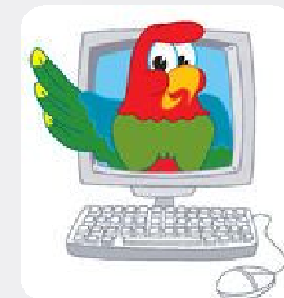

Internet   Web   Search Engine

Talk, Store & Retrieve and Search what we want.

✓ Much like Parrot that mimic human sound with understanding it..

Computers mimic human information without knowing its meaning.

Web 3.0 : Semantic Web

"The Semantic Web is an extension of the current web in which information is given well-defined meaning, better enabling computers and people to work in cooperation."

Viewpoint: the Web = a web of Knowledge (**Data + Relationship**)

Goal: to provide a common framework to share data on the Web across application boundaries.

How to teach relations-ships to computers ?????

Main Ideas: Ontology + Standards + "Layers"

Ontology

- The primary goal of ontology is to develop a shareable representation of knowledge.

- The ability to access, analyze and merge data from many diverse sources across the web because they use the same ontology or specify a mapping between their ontology and other more broadly used ontologies.

- Another key advantage of this approach is that the knowledge of public services becomes available in a machine process able form which allows for much more automation.
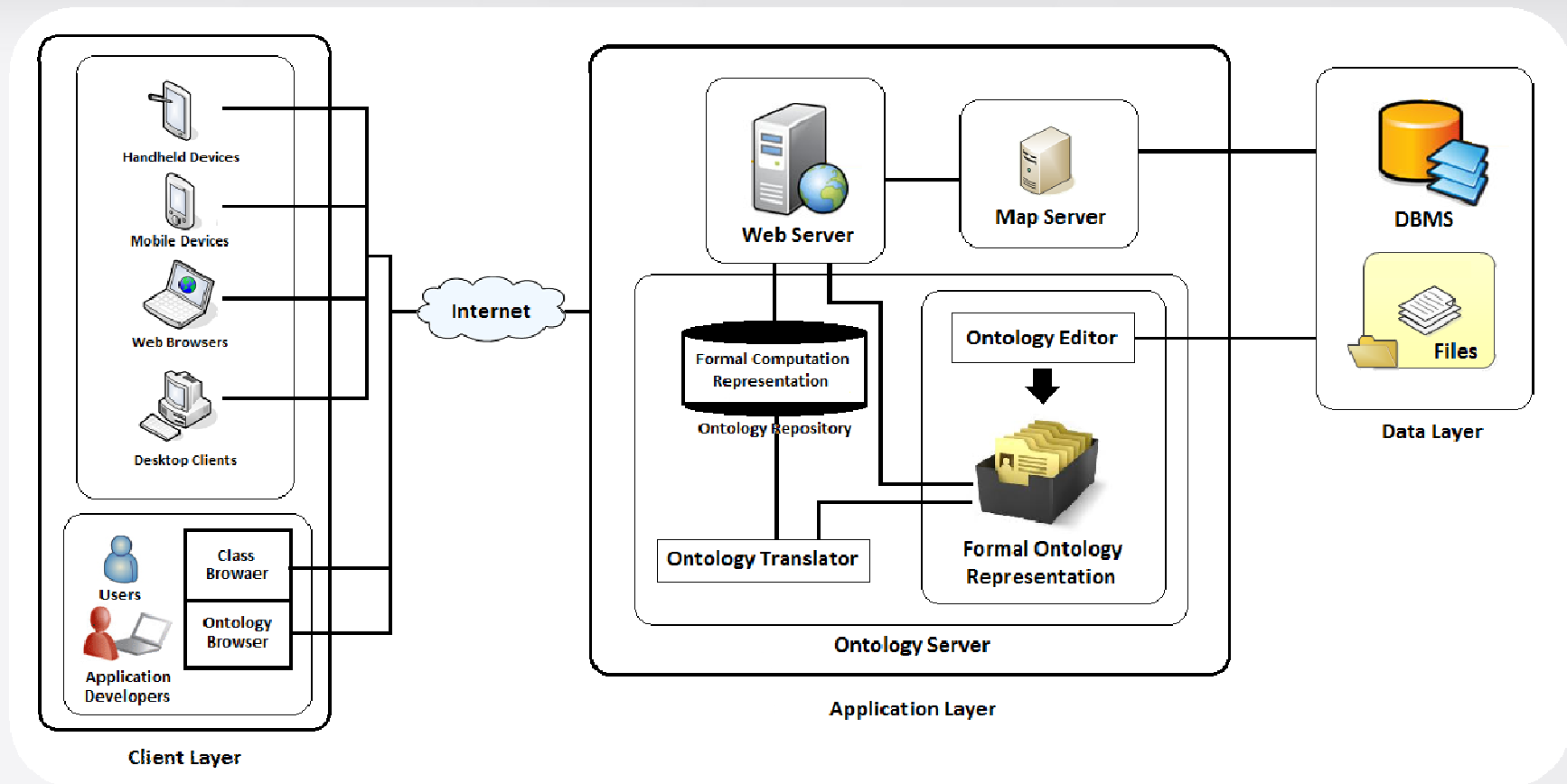
Semantic Web GIS Architecture

Figure. Ontology driven Web GIS Architecture.

Semantic Architecture…

- **The Basic Architecture is same as 3-tier Client-Server Architecture.**
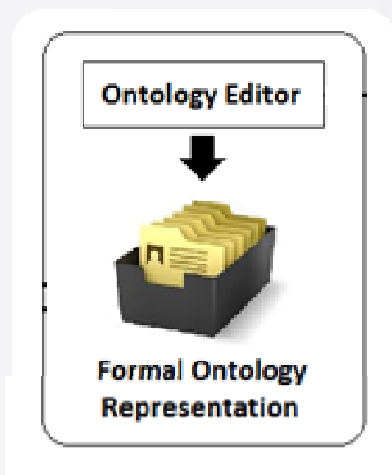
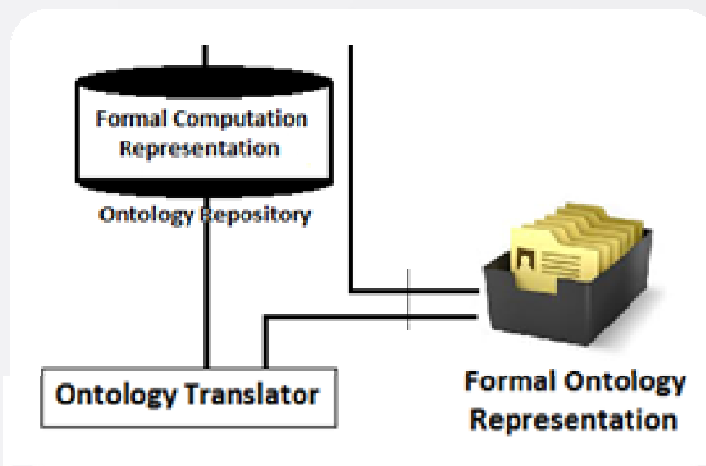**Extended Components are:**

Figure. Knowledge Generation Phase
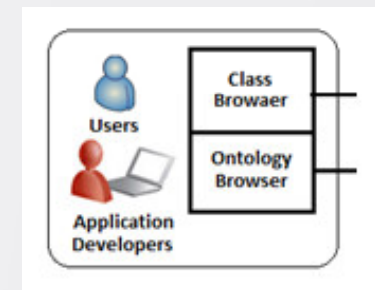
Figure. Knowledge Use Phase

Figure. Extended User Group

Key Contribution

- **Physical Universe**   **Objects & Phenomenon**
- **Mathematical Universe**   **Def (Obj) & Def (Phen)**
- **Representation Universe**   **Symbology for Obj & Phen**
- **Implementation Universe**   **Data Structure for Obj & Phen**

COGNITIVE UNIVERSE
Human Dimension/Perception
Object & Relationship of objects with Phenomenon

Conclusion

- **This Paper describe the concept of Semantic Web with GIS Technology.**

- **This Paper introduce a Web GIS architecture that enable geospatial information integration in a seamless and flexible way based on its semantic value regardless of its representation.**

- **Spatial Data availability In the form of classes (computation form) brings a new geospatial opportunity for GIS developer to do whatever they want to do ☺ ☺ ☺ .**