Capacity Building For National Surveying and Geographic Information Institute

Introduction to Open Source GIS

CONTENTS

Microsoft ❤ Linux

Bash coming to Windows

Windows 10 To Open Up Further to Linux

Expect the changes to hit this fall.

By Kurt Mackie ■ **08/01/2017**

I. Overview of Open Source SW

1. What is Open Source SW?
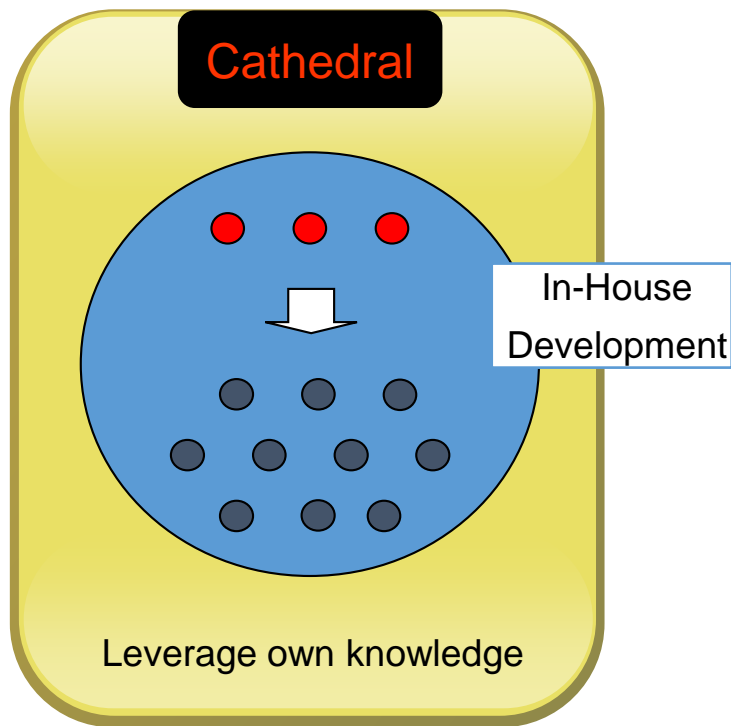
❑ Open source SW(OSS) is the computer SW that is available in source code form under certain licenses.

❑ Users of OSS are permitted to use, copy, study, change, improve and even redistribute those OSS freely.

❑ 'Free' does not mean 'Free of Charge' but 'Freedom' or 'Liberty'

Freedom Of Software

Freedom of Use

Freedom of Redistribute

Freedom of Copy

Freedom of Modify
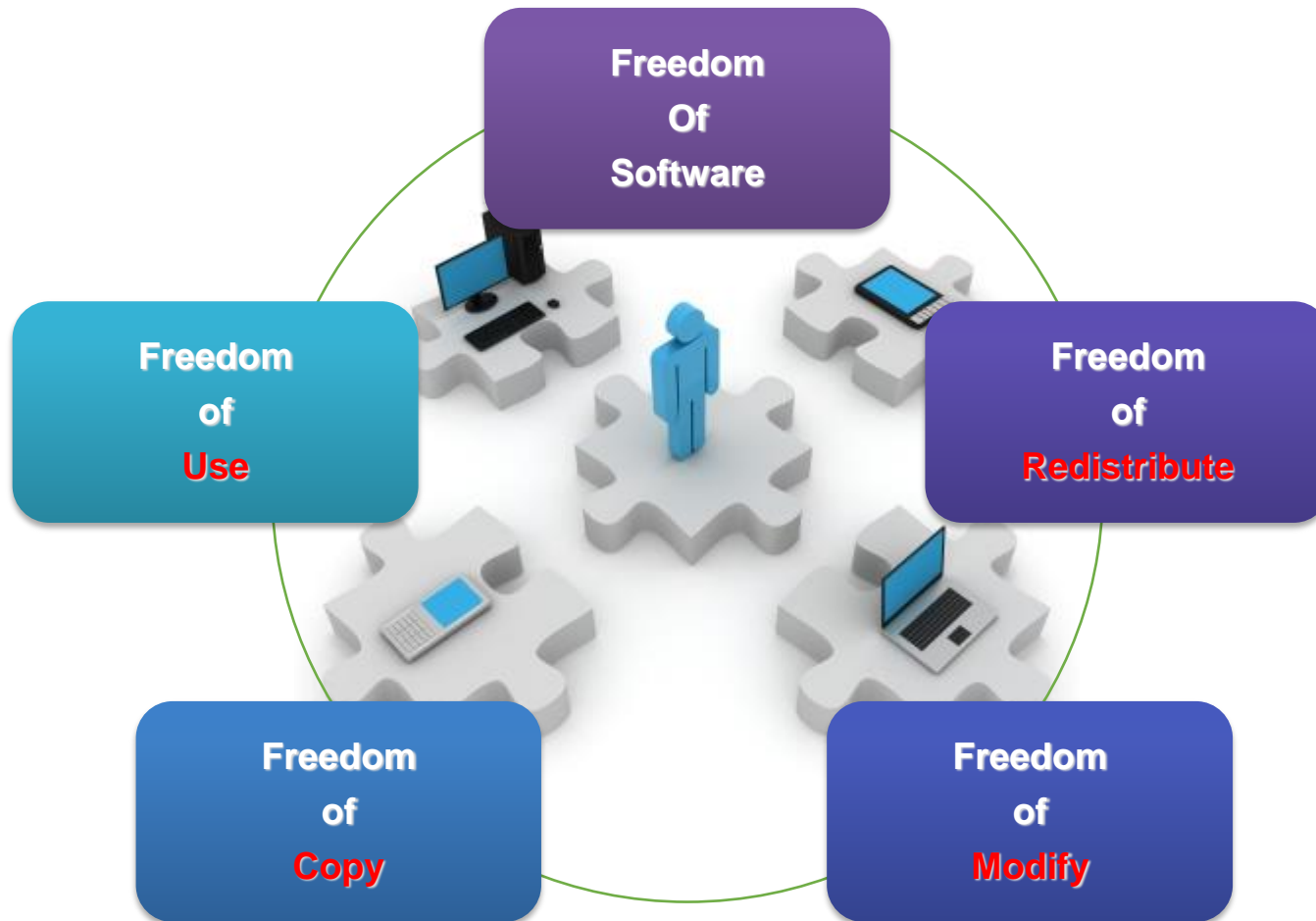
2. SW Models – Cathedral vs. Bazaar

❑ **Open Source Software Development Model**

<Closed Development>

<Open Development>

Cathedral

Bazaar

In-House Development

Collaborative Development

Leverage own knowledge

Leverage others knowledge too
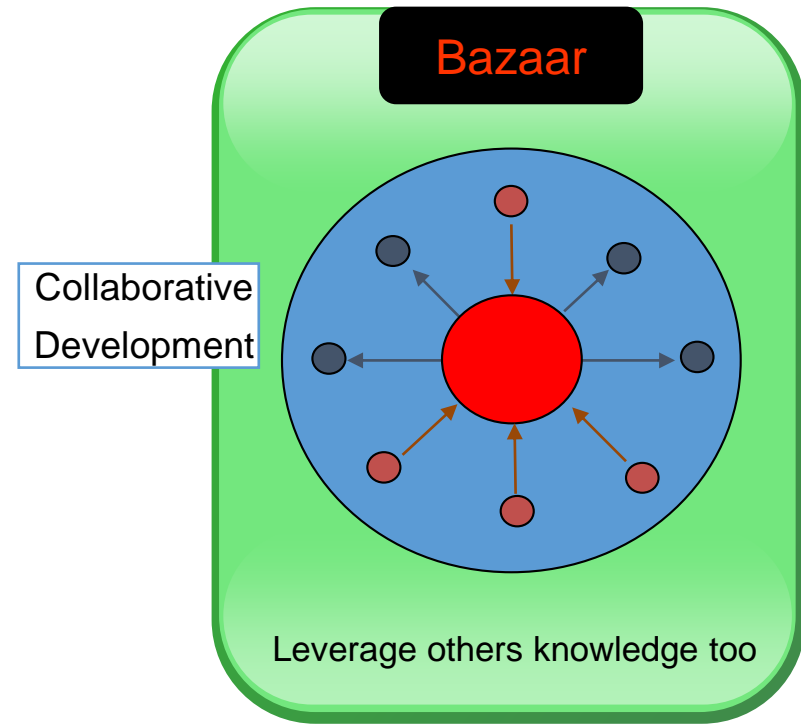
- Designed and developed by inside R&D lab
- Inside knowledge, intellectual property, experiences
- Idling knowledge, limited leveraging outside knowledge

- Designed and developed with other outside partners
- Inside knowledge + outside knowledge
- 'We are smarter than Me!!'

➔ Leveraging inside & outside knowledge

3. Benefits of Open Source SW

❑ **Benefits of Open Source Software**

  ▪ Empower people, save money, save resources, increase stability, access to source code, access to skilled community of developers

| 1. Technological Aspects	2. Economical Aspects	3. Business Aspects	4. Other Aspects
Rapid development of high-class SW	Very low adoption cost	Extend company's products portfolio	Reduce energy
Increased stability by skilled community review	Reduce SW development cost	Open up new market by providing diversified services & products	Self-Satisfaction
Reduce technological gap to leading proprietary SW company	Easy to customize	Improve brand image of company	Help society
Internalize outside SW developer resources	Reuse successful story		

Develop the society by sharing technology & outcomes!!

4. Reasons Why Select Open Source

❑ **Open Source as Better Quality Software(2014)**

1 **Quality**

2014
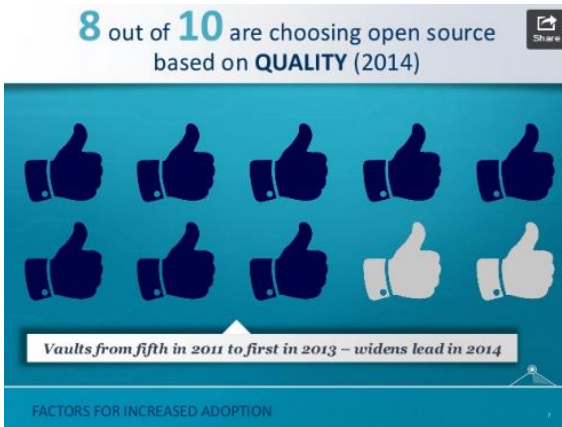
Ease of Deployment **3**

2 **Security**

Source Code Access **4**

Source: BlackDuck Software, http://www.slideshare.net/blackducksoftware/2014-future-of-open-source-survey-results

II. Open Source GIS

1. What is Open Source GIS?

❑ **Open Source GIS**

- FOSS4G : Free Open Source Software for Geo-Spatial

- GeoFOSS : Geospatial Free Open Source Software

2. Why Open Source GIS?

❑ **Current State & Needs of Open Source GIS**

Current State

✓ Boom-up of Open Source & Open Source GIS
- Around 300 ~ 400 Open Source GIS projects are available (Freegis.org, 2011)

✓ Advance of Open Source GIS
- OSGeo Foundation : Commercial proprietary GIS SW can be replaced with Open Source GIS
- **Google used Open Source based GDAL in its Google Earth program**
- **AutoDesk opend the source code of MapGuide, FDO & MetaCRS and then donated those to OSGeo**
- **ESRI actively used GDAL and also changed its ArcGIS GeoPortal Server to Open Source based one**

✓ Active adoption of Open Source GIS in UN, EU, USA , Canada and other countries

Necessity

✓ Want to meet lots of needs of GIS from public sectors

✓ Want More with Less!!

✓ Want to replicate other people & institution's experience

✓ Want to manage & modify the system by ourselves!!

3. Characteristics of GIS

❑ **Characteristics of GIS**

- GIS = **Vertical Set of Many Software**
  - Interoperability is very crucial among components
  - Linux, Apache, PHP are Horizontal based Software
  - GIS is Vertical Architecture based one from DB to web client

- GIS as **Public Infrastructure** = Spatial Data Infrastructure
  - **Vendor neutral, standard based architecture** is very important
  - Active standardization by ISO, OGC

- Open Source GIS as another Lego Block
  - Active implementation of "Standard Compatibility" by Open Source GIS
  - Open Source GIS could replace commercial proprietary SW/Components

4. GIS: Vertical Set of Many Software

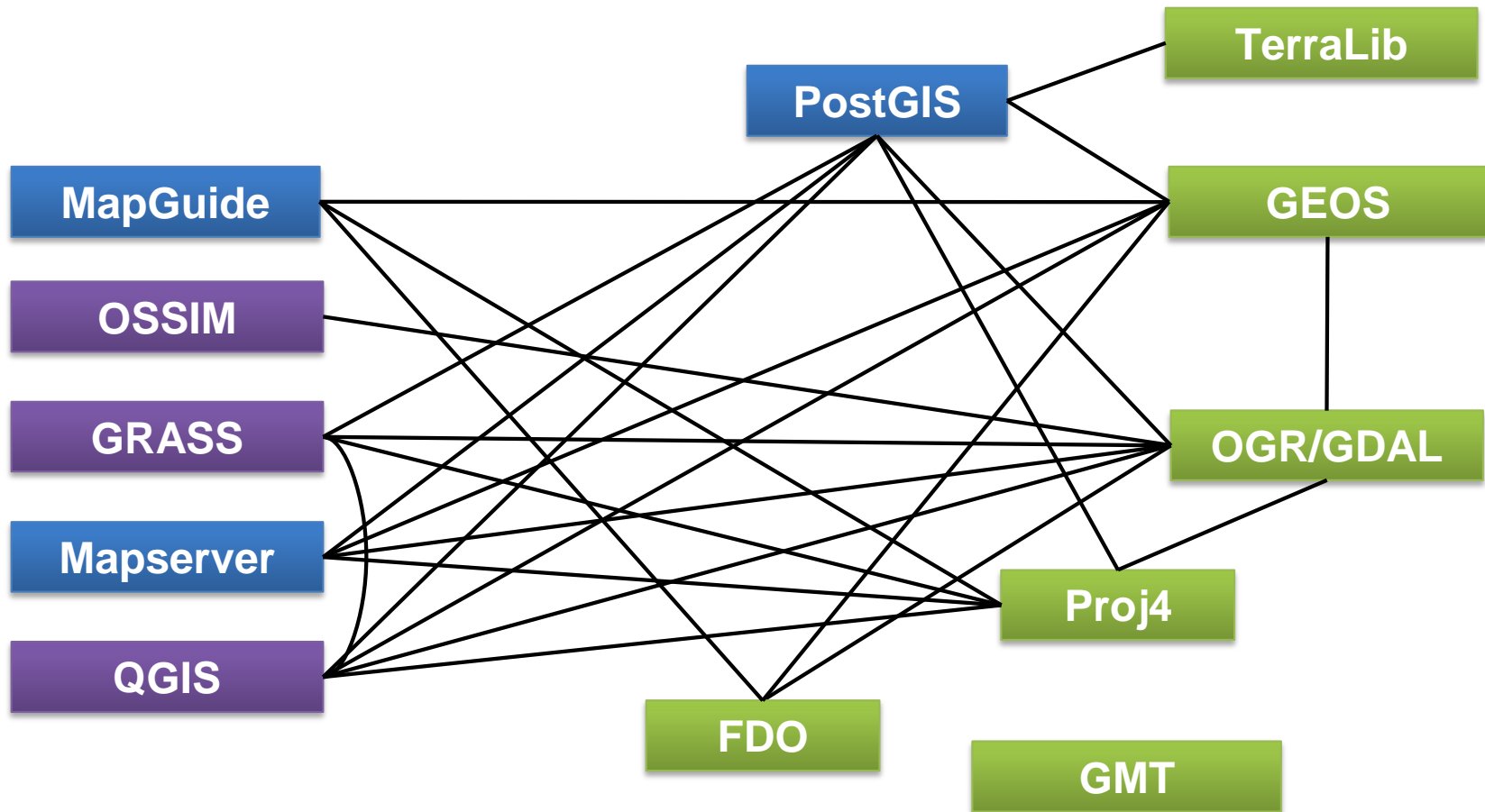❑ **Characteristics of GIS : Vertical Set of Many Software**
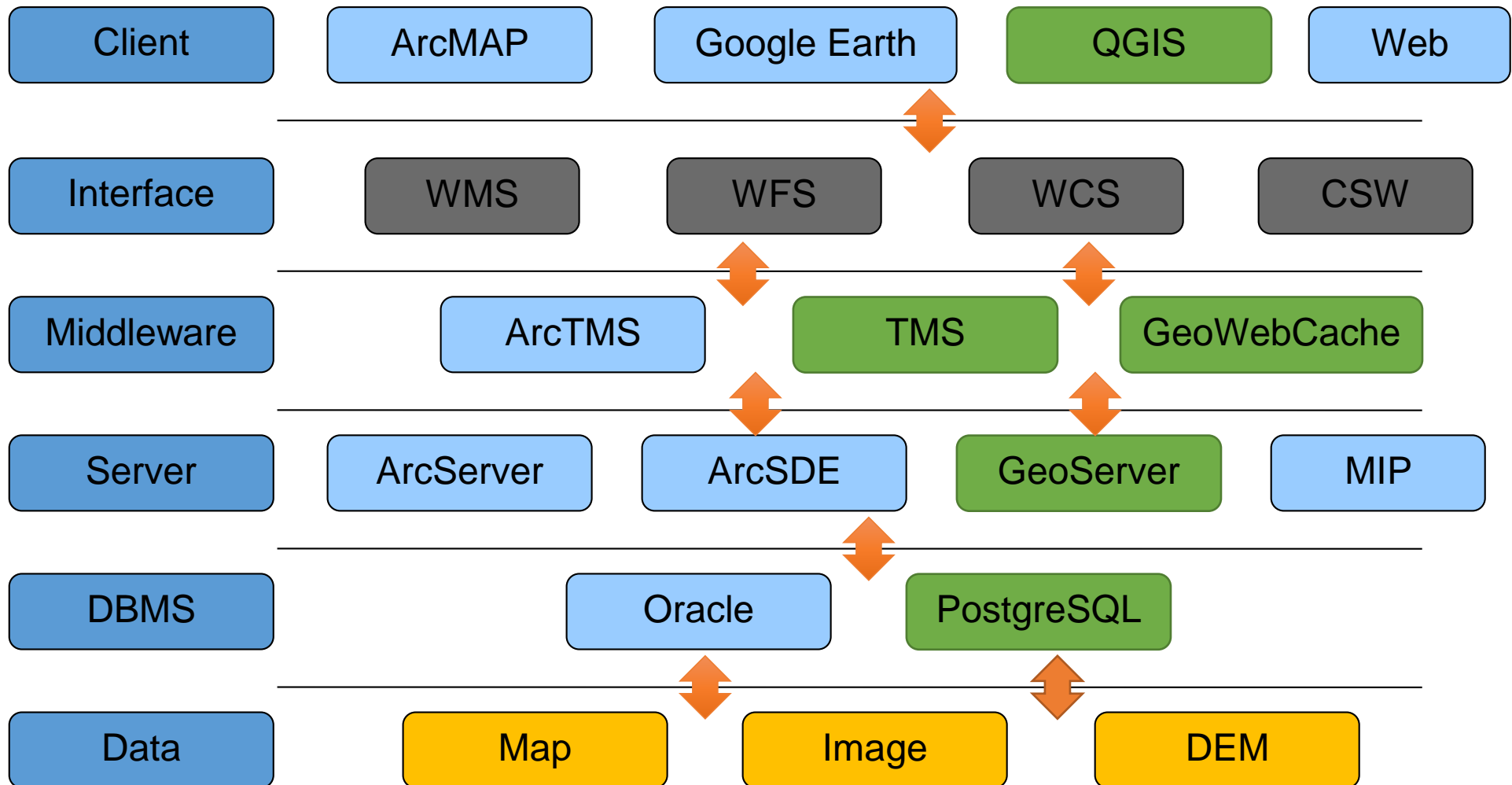
5. Another Lego Block

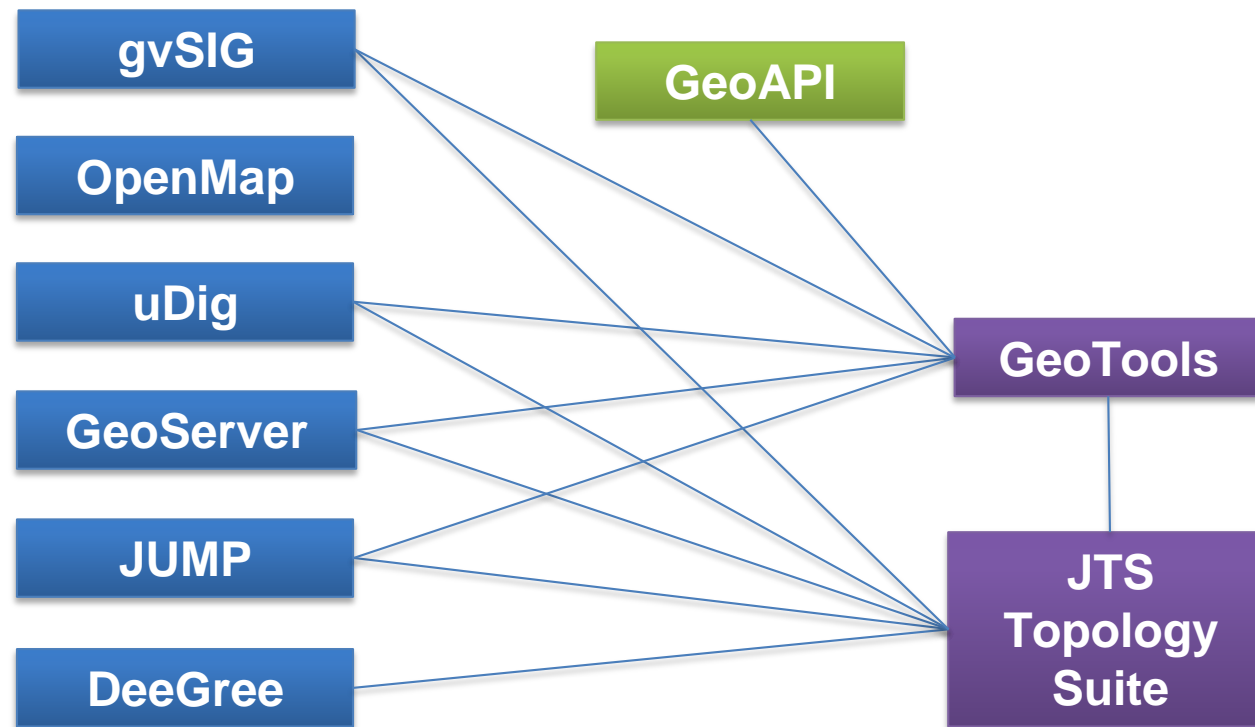❑ **FOSS4G Projects under OSGeo Umbrella**
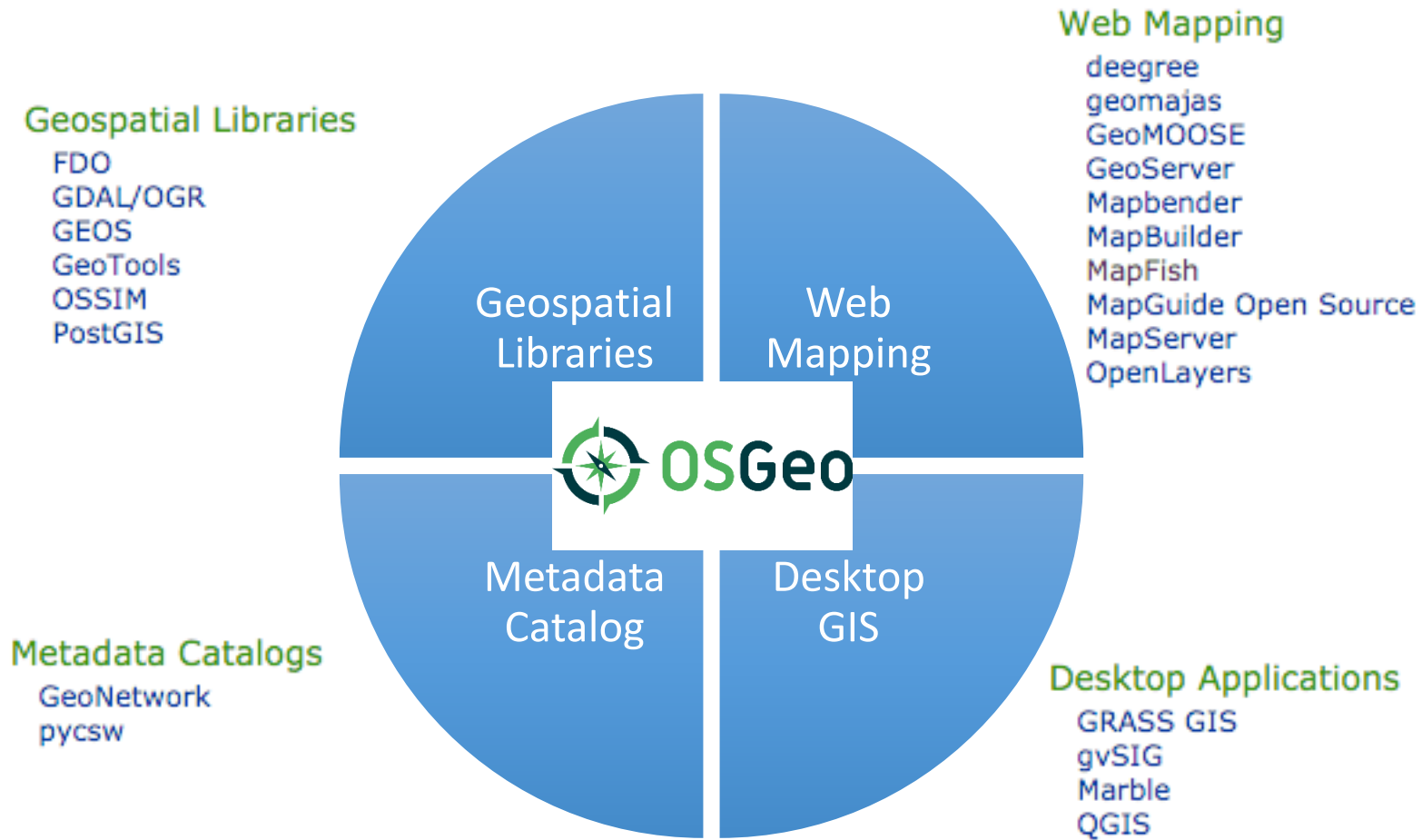
5. Another Lego Block

❑ **C Tribe**

• Source : Tyler Mitchell
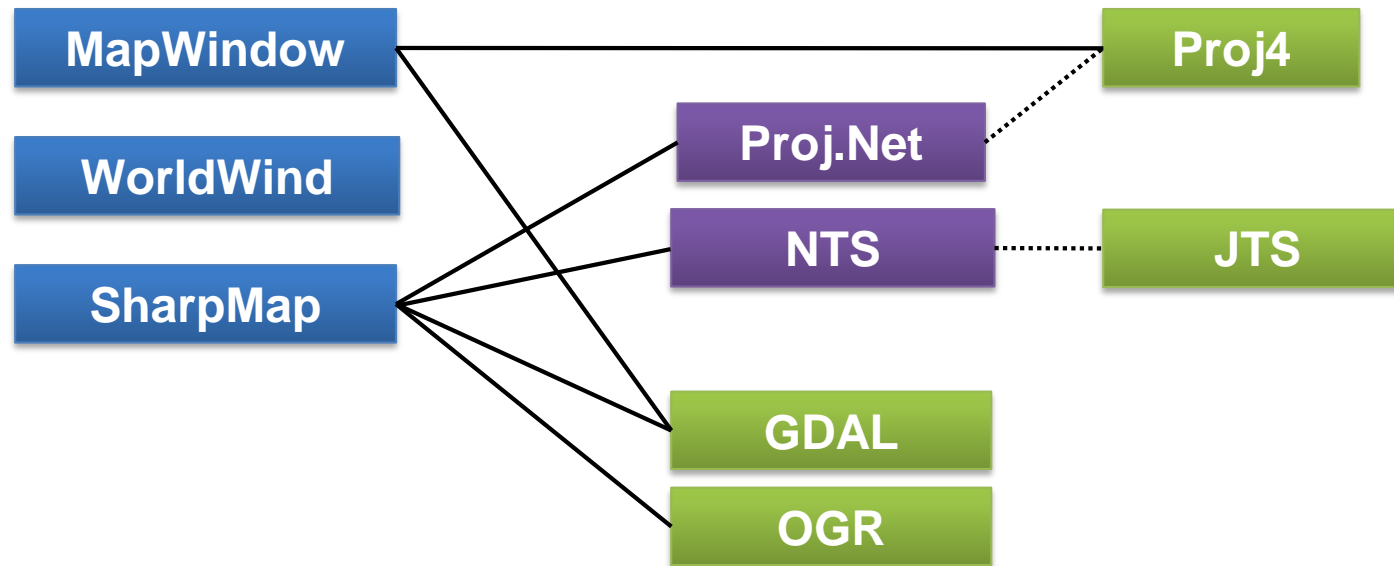
5. Another Lego Block

❑ **Java Tribe**

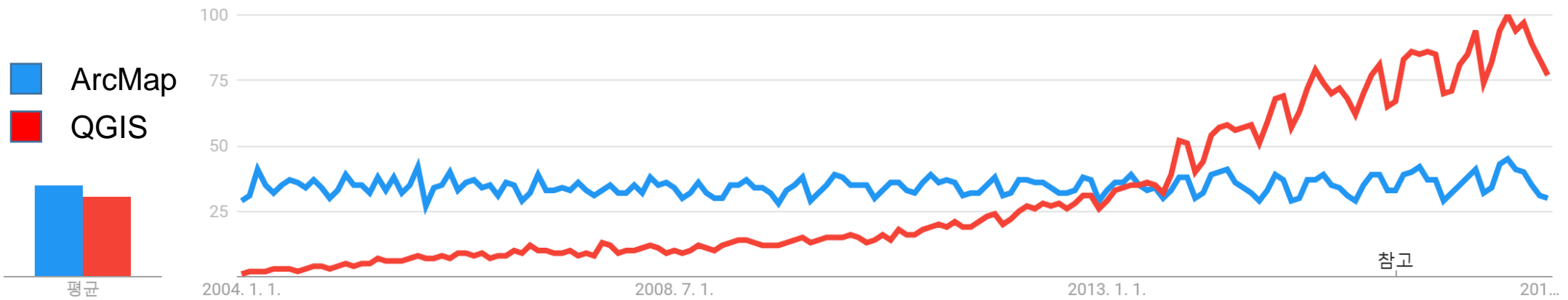- Source : Tyler Mitchell

5. Another Lego Block

❑ **.Net Tribe**

• Source : Tyler Mitchell

6. Rising of Open Source GIS
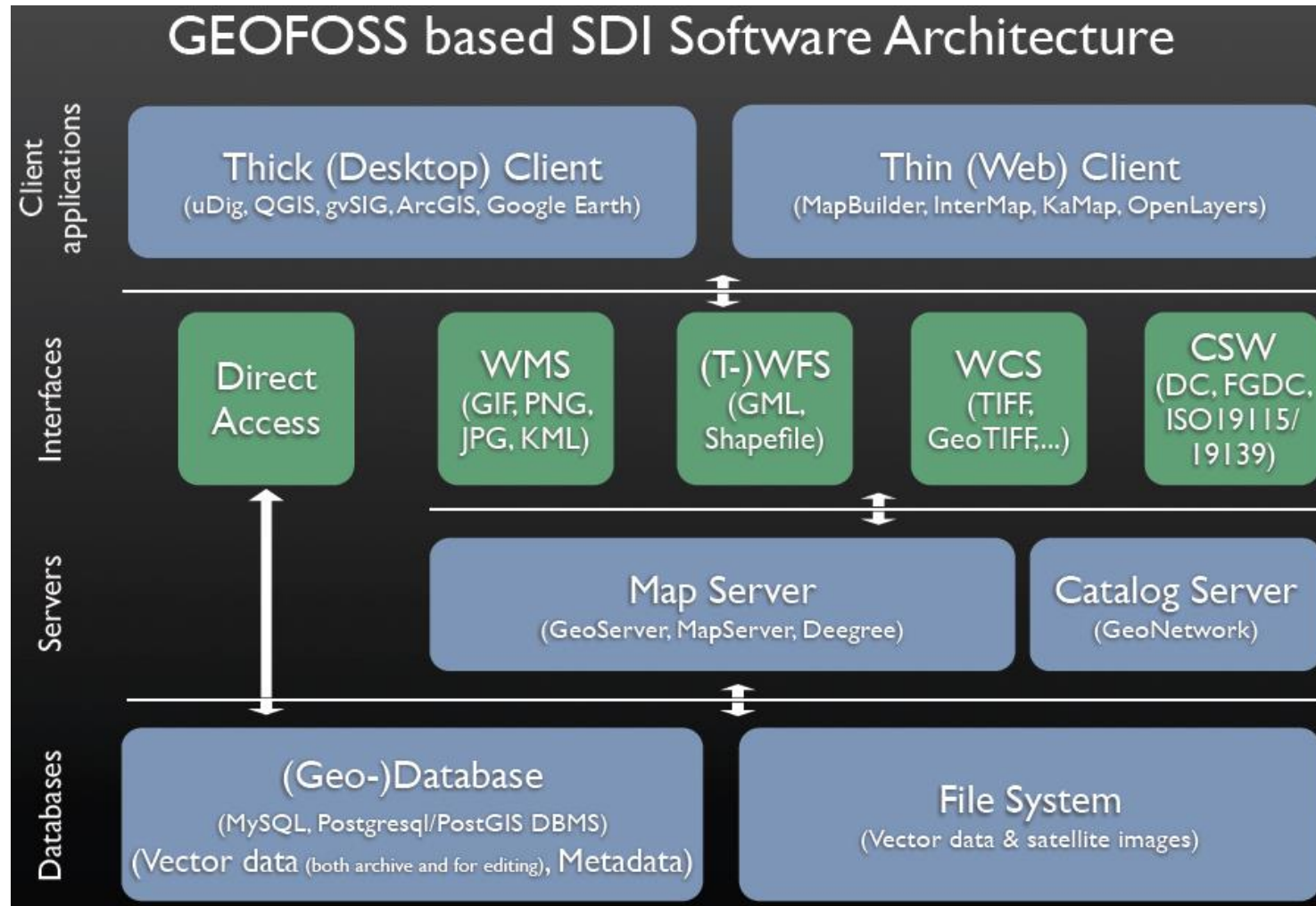
❑ **Google Trends Analysis**

시간 흐름에 따른 관심도 변화 ⓘ   ⬇ <> ⤴

ArcMap
QGIS

100
75
50
25

평균   2004. 1. 1.   2008. 7. 1.   2013. 1. 1.   참고   201...

* Source: http://www.google.com/trends/

Ⅲ. Open Source GIS Projects

1. FOSS4G Based NSDI

❑ **FOSS4B Based NSDI Architecture**

1. FOSS4G Based NSDI

☐ **FOSS4B Based System Architecture**

Client	QGIS	Map Window	Open Layers	GeoExt
	uDIG	World Wind	Open Scales	Leaflet

OWS Interface

Middleware	Squid	TMS	GeoWebCache

Server	MapServer	MapGuide	GeoServer	Deegree

DBMS	PostGIS	GRASS	GeoNetwork

Data	Open Street Map	Open Aerial Map	GeoNames
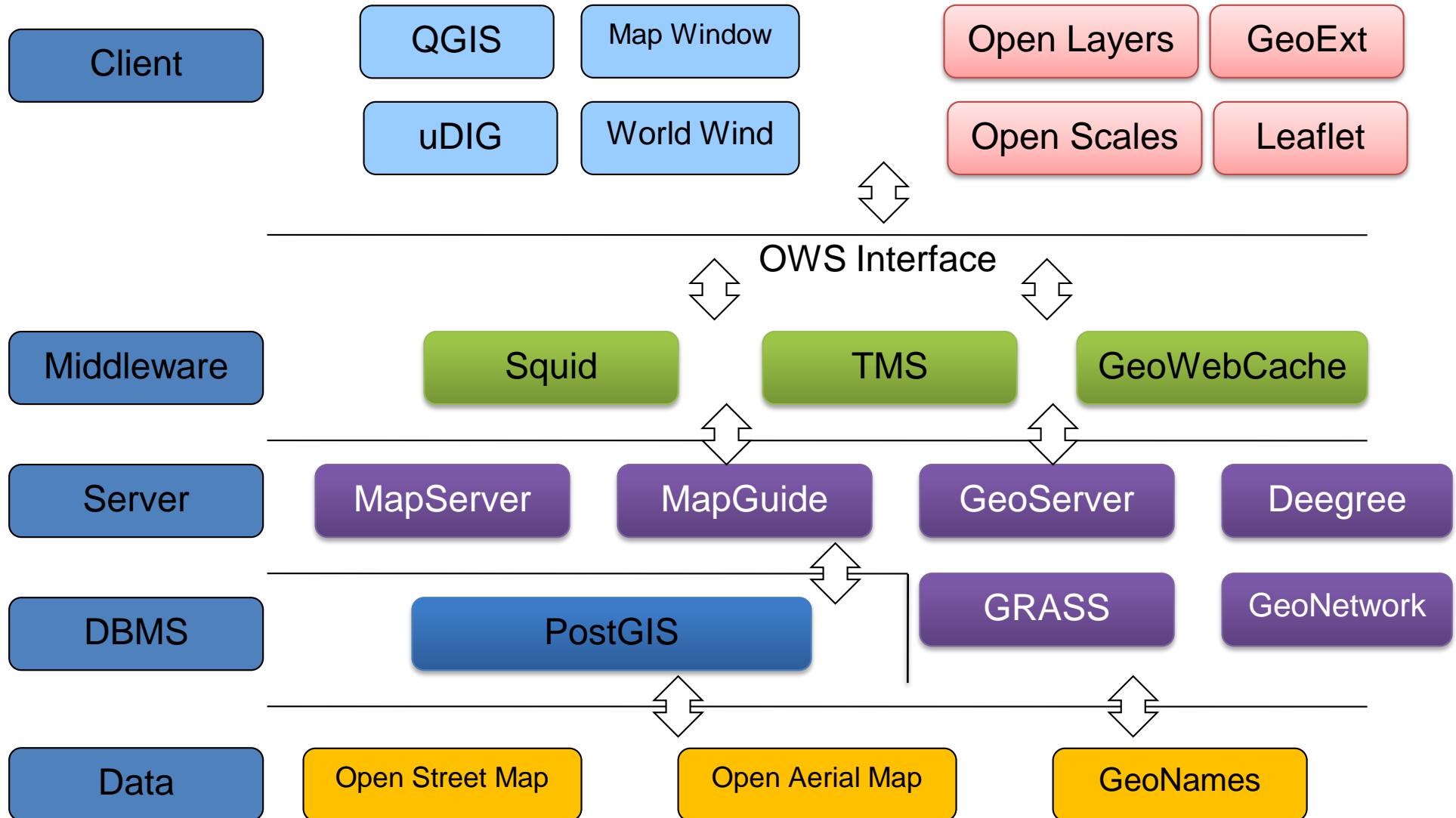
1. FOSS4G Based NSDI

❑ **EU : INSPIRE**

- Hybrid model mixing proprietary and foss4g

EU : INSPIRE
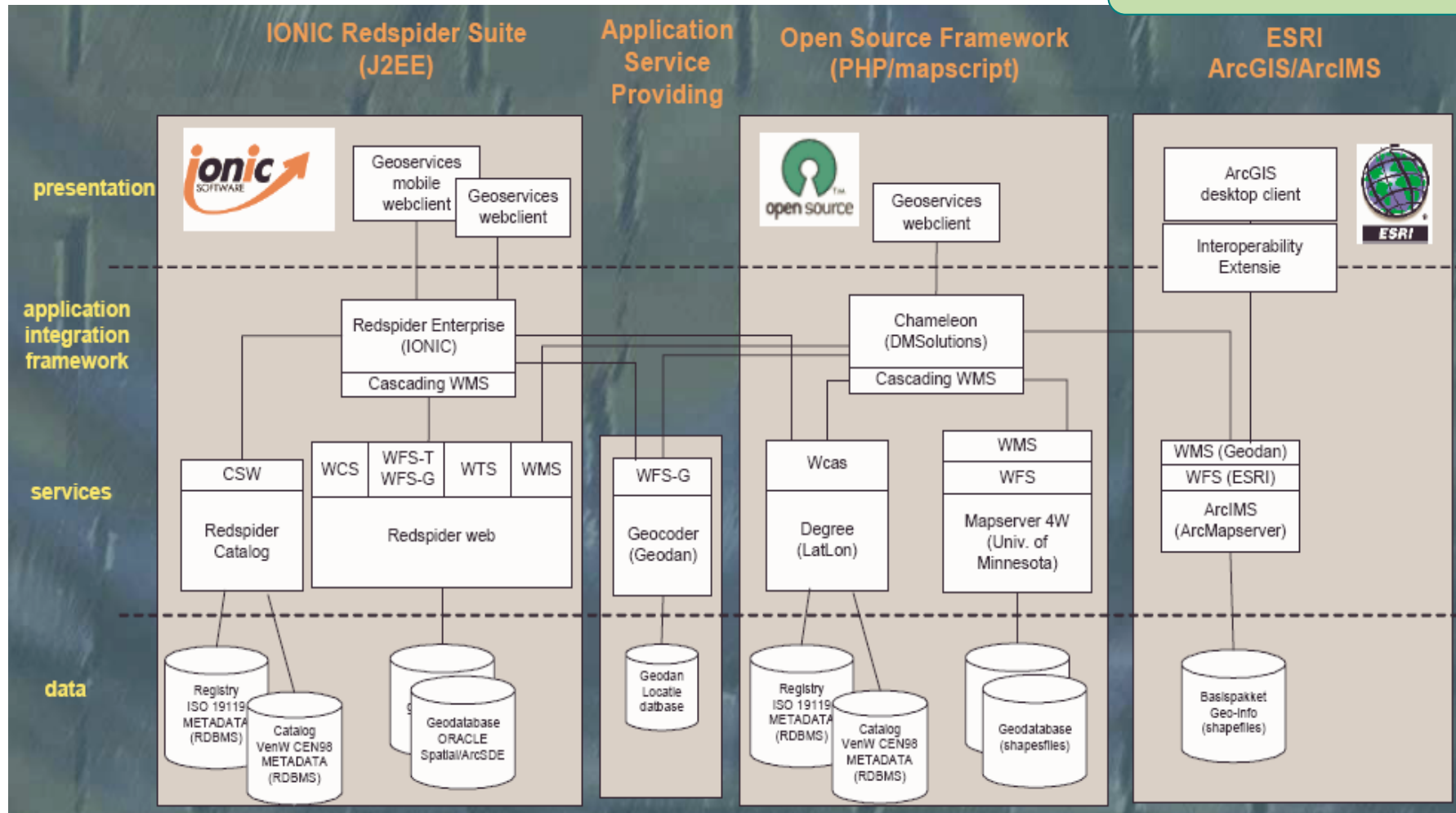
2. Real Cases

❑ **Geo Bolivia**

- Pursuing Open Source GIS based NSDI

2. Real Cases

❑ **IGN, France**

http://www.ign.fr

➔ **Managing more than 100M spatial entities using PostGIS**

2. Real Cases

❑ **United Nations Open GIS Initiative**
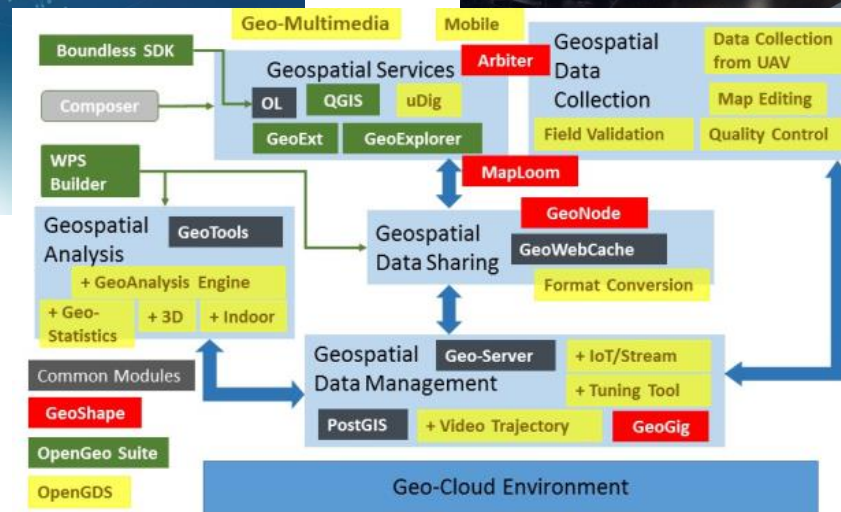
➔ From 'More with Less' to 'Better with Less'

2. Real Cases

❑ **United Nations Open GIS Initiative**

- 2 times meeting was held and 3rd meeting will be held on November

➔ **TD of Spiral 1 on Sep, OD of Spiral 1 will be on November.**

4. Open GeoData

❑ **OpenStreetMap**
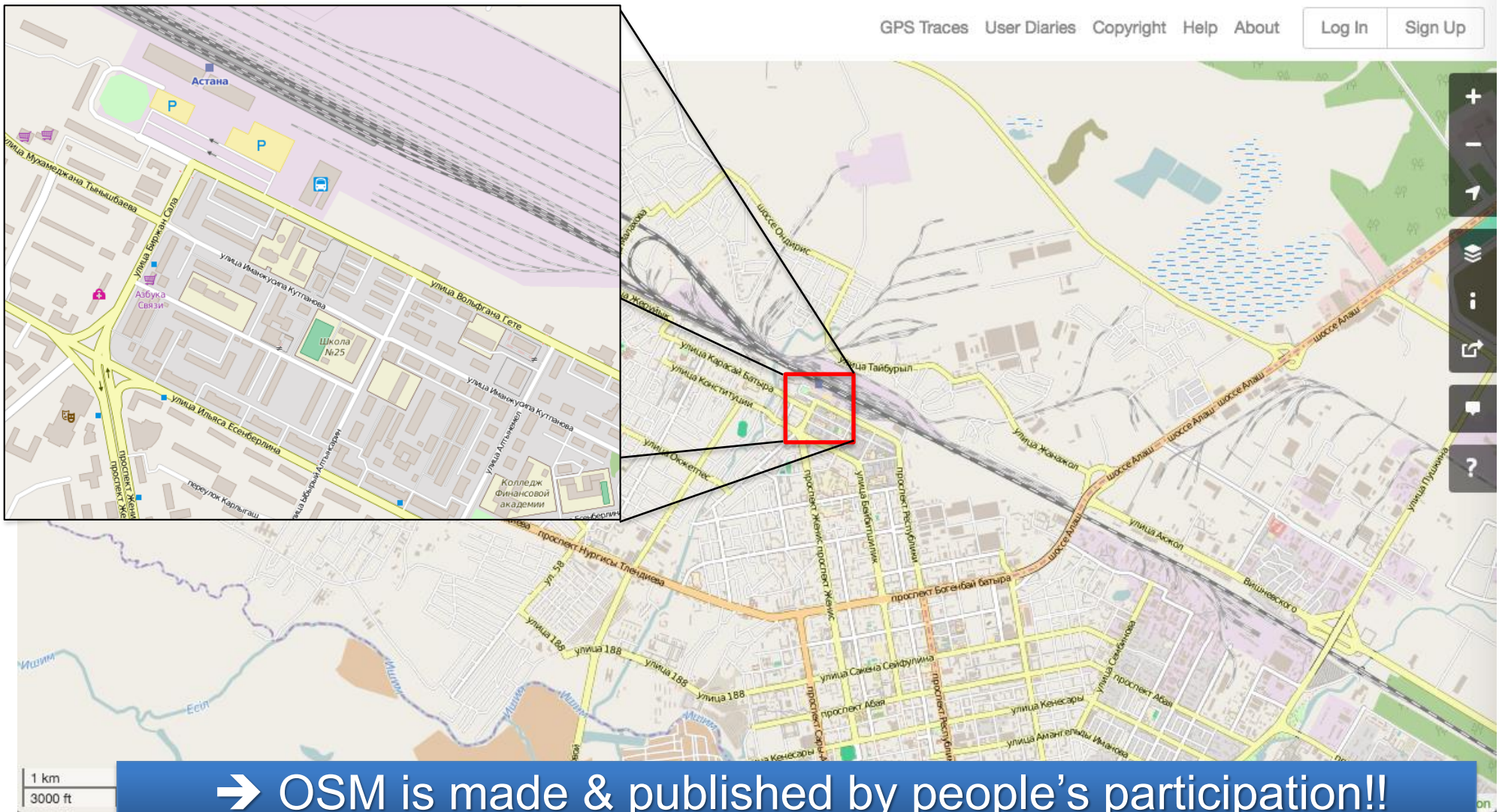
➔ OSM is made & published by people's participation!!

IV.OSGeo

1. OSGeo – Open Source Geospatial Foundation

❑ **OSGeo General**

OSGeo Projects

Web Mapping
- deegree
- geomajas
- GeoMOOSE
- GeoServer
- Mapbender
- MapBuilder
- MapFish
- MapGuide Open Source
- MapServer
- OpenLayers

Desktop Applications
- GRASS GIS
- gvSIG
- Marble
- QGIS

Geospatial Libraries
- FDO
- GDAL/OGR
- GEOS
- GeoTools
- OSSIM
- PostGIS

Metadata Catalogs
- GeoNetwork
- pycsw

Outreach Projects
- Public Geospatial Data
- Education and Curriculum
- OSGeo Live
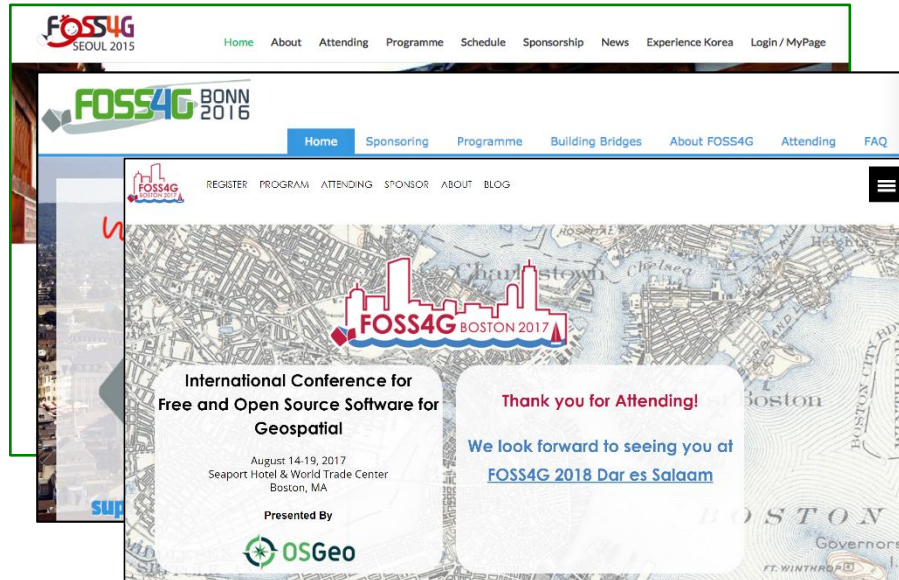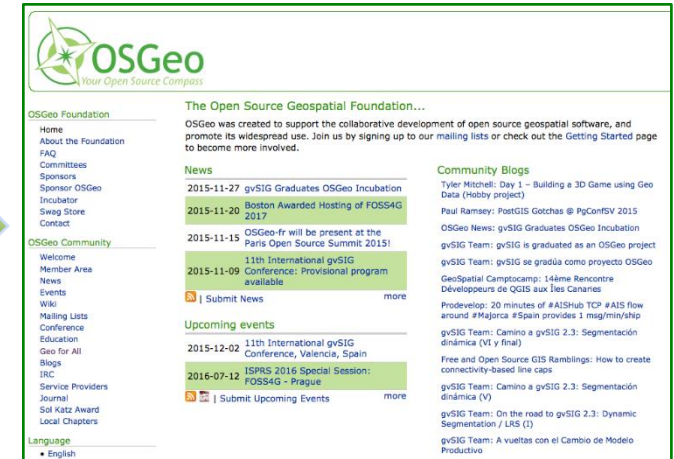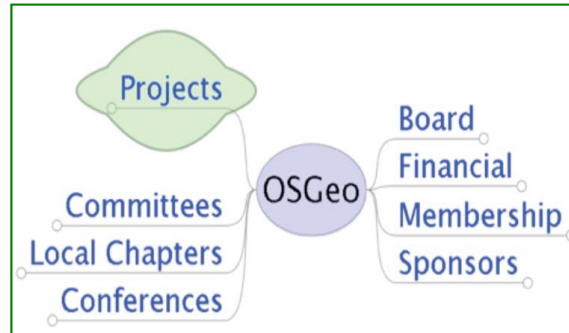
OSGeo
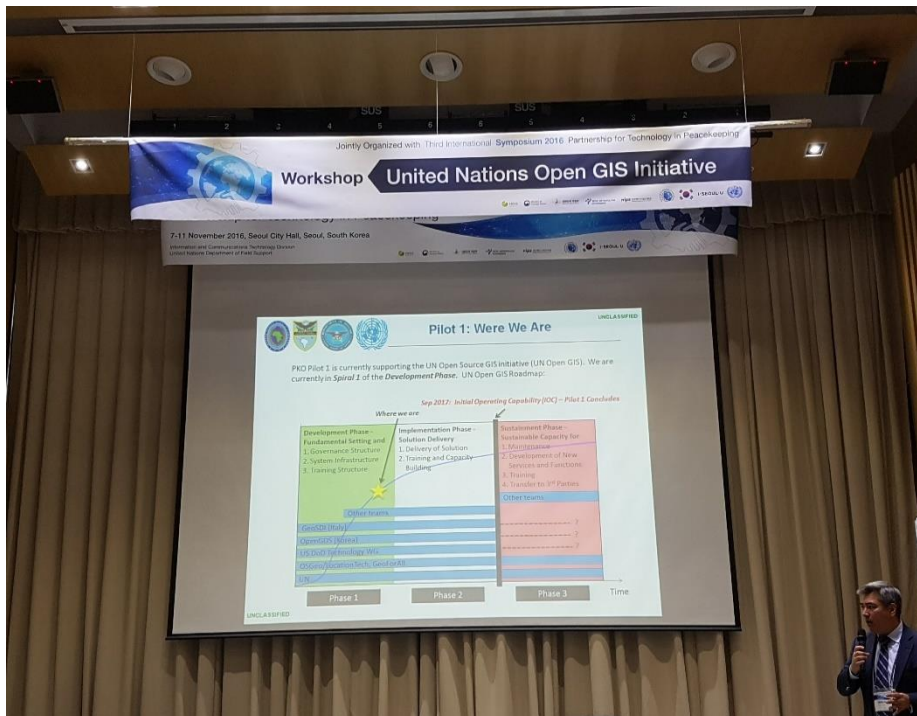- Open Source Geospatial Foundation

- Established in Chicago, US on 4th February, 2006.

- Mission : To support the collaborative development of open source geospatial software, and promote its widespread use.

- OSGeo is a NPO that is functioning as community of communities.

2. Goal & Activities

❑ **Goal & Activities of OSGeo**

Goal	Activities

Goal

✓ **Provide resources for FOSS4G projects**
  - **Infrastructures**
  - **Legal**
  - **Financial**

✓ **Promote free and open geospatial data**

✓ **Create and maintain a quality brand**

✓ **Create and promote free curriculum**

✓ **Promote and contribute to standards**

Activities

✓ **Support FOSS4G on a global scale**

✓ **Support local activities and capacities**

✓ **Facilitate inter-project communication**

✓ **Build a solid market for business and users**

✓ **Interface with industry and academia**

✓ **Support the education of domain experts not <brand specialists>**

OSGeo http://www.osgeo.org

3. Incubation

☐ **OSGeo Incubation**

- Efforts for ensuring high quality open source GIS development

- A kind of project health inspection

| 1 | **Have a successfully operating open and collaborative development community** |

| 2 | **Have clear IP oversight of the code base of the project** |

| 3 | **Adopt the OSGeo principles and operating principles** |

| 4 | **Are mentored through the incubation process** |

V. Wrap-Up

1. Pros & Cons

❑ **Economic Advantages – More with Less!**

<Previous Cost Structure>   <FOSS4B based Cost Structure>

- Additional development
- Could increase jobs

- More with Less
- Users can focus on their own job instead of spending SW/HW
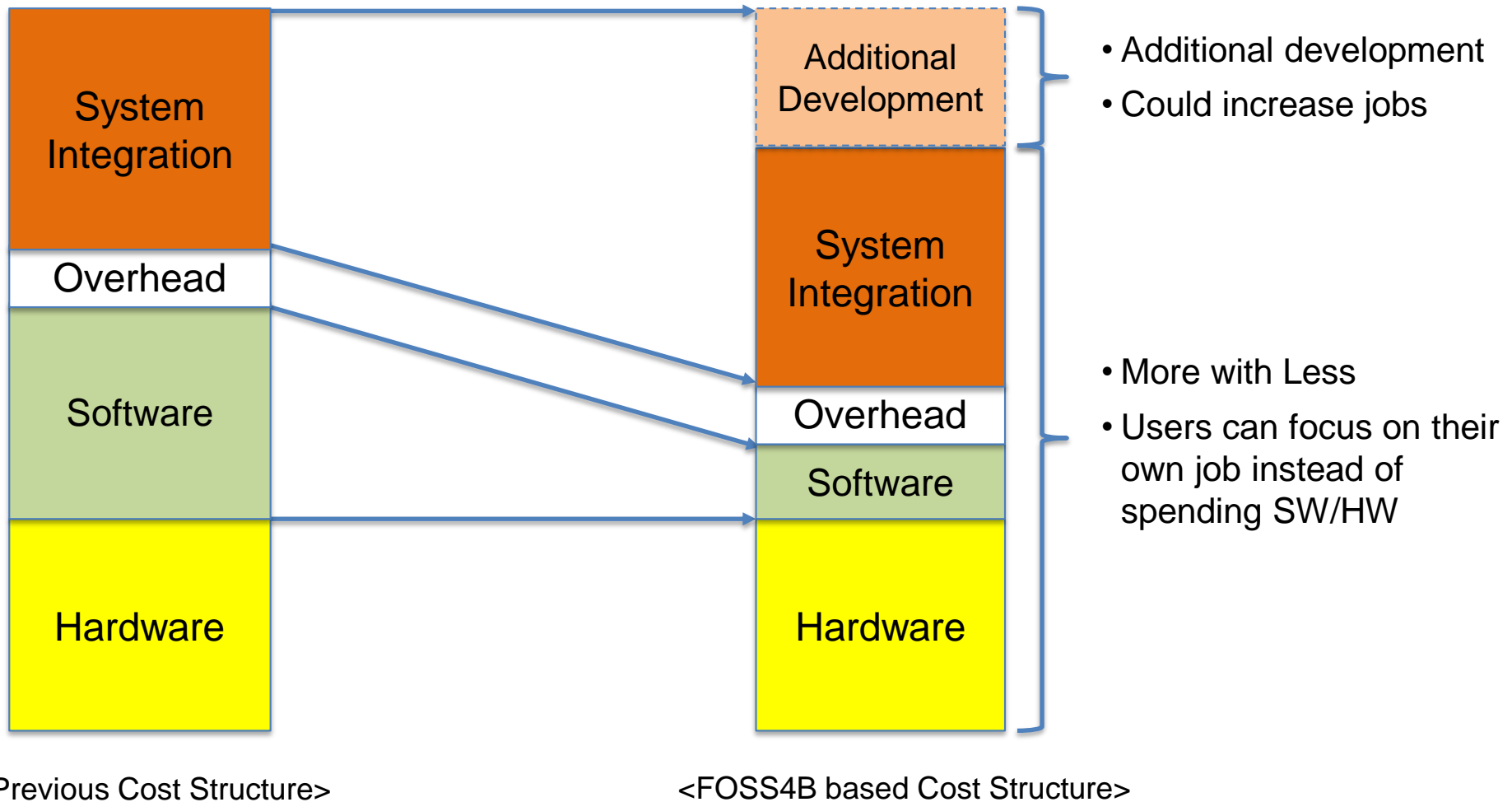
1. Pros & Cons

❑ **Social Advantages – Capacity Building**

• Free access to open source GIS

• Source access to open source GIS

Image source: Gérald Fenoy, https://www.facebook.com/gerald.fenoy

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1. Pros & Cons

❑ **Downside of Open Source GIS**

Proprietary Software
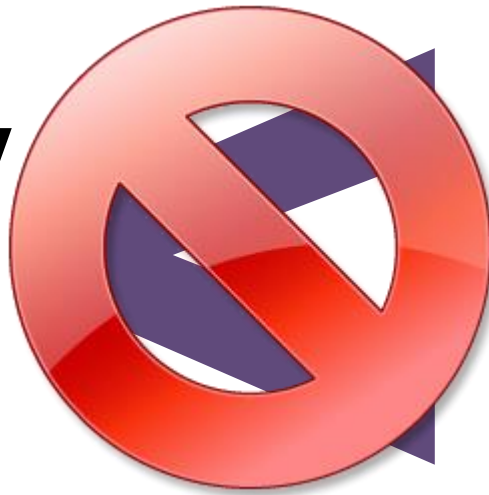
Open Source Software

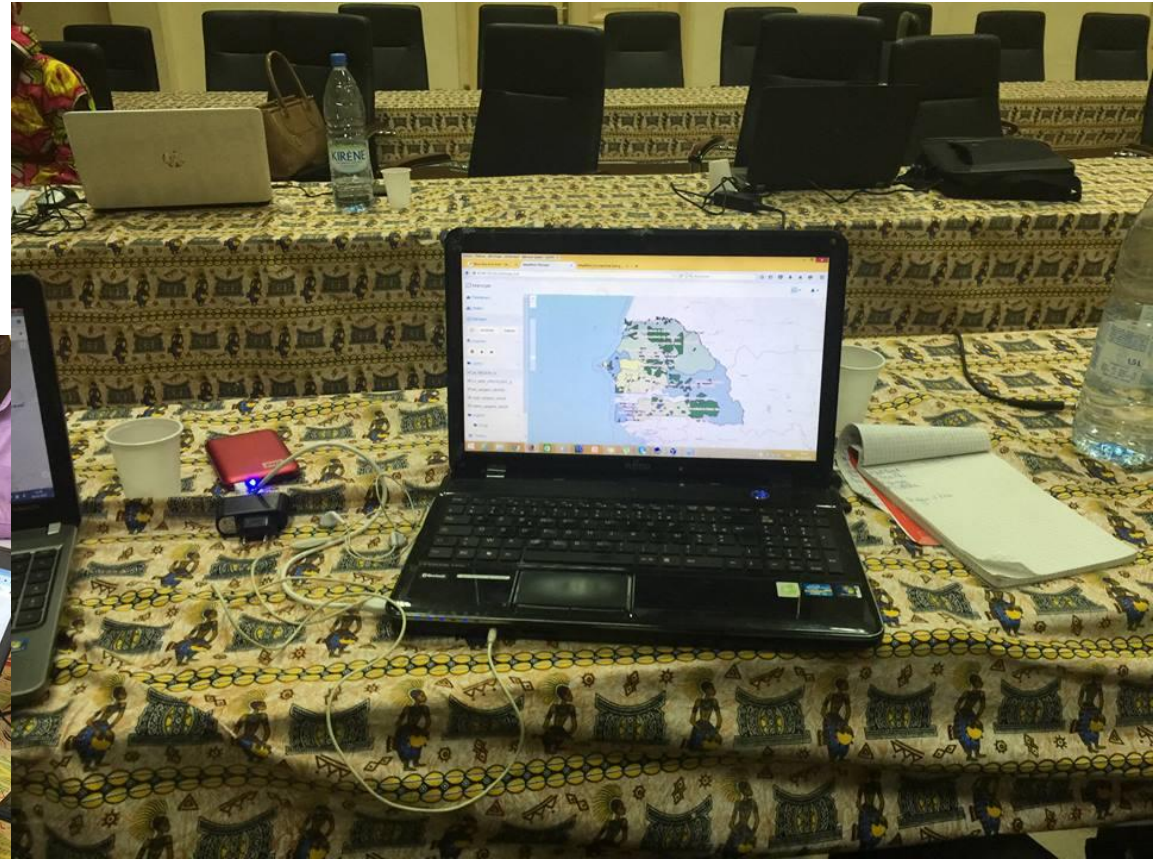- ▪ "Software of the developers, by the developers, for the developers"
- ▪ Highly depends on network effects
- ▪ Less economical incentive could reduce the sustainability of a project

KOICA
Korea International
Cooperation Agency

National Geographic
Information Institute
Ministry of Land, Infrastructure
and Transport

1. Pros & Cons

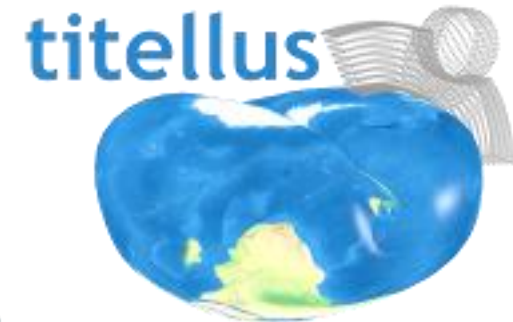❑ **Downside of Commercial Proprietary Software**

Proprietary Software   **Open Source Software**

- ▪ "High Price" is always headache to users
- ▪ Can be locked-in to non standard format or protocol
- ▪ Black box could hinder knowledge diffusion

2. Commercial Open Source GIS Companies

3. Wrap-up

Advance of Open Source GIS	• Open Source GIS is now comparable with commercial proprietary GIS • Open Source GIS is now actively adopted & used all around the world
Cost Reduction	• Open Source GIS is basically free. • The price of commercial Open Source GIS is lower than proprietary one
Interoperability	• Almost all the Open Source GIS is compliant with OGC standards • Open Source GIS can be used with existing proprietary GIS
Opened Source Code	• Anybody can modify & upgrade the system from the source code level • Can easily replicate or migrate success cases to their system
Collaboration based SW	• Collaboration, sharing & community based SW development model • Source code will be managed by community not by company • Neutrality from specific technology or company • Anybody can join and contribute to Open Source GIS with OSGeo