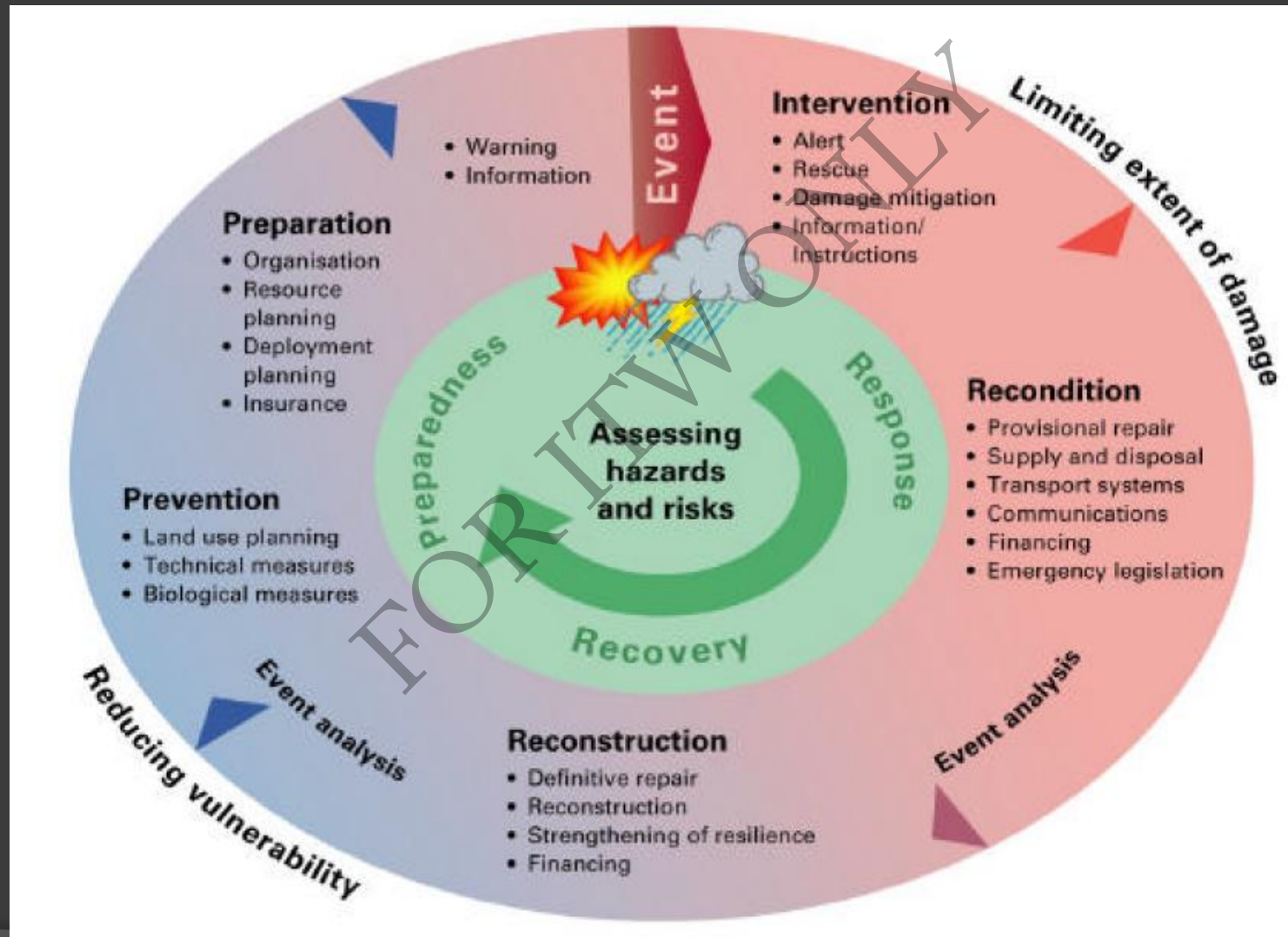


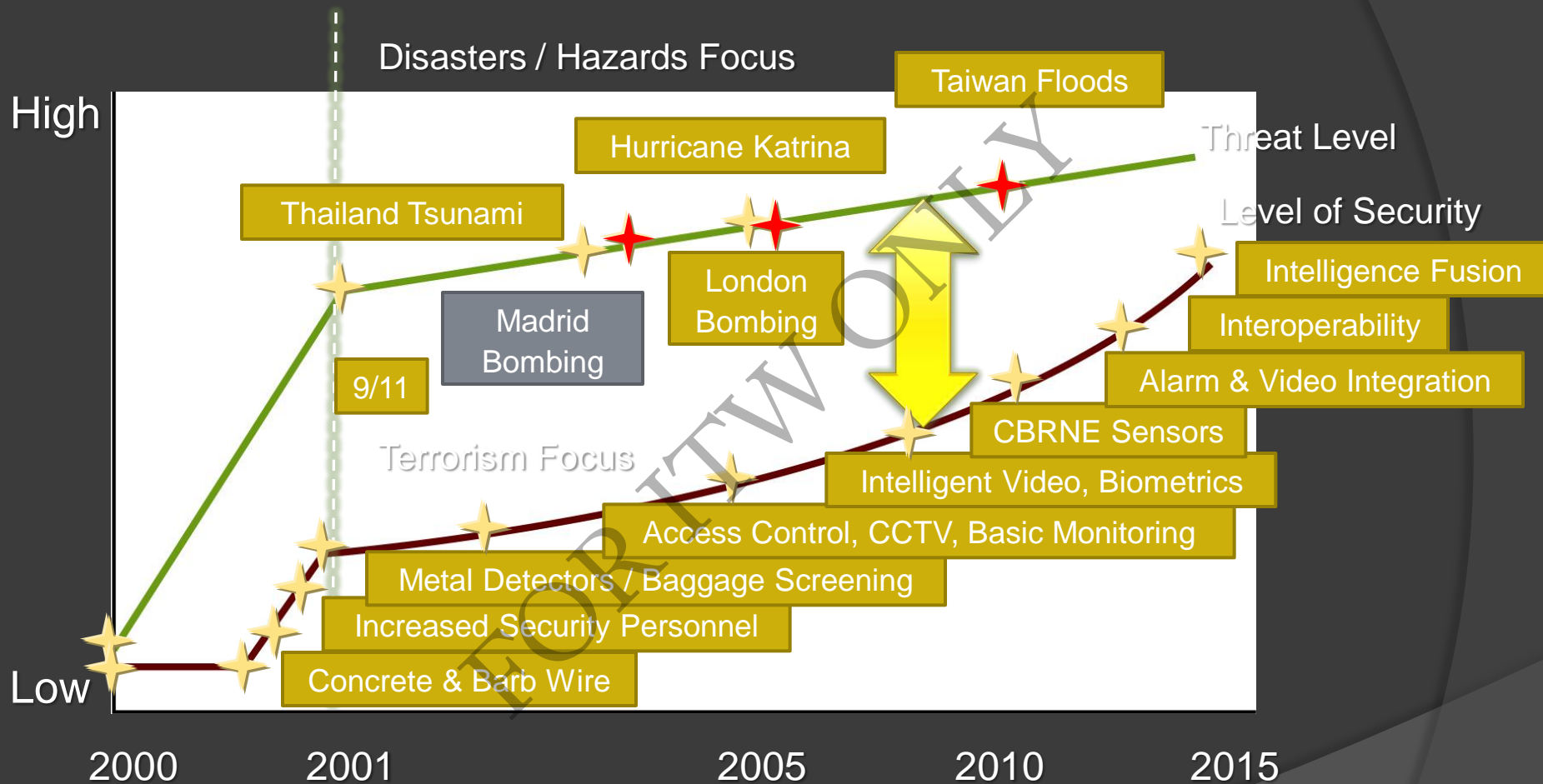
AN OPEN AND INTEROPERABLE DISASTER MANAGEMENT SYSTEM FOR BIG DATA

Tien-Yin(Jimmy) Chou, Distinguished Professor/Director
OGC Planning Committee
GIS Research Center
Feng Chia University, Taiwan

Disaster Management is a Continuous Process



Problems to Address and Technologies



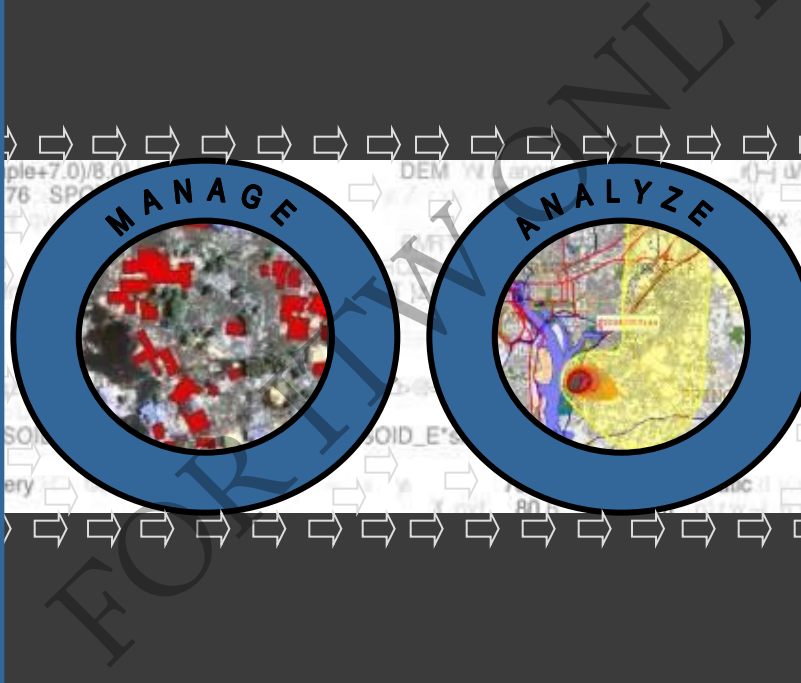
Increasing Threats = Evolution of Security Solutions

Information Sharing Is Critical

Data Capture &
Sensor Fusion



Combination of Geospatial
& Emergency Response Technologies



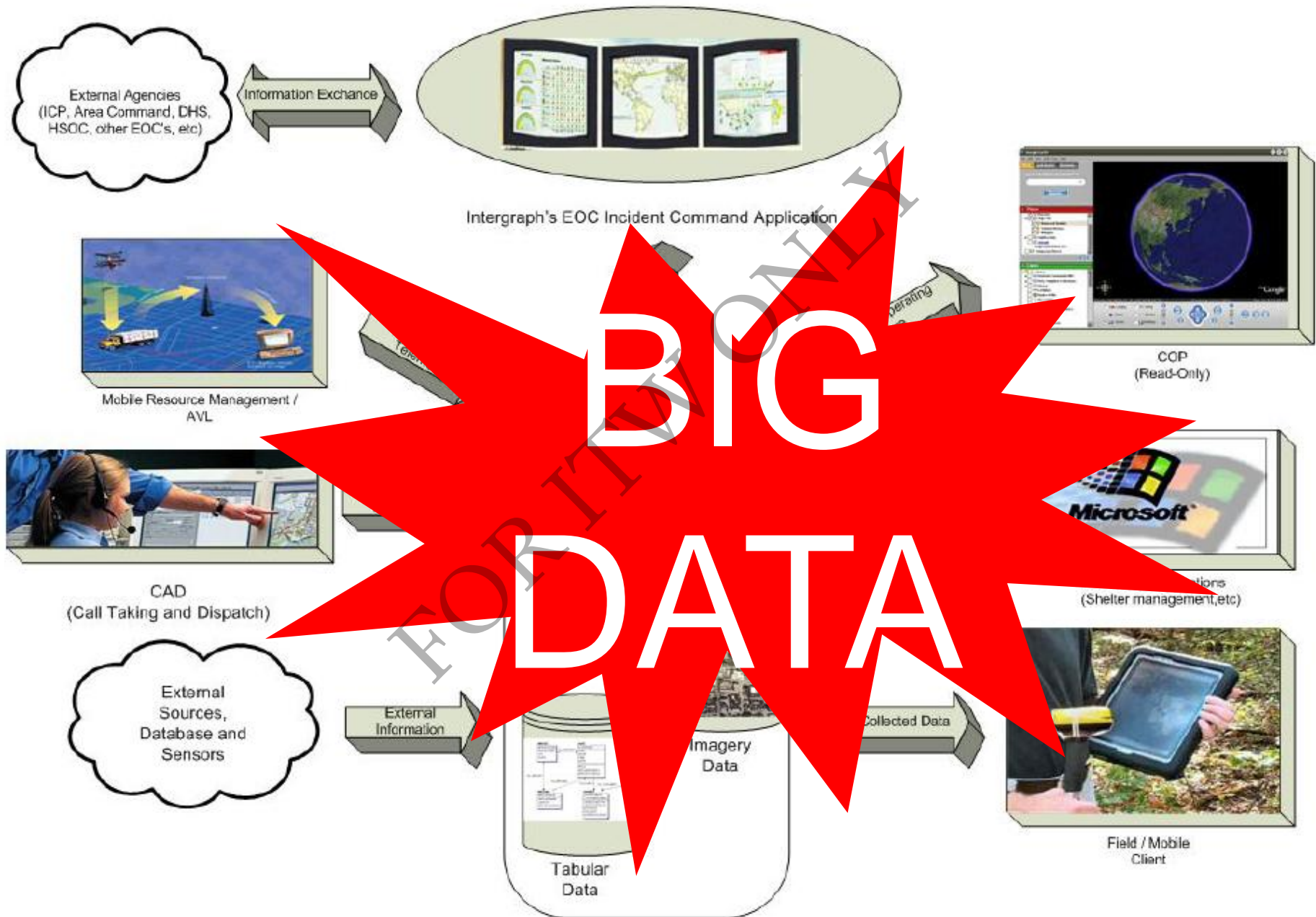
Interagency Data Integration



From Need to Know to- Need to Share to- Responsibility to Provide

Provides Enhanced Situational Awareness

Emergency Operations Center Operational Model

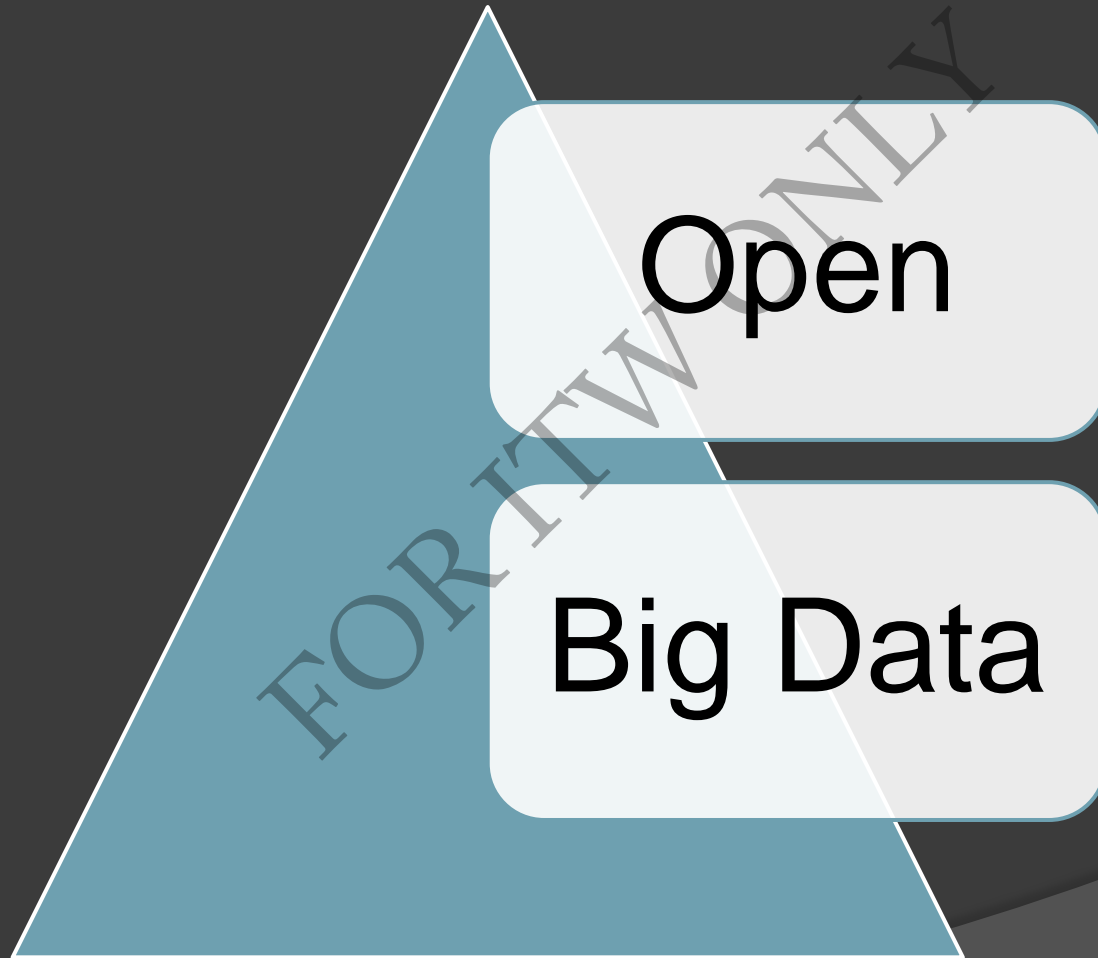


How big is data?

⦿ We are talking about:

- Up to 500,000,000,000 records
- Up to several Peta bytes
- No commercial database can deal with

Critical Issues



Open Standards

- Standardization is the reason for the success of the Internet, the World Wide Web, e-Commerce, and the emerging wireless revolution. The reason is simple:
 - our world is going through a communications revolution on top of a computing revolution. Communication means “transmitting or exchanging through a common system of symbols, signs or behavior.” Standardization means “agreeing on a common system.”

Interoperability

- ◎ The IEEE Glossary defines interoperability as:
 - the ability of **two or more systems or components** to **exchange information** and to **use the information** that has been exchanged.
- ◎ ISO/IEC 2382-01, *Information Technology Vocabulary, Fundamental Terms*, interoperability
 - "The capability to **communicate, execute programs, or transfer data among various functional units** in a manner that requires the user **to have little or no knowledge of the unique characteristics** of those units"

'Service' in Service Oriented Architecture

⦿ Service

- A mechanism to bind the needs of demanders and the capabilities of providers.
- a set of pre-defined Interfaces are provided by this mechanism
- Services have interfaces

OGC role in Disaster Management

- Emergency Response and Disaster Management **are different domains of activity with different information sharing requirements**. They do, however, overlap and in both domains there is a need to rapidly ***discover, share, integrate and apply geospatial information***.
- The standards work of OGC plays a key role in addressing this need. Speeding the flow of location information means more lives and property saved and less risk for first responders.

OGC and Alliance Partners



- Primary alliances for standards coordination
 - COMCARE
 - Digital Geospatial Information Working Group (DGIWG)
 - Internet Engineering Task Force (IETF)
 - OASIS
 - International Organization for Standards (ISO)
 - Open Mobile Alliance (OMA)
 - National Institute of Building Sciences (NIBS)
 - National Emergency Number Association (NENA)
 - IEEE Technical Committee 9 (Sensor Web)



- Secondary alliances
 - Global Spatial Data Infrastructure Association (GSDI)
 - Web3D
 - World Wide Web Consortium (W3C)
 - Simulation Interoperability Standards Organization
 - International Alliance for Interoperability (IAI)
 - IEEE GRSS and ICEO
 - Taxonomic Data Working Group (TDWG)



- Others

Disaster Management is an issue consists of mass interfaces and needed to be integrated

We need interoperability

Interoperability Committee in USA

- State Interoperability Executive Committee (SIEC)
 - Our emergency responders cannot always talk to each other during crisis situations. The State Interoperability Executive Committee (SIEC) was formed by legislative mandate in 2003 and works to ensure:
 - all emergency responders
 - across all levels of government and across all jurisdictions
 - can talk to each other and share data:
 - on demand
 - in real-time
 - as needed
 - as authorized
- Commonwealth Interoperability Coordinators Office (CICO)



Benefits

1. We avoid potentially redundant costs by implementing shared systems between agencies that can consolidate fixed assets. This reduces the amount of unnecessary duplicated infrastructure, system management and operational expenses, including network connectivity, maintenance, leased lines fees, and land leasing fees
2. We increase productivity as a result of better coordination between first responders. This occurs with using a shared communications system that handles voice, data, and mutual-aid needs during day-to-day and major emergency situations.



About OGC

Vision, Mission, & Goals

Our process & your input

OGC History

OGC Programs

▼ Domains

Aviation

Built Environment and 3D

Business Intelligence

Defense and Intelligence

Emergency Response

Geosciences & Environment

Government & SDI

Mobile Internet

Sensor Webs

Universities and Research

Interoperability Initiatives

Endorsements

Members

Alliance Partners

▼ Join OGC

Benefits

Contact Us

Download Application

Member Levels & Fees

The OGC's Role in Emergency Response and Disaster Management

Table of Contents:

[Communication](#)[OGC Working Group](#)[Interoperability](#)[Members & Partners](#)[EDM Working Group](#)[Standards](#)[Participate](#)

Overview

Emergency Response and Disaster Management are different domains of activity with different information sharing requirements. They do, however, overlap and in both domains there is a need to rapidly *discover, share, integrate and apply geospatial information*. The standards work of the Open Geospatial Consortium (OGC) plays a key role in addressing this need. Speeding the flow of location information means more lives and property saved and less risk for first responders.

Sahana also works with the OGC's candidate encoding to exchange lightweight location with other OGC standards, such as those for such as the [OASIS Common Alerting Protocol](#) organizations to make geospatial information infrastructure.

Haiti Earthquake

Immediately after the 2010 earthquake in make [information](#) available for immediate web services standards.

Chinese Taipei

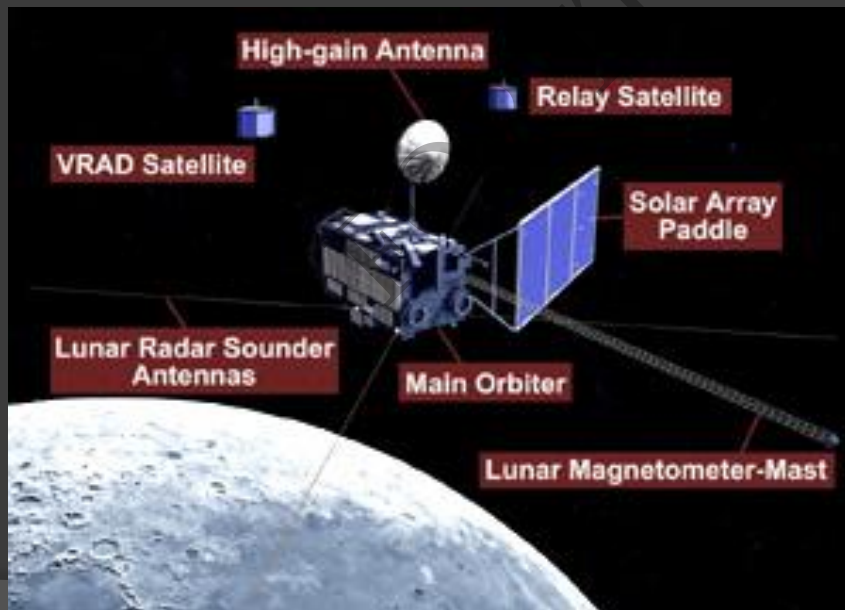
In [Chinese](#) Taipei, massive flows of rock, soil and water in populated valleys pose a major threat. OGC standards play an important role, along with other standards, in connecting advanced monitoring instruments to systems that also receive and broadcast citizen-originated warnings about imminent or in-progress debris flows.



HOW CLOUD COMPUTING HAS CONTRIBUTED TO DISASTER MANAGEMENT

SELENE(KAGUYA)

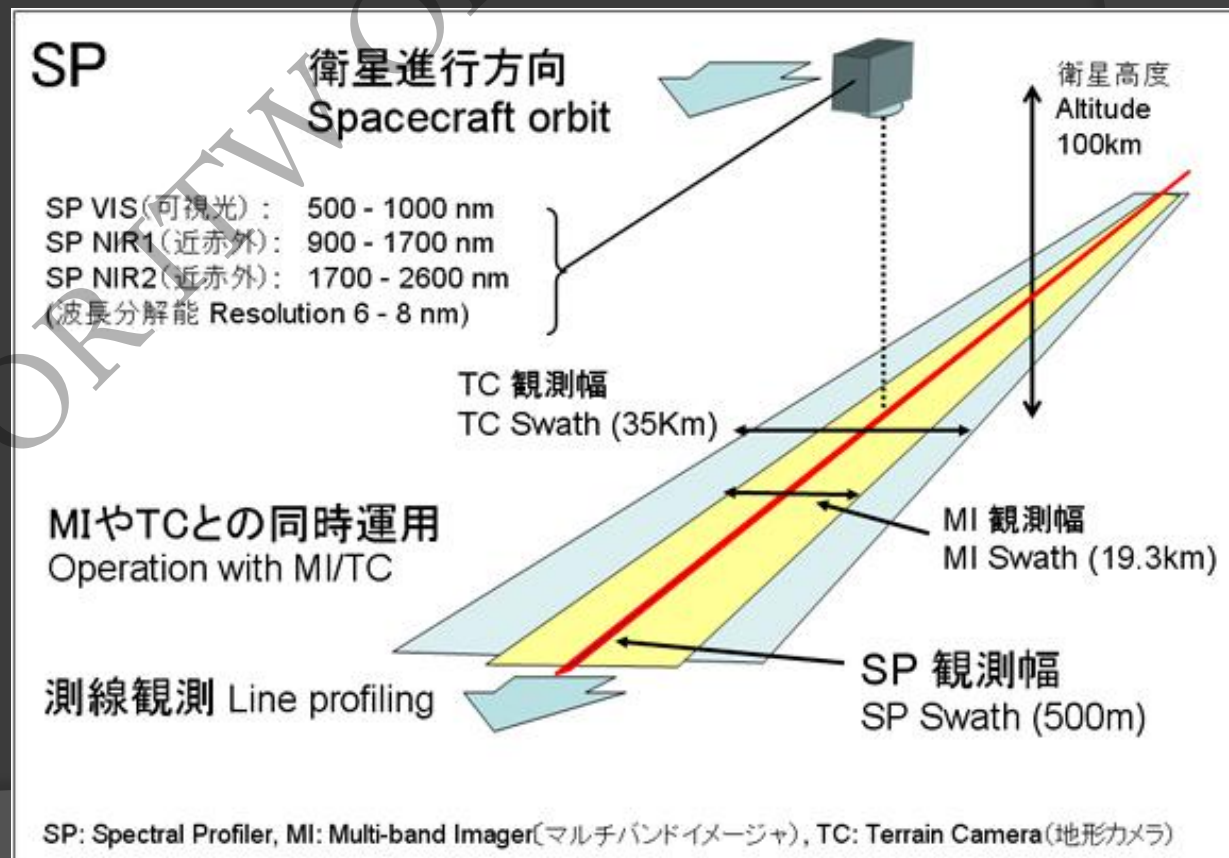
- JAXA
- SELEnological and Engineering Explorer
- Launched on 2007/9/14



Spectral Profiler

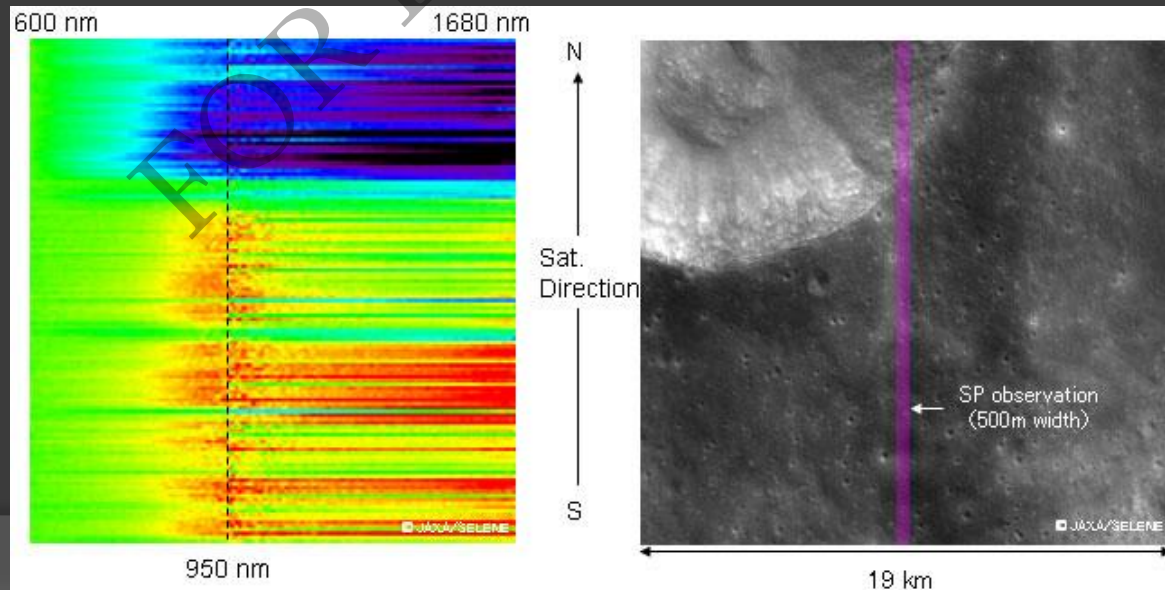
Spectrum resolution : 6-8 nm

Spatial resolution : 500 m



Fact sheets

- Revolutions=7,000
- Observation data for each revolution saved to a CSV file
 - File size of a CSV file =150MB
 - Total capacity is 1TB
 - Each column = 1 pixel = 1 observation point = 500m * 500m
 - 544 spectral data saved to each column

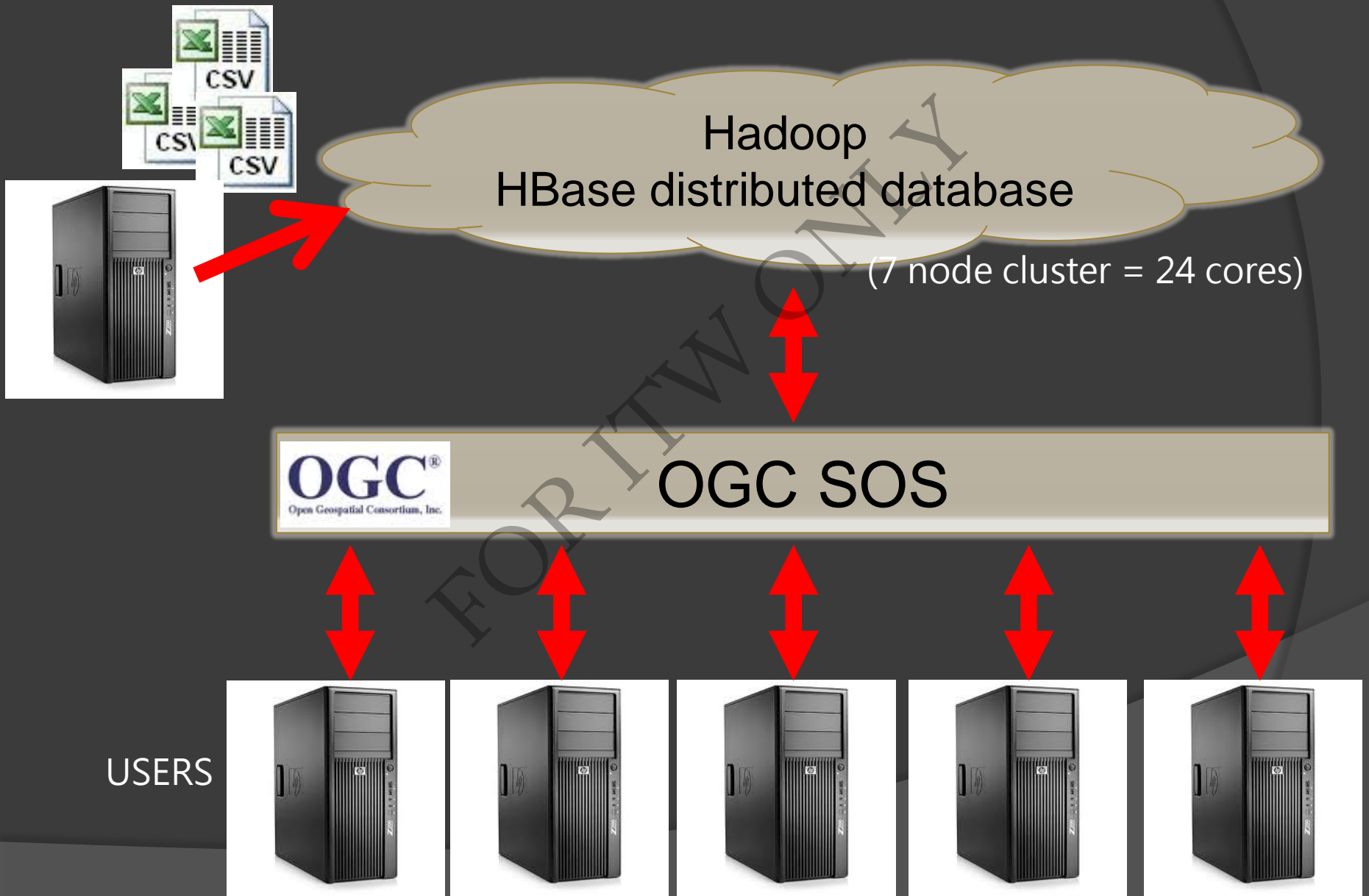


Time consuming

41 billions of records, needs **4 years** to import into relational database

A1		SP2A0_02NSN01500_001_0001.spc														
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	SP2A0_02	1500	0	-1	SHORT	OBS-NOR	Nominal	8.87E+08	18.42	16.55	243	16.71	19.55	16.97	21.97	4.759
2	SP2A0_02	1500	1	-1	SHORT	OBS-NOR	Nominal	8.87E+08	18.42	16.55	243	16.71	19.64	16.97	21.97	4.759
3	SP2A0_02	1500	2	-1	SHORT	OBS-NOR	Nominal	8.87E+08	18.42	16.55	243	16.71	19.64	16.97	21.97	4.759
4	SP2A0_02	1500	3	-1	SHORT	OBS-NOR	Nominal	8.87E+08	18.42	16.55	243	16.71	19.64	16.97	21.97	4.759
5	SP2A0_02	1500	4	-1	SHORT	OBS-NOR	Nominal	8.87E+08	18.42	16.55	243	16.71	19.64	16.97	21.97	4.759
6	SP2A0_02	1500	5	-1	SHORT	OBS-NOR	Nominal	8.87E+08	18.42	16.55	243	16.71	19.55	16.97	21.97	4.759
7	SP2A0_02	1500	6	-1	SHORT	OBS-NOR	Nominal	8.87E+08	18.42	16.55	243	16.71	19.55	16.97	21.97	4.759
8	SP2A0_02	1500	7	-1	SHORT	OBS-NOR	Nominal	8.87E+08	18.42	16.55	243	16.71	19.64	16.97	21.97	4.759
9	SP2A0_02	1500	8	-1	SHORT	OBS-NOR	Nominal	8.87E+08	18.42	16.55	243	16.71	19.64	16.97	21.97	4.759
10	SP2A0_02	1500	9	-1	SHORT	OBS-NOR	Nominal	8.87E+08	18.42	16.55	243	16.71	19.64	16.97	21.97	4.759
11	SP2A0_02	1500	10	-1	SHORT	OBS-NOR	Nominal	8.87E+08	18.51	16.55	243	16.71	19.64	16.97	21.97	4.759
12	SP2A0_02	1500	11	-1	SHORT	OBS-NOR	Nominal	8.87E+08	18.42	16.55	243	16.71	19.64	16.97	21.97	4.759
13	SP2A0_02	1500	12	-1	SHORT	OBS-NOR	Nominal	8.87E+08	18.42	16.55	243	16.71	19.64	16.97	21.97	4.759
14	SP2A0_02	1500	13	-1	SHORT	OBS-NOR	Nominal	8.87E+08	18.42	16.55	243	16.71	19.64	16.97	21.97	4.759
15	SP2A0_02	1500	14	-1	SHORT	OBS-NOR	Nominal	8.87E+08	18.42	16.55	243	16.71	19.64	16.97	21.97	4.759
16	SP2A0_02	1500	15	-1	SHORT	OBS-NOR	Nominal	8.87E+08	18.51	16.55	243	16.71	19.64	16.97	21.97	4.759
17	SP2A0_02	1500	16	-1	SHORT	OBS-NOR	Nominal	8.87E+08	18.42	16.55	243	16.71	19.64	16.97	21.97	4.759
18	SP2A0_02	1500	17	-1	SHORT	OBS-NOR	Nominal	8.87E+08	18.51	16.55	243	16.71	19.64	16.97	21.97	4.759
19	SP2A0_02	1500	18	-1	SHORT	OBS-NOR	Nominal	8.87E+08	18.42	16.55	243	16.71	19.64	16.97	21.97	4.759
20	SP2A0_02	1500	19	-1	SHORT	OBS-NOR	Nominal	8.87E+08	18.51	16.55	243	16.71	19.64	16.97	21.97	4.759

Data publishing mechanism



RAW DATA

SP2A0_02NLN01540_001_0001.spc, 1540, 0, -1, LONG, OBS-NORMAL, Nominal, 886847764.124000, 17.990000, 16.969999, 243.000000, 17.049999, 19.120001, 17.139999, 21.059999, 4.759000, 4.759000, 4.759000, 28.450001, 17.959999, 113.124947, 1.523947, 37.021706, 340.717743, 37.017242, 340.712677, 0.098721, 42.324886, 120.870209, 63.473141, 120.778130, 18.696699, -12.872400, -18.905001, 15.620400, 15.620400, 15.278600, 4.973500, -14.826800, 14.867200, 0, 1, 0,

SP2A0_02NLN01540_001_0001.spc, 1540, 1, -1, LONG, OBS-NORMAL, Nominal, 886847764.124000, 17.990000, 16.969999, 243.000000, 17.049999, 19.120001, 17.139999, 21.059999, 4.759000, 4.759000, 4.759000, 28.450001, 17.959999, 113.124947, 1.523947, 37.021706, 340.717743, 37.017542, 340.712877, 0.098721, 42.324886, 120.870209, 63.473141, 120.778130, 18.696699, -12.872400, -18.905001, 15.620400, 15.620400, 15.278600, 4.973500, -14.826800, 14.867200, 0, 1, 0,

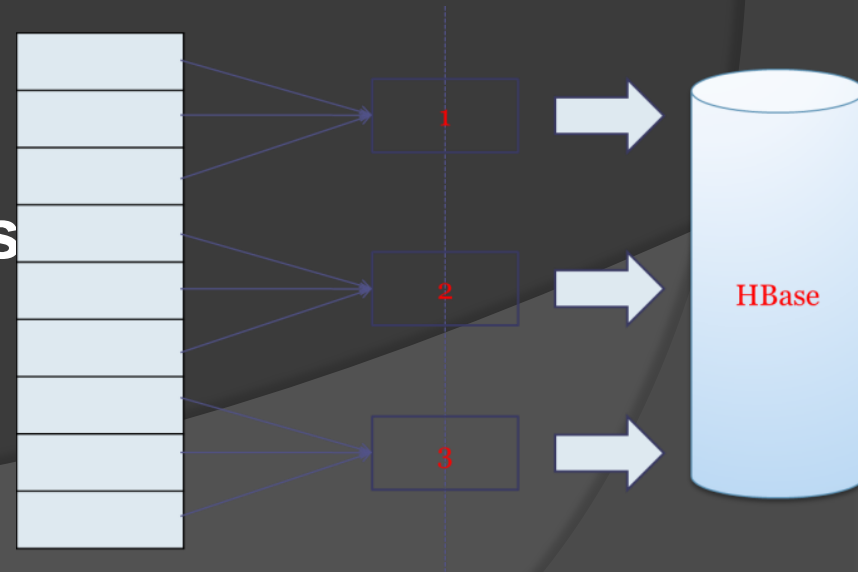
Performance

Records to be imported

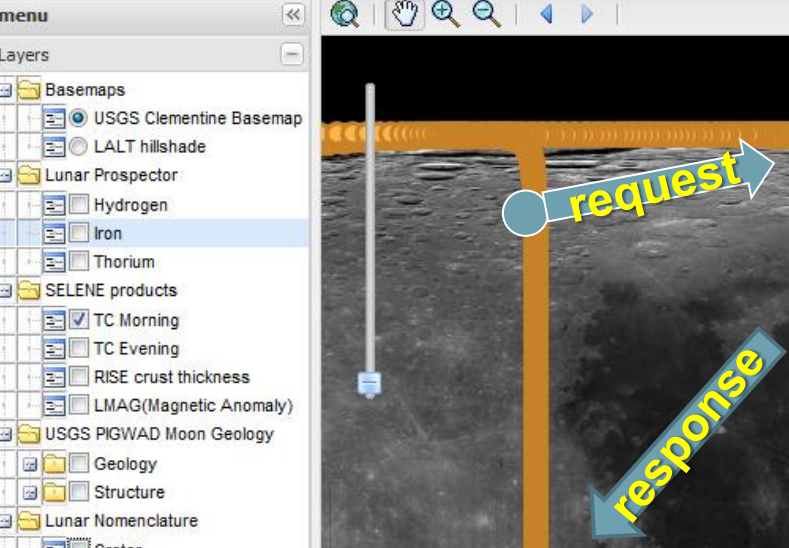
- Original data= 544 x 10,800 points x 7,000 rev \approx 410 billions records
- Current data= ~~544~~ x 10,800 points x 7,000 rev \approx 70 millions records

Importing time

- From 4 years to 3 weeks

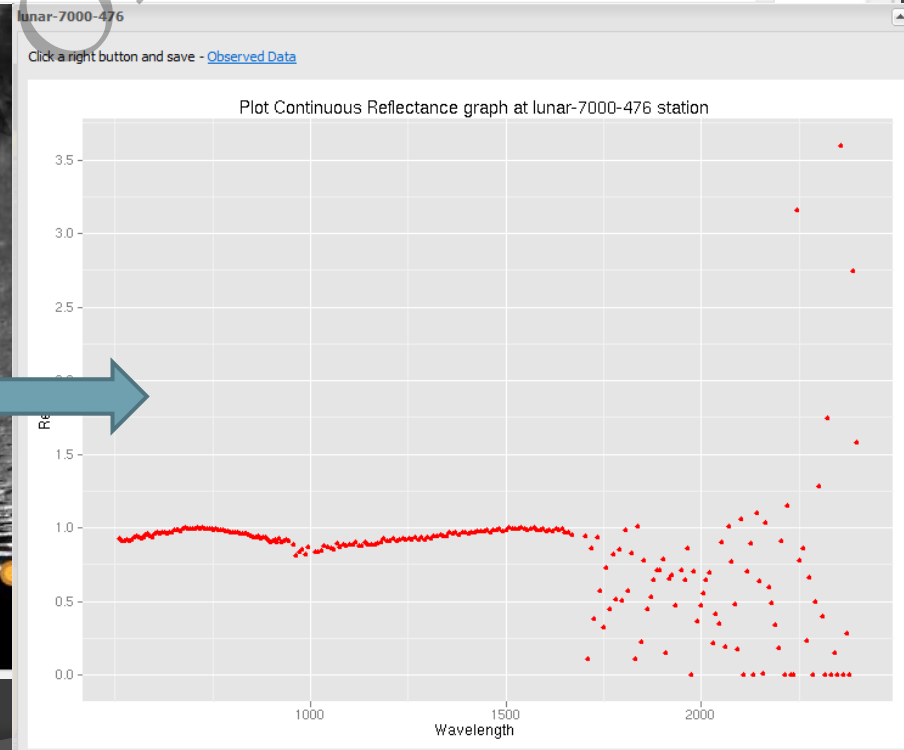


Lunar WMS



```
<?xml version="1.0" encoding="UTF-8" ?>
- <GetObservation service="SOS" srsName="urn:ogc:def:crs:EPSG:4326" version="1.0.0"
  xmlns="http://www.opengis.net/sos/1.0" xmlns:gml="http://www.opengis.net/gml"
  xmlns:ogc="http://www.opengis.net/ogc" xmlns:om="http://www.opengis.net/om/1.0"
  xmlns:ows="http://www.opengis.net/ows/1.1" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="http://www.opengis.net/sos/1.0 http://schemas.opengis.net/sos/1.0/sosGetObservation.xsd">
  <offering>LUNAR</offering>
  <observedProperty>urn:ogc:def:phenomenon:OGC:1.0.0:hyper:REF:VIS:554.5</observedProperty>
  <observedProperty>urn:ogc:def:phenomenon:OGC:1.0.0:hyper:REF:VIS:560.5</observedProperty>
  <observedProperty>urn:ogc:def:phenomenon:OGC:1.0.0:hyper:REF:VIS:566.7</observedProperty>
  <observedProperty>urn:ogc:def:phenomenon:OGC:1.0.0:hyper:REF:VIS:572.6</observedProperty>
  <observedProperty>urn:ogc:def:phenomenon:OGC:1.0.0:hyper:REF:VIS:578.5</observedProperty>
  <observedProperty>urn:ogc:def:phenomenon:OGC:1.0.0:hyper:REF:VIS:578.5</observedProperty>
  <observedProperty>urn:ogc:def:phenomenon:OGC:1.0.0:hyper:REF:VIS:584.5</observedProperty>
  <observedProperty>urn:ogc:def:phenomenon:OGC:1.0.0:hyper:REF:VIS:596.7</observedProperty>
  <featureOfInterest>
  <ObjectID>lunar-1508-3377</ObjectID>
  </featureOfInterest>
  <responseFormat>text/xml;subtype="om/1.0.0"</responseFormat>
</GetObservation>
```

```
<?xml version="1.0" encoding="UTF-8" ?>
- <om:ObservationCollection xmlns:om="http://www.opengis.net/om/1.0" xmlns:gml="http://www.opengis.net/gml"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:xlink="http://www.w3.org/1999/xlink"
  xmlns:swe="http://www.opengis.net/swe/1.0.1" xmlns:sa="http://www.opengis.net/sampling/1.0" gml:id="oc_0"
  xsi:schemaLocation="http://www.opengis.net/om/1.0 http://schemas.opengis.net/om/1.0.0/om.xsd
  http://www.opengis.net/sampling/1.0 http://schemas.opengis.net/sampling/1.0.0/sampling.xsd">
+ <gml:boundedBy>
- <om:member>
- <om:Observation gml:id="ot_217869">
+ <om:samplingTime>
+ <om:procedure xlink:href="urn:ogc:object:feature:hyper:lunar:1508:3377" />
+ <om:observedProperty>
+ <om:featureOfInterest>
- <om:result>
- <swe:DataArray>
- <swe:elementCount>
- <swe:Count>
- <swe:value>1</swe:value>
- </swe:Count>
- </swe:elementCount>
+ <swe:elementType name="Components">
- <swe:encoding>
- <swe:TextBlock decimalSeparator="." tokenSeparator="," blockSeparator=";" />
- </swe:encoding>
- <swe:values>2008-02-09T20:13:47.893+09:00,lunar-1508-3377,0.120700,0.122700,0.123500,0.124100,0.125400,0.125400,0.127400,0.128100;</swe:values>
- </swe:DataArray>
- </om:result>
- </om:Observation>
- </om:member>
</om:ObservationCollection>
```

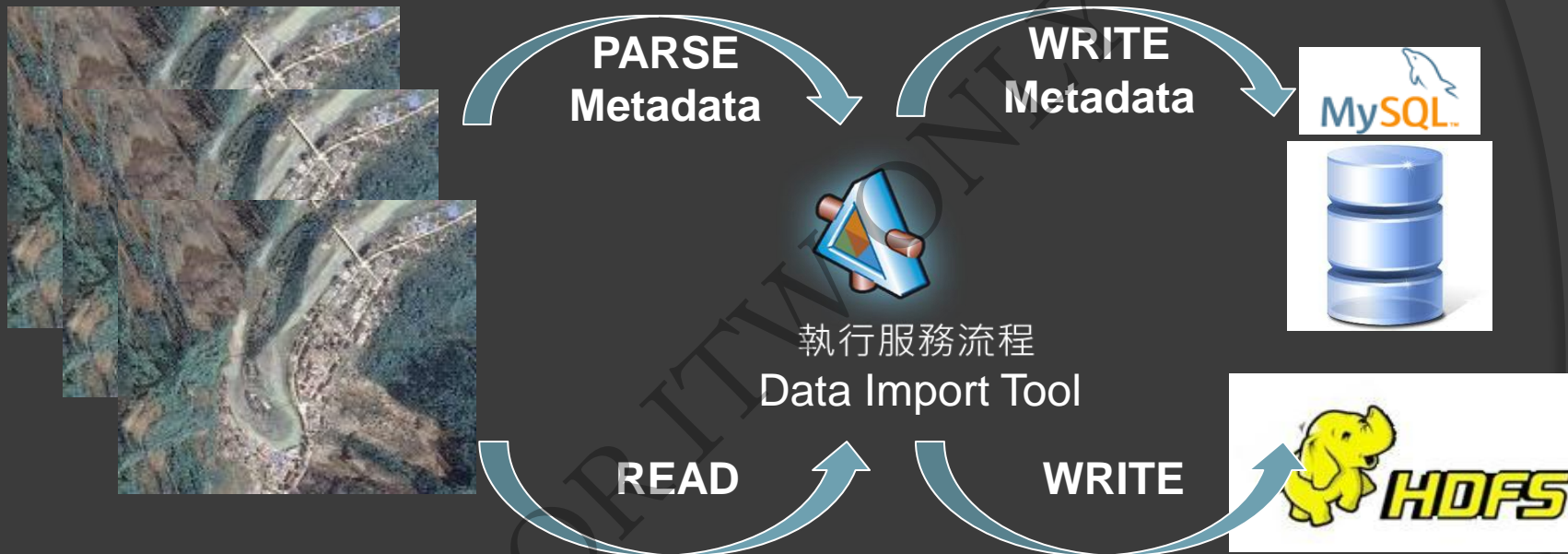


Plot Reflectance graph at lunar-7000-476 station

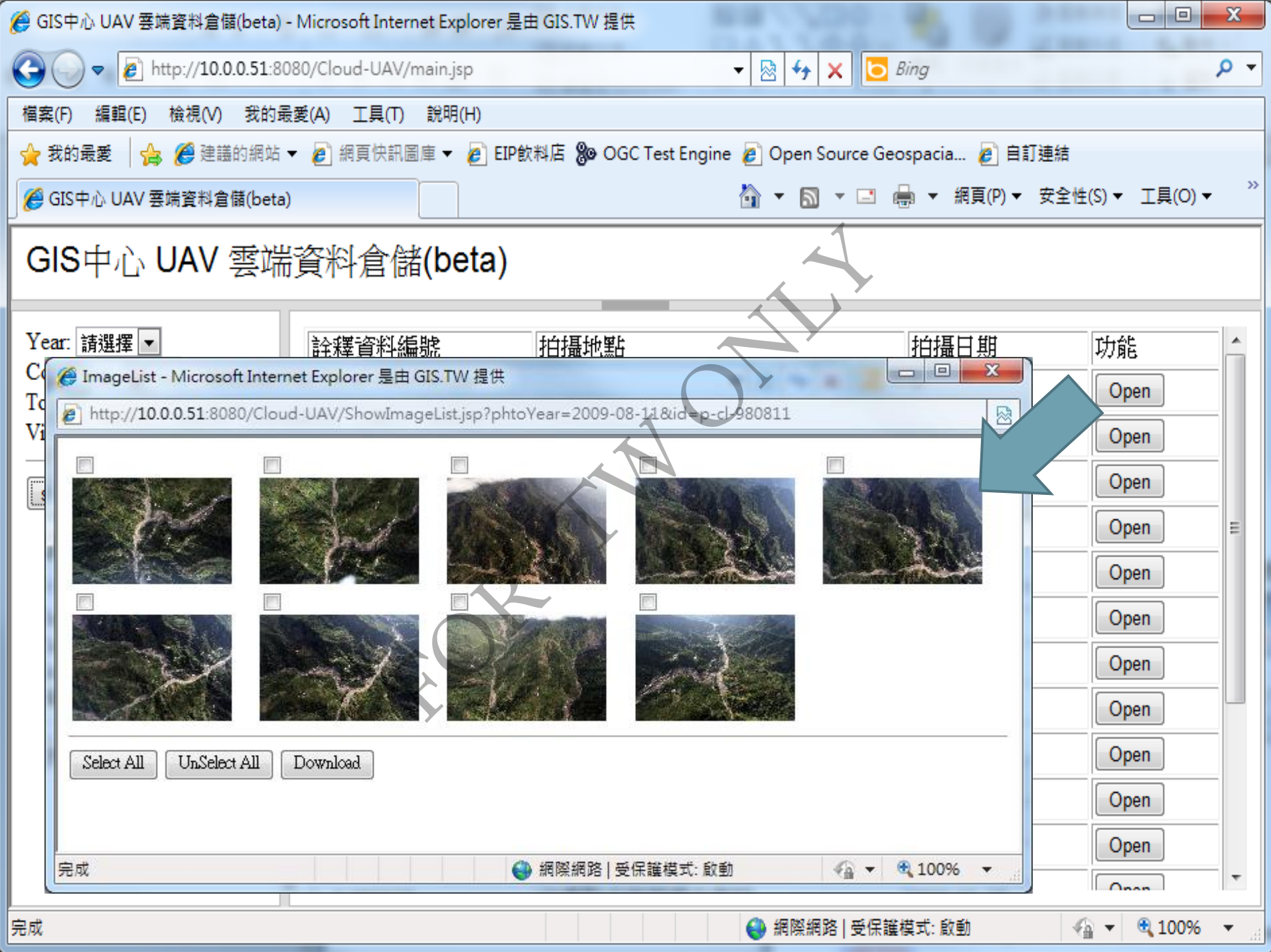
Satellite Image management

- Historical Data
 - Several peta bytes stored in TAPES
 - Slow, out of the date and can't be retrieve online
 - Costs of storing(need thousands of tapes, Tapes spec changes from time to time)





* Peta bytes historical satellite images





Cloud Configuration for Flood Dashboard

CREST Hydrological Model

TRMM based Global Rainfall Estimates

Radarsat Images & flood extent maps

MODIS Daily Flood Extent Map

Global Disaster and Alert and Coordination System (GDACS)

Namibian River Gauge Stations - Daily Measurements

Namibia River Gauge Data base

Flood Dashboard Display Service
- Mashup
- Google Maps Inset
- Plot Package

http server

Storage – 1 year
Hyperion & ALI Level 1R

Storage – 1 year
Hyperion & ALI Level 1G

Storage – 1 years
Hyperion & ALI Level 1R
and Level 1G AC

Storage – 1 year
User Defined L2
Products
e.g. EO-1 Flood Mask

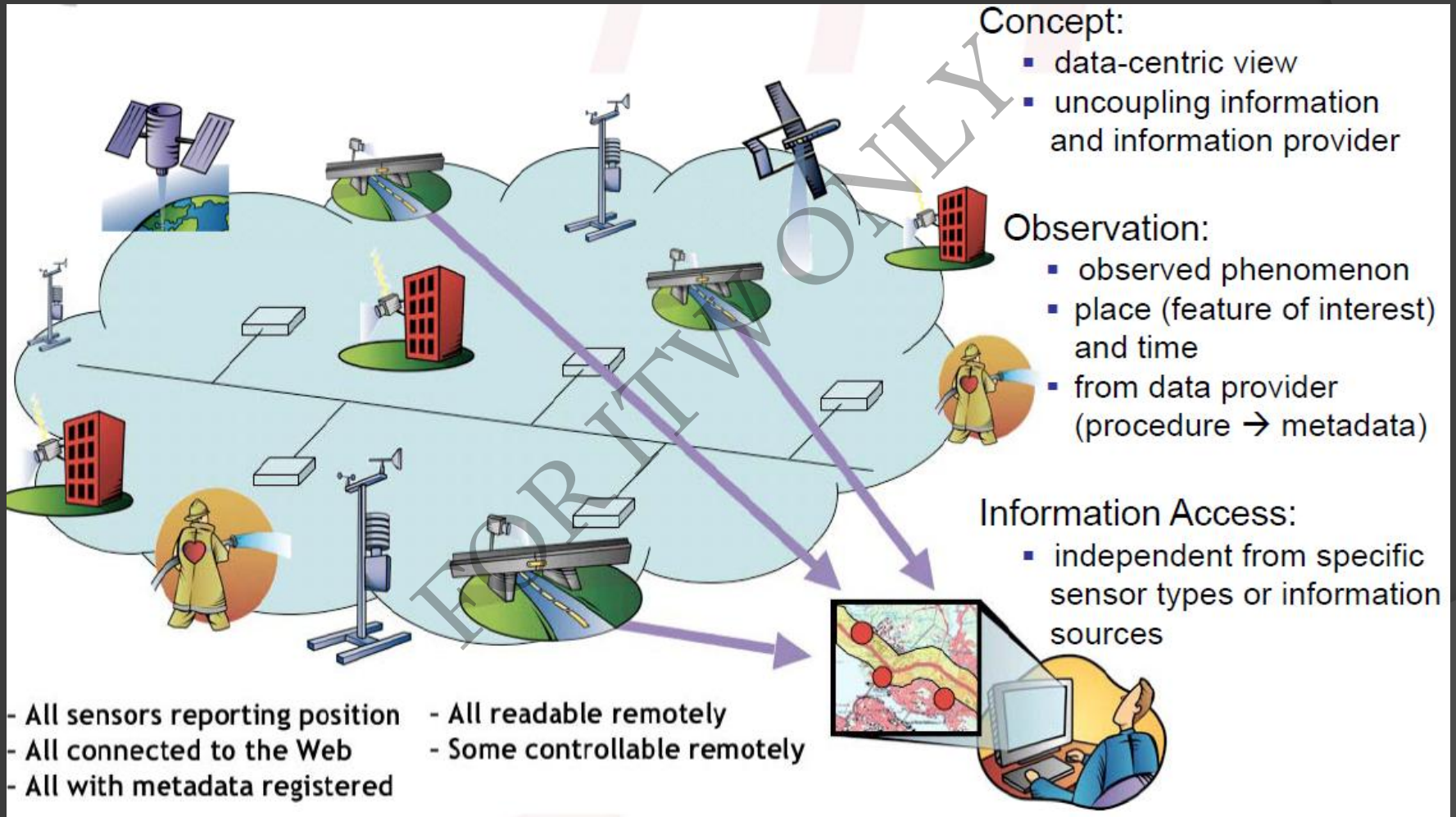
- Eucalyptus/Open Stack-based Elastic Cloud SW
- 300+ core processors
- 40 x 2 Tbytes of storage
- 10 Gbps connection to GSFC
- being upgraded to 80 Gbps (Part of OCC)

•**Hadoop**/Tiling

- Supplied by Open Cloud Consortium
- Open Science Data Cloud Virtual Machines & HTTP server to VM's



OGC SWE(Sensor Web Enablement)



Permanent/Mobilized Monitoring Station

觀測站展示 即時雨量 行動站管理平台 應變表單 設備管理 資料供應平台 參數設定 回首頁

電子地圖 航照圖 混合地圖

- 01.白布帆站 (Baibufan Station)
- 02.九份二山站 (Jiufen-Ershan Station)
- 03.神本站 (Shenmu Station)
- 04.上安站 (Shang-an Station)
- 05.郡坑站 (Jyunkeng Station)
- 06.豐丘站 (Fongciou Station)
- 07.大粗坑站 (Dacukeng Station)
- 08.鳳義坑站 (Fongyikeng Station)
- 09.射馬干站 (Shemangan Station)
- 10.華山站 (Huashan Station)
- 11.大興站 (Dasing Station)
- 12.豐山站 (Fongshan Station)
- 13.松鶴站 (Songhe Station)
- 14.坪頂站 (PingDing Station)
- 15.蘇樂站 (Suru Station)
- 16.玉峰站 (Yufong Station)
- 17.下田埔站 (Shiatainpu Station)
- 18.羌黃坑站 (Cianghuangkeng Station)
- 19.集來站 (Jilai Station)
- 20.來義站 (Laiyi Station)
- 21.大鳥站 (Daniao Station)



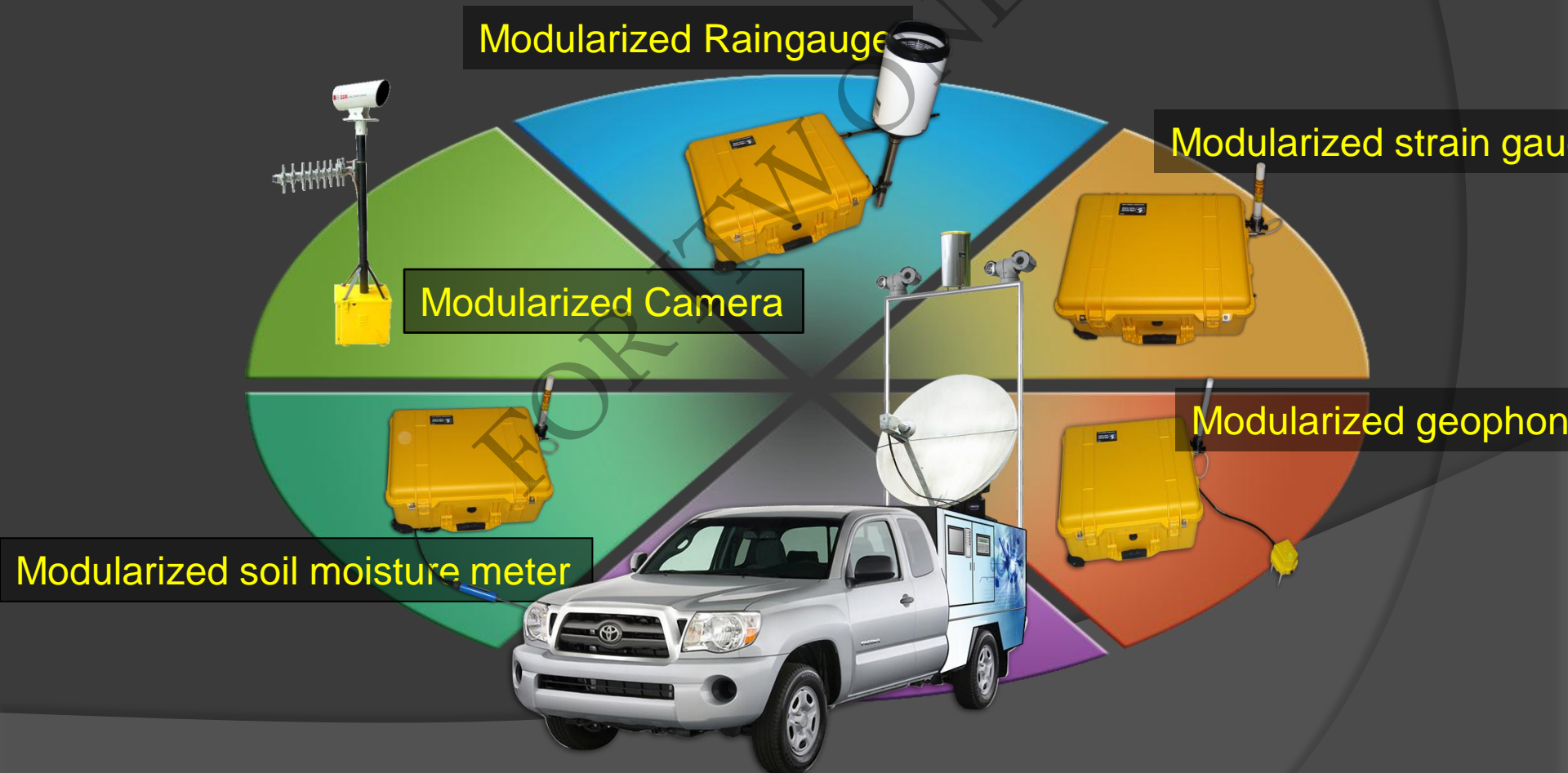
固定式土石流監測站x17
固定式崩塌監測站x1
固定式地滑監測站x1
固定式泥砂監測站x3
行動式土石流監測站x3

From Upstream to Downstream—permanent station



Mobilized monitoring equipment

To extent the coverage of monitoring



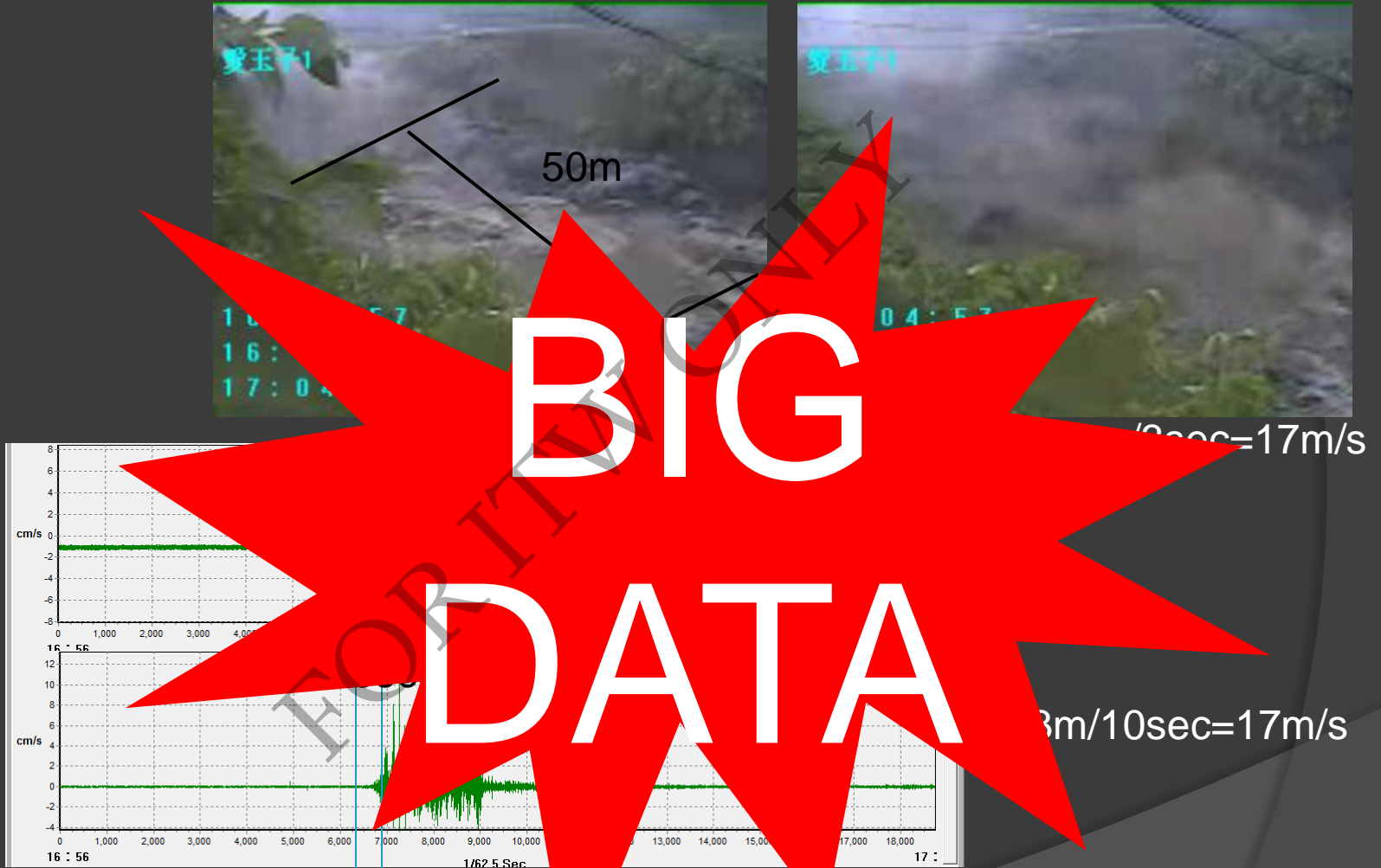
Portable monitoring equipment



Data Transmission



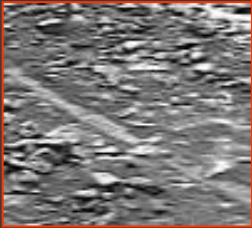
Estimating of debris flow speed



The comparison of downstream and midstream Underground Sound analysis by Wavelet Transform at Shen-Mu station (8/8 4:36~4:42)

Auto images change detection

Raw image

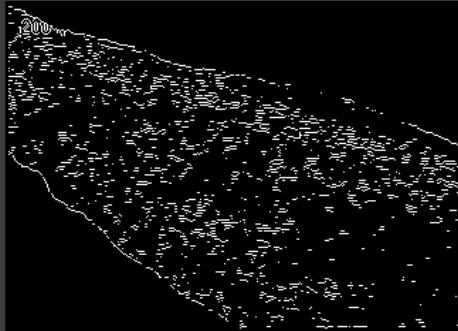


137	74	32	9	24	39	51	100	158	225
86	135	165	216	222	144	62	89	172	154
8	23	17	37	74	87	58	25	11	31
87	14	21	17	7	18	54	86	98	54
90	91	100	117	114	84	64	98	151	171
109	66	48	35	33	34	55	117	180	210
231	255	219	165	130	114	116	140	171	157
158	95	74	61	70	83	85	86	88	100
12	30	37	58	90	117	124	120	113	100
83	80	80	77	74	69	65	57	51	100
66	75	81	79	78	84	99	109	112	93
77	55	64	68	68	72	77	77	71	82
0	37	43	53	63	74	82	89	94	93
121	117	115	111	107	103	100	99	99	93
78	123	122	120	118	113	105	97	91	85
107	28	31	40	57	79	99	113	120	129
112	130	128	129	135	146	154	156	155	141
89	134	142	154	158	143	105	56	21	33
121	71	83	103	120	121	96	57	27	6
143	162	143	121	113	121	137	149	154	128

Image texture

No incident

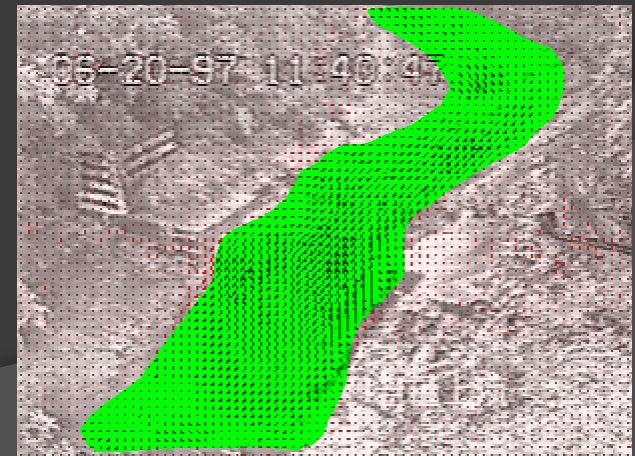
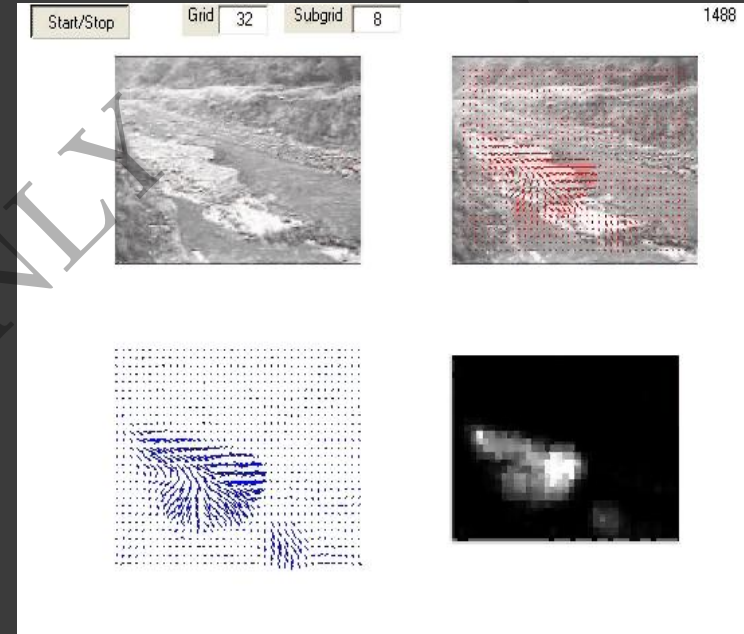
Debris flow



Texture voices



Image model



※ 土石流影像分析系統

選擇來源

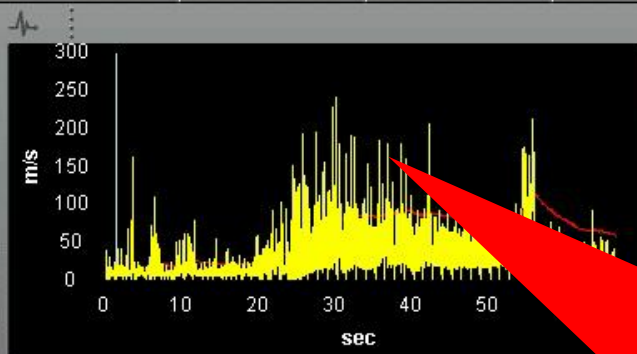
開啟影像

異常通報

輔助資訊

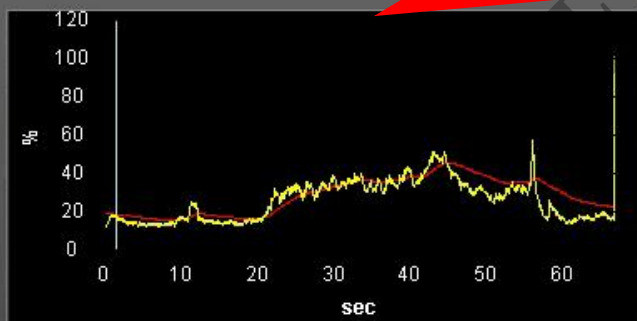
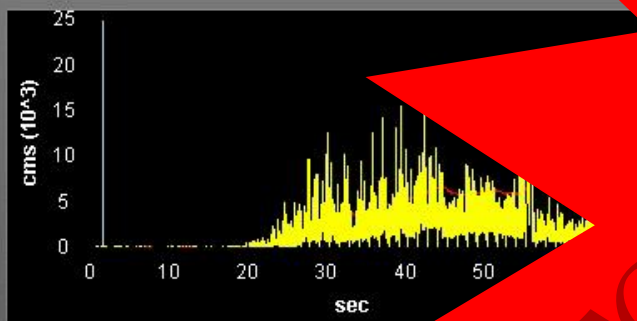
離開系統

警戒燈號



估計流速
10.29m/s

估計規模
9.0cms



拍攝

座標點位

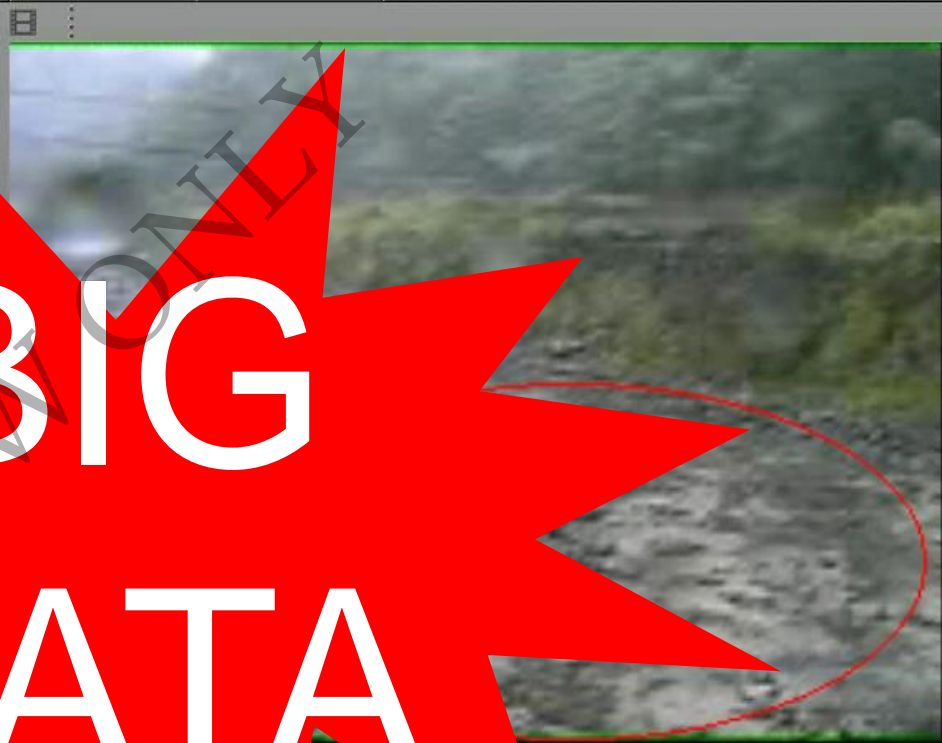
影像格式

jpg

影像大小

320*240

BIG
DATA



Erosion and Sedimentation Monitoring

Permanent station



sensors



高倍數攝影機



全景式攝影機



攝影機模組架設



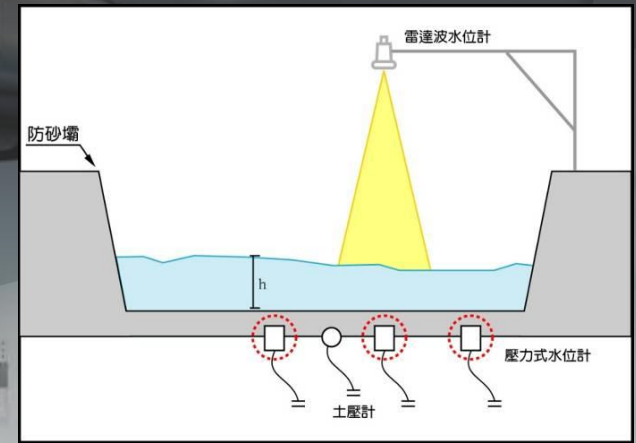
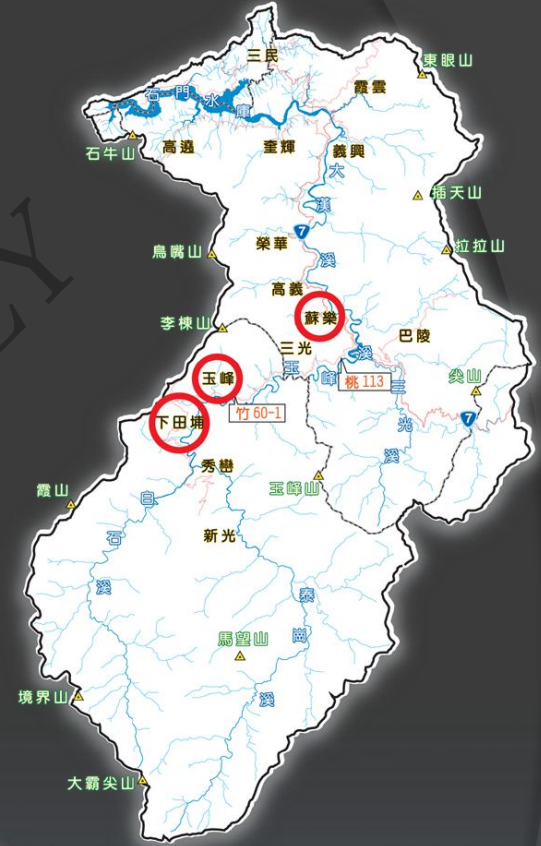
雷達波水位計



壓力式水位計

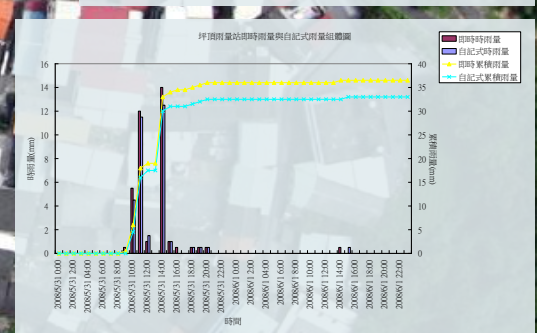
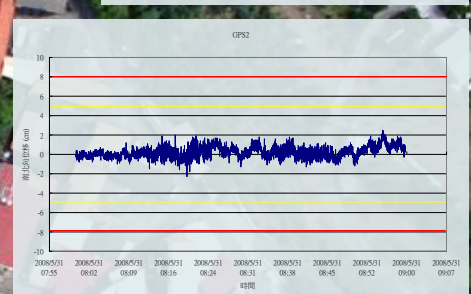
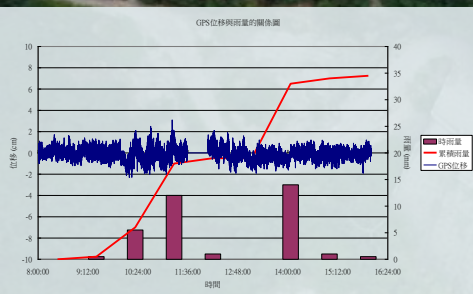


土壓計



Slope land Monitoring

自動播放 觀測展示訊 即時雨量 行動站管理模組 應變表單 設備管理 資料供應平台 管理系統



觀測站資訊

微氣候資訊

空間資訊

雨量分析

儀器設備簡介

坪頂觀測站資訊

伸縮計資訊

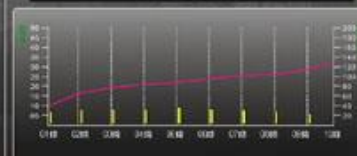
伸縮計群組-1	伸縮計群組-2	伸縮計群組-3	伸縮計群組-4
1-1 1 mm	2-1 1 mm	3-1 1 mm	4-1 1 mm
1-2 1 mm	2-2 1 mm	3-2 1 mm	4-2 1 mm
1-3 1 mm	2-3 1 mm	3-3 1 mm	4-3 1 mm
1-4 1 mm	2-4 1 mm	3-4 1 mm	4-4 1 mm



CCD監測畫面



雨量資訊



傾度盤資訊

傾度盤 0.1 度

GPS資訊

GPS-1 1 cm
GPS-2 1 cm
GPS-3 1 cm
GPS-4 1 cm
GPS-5 1 cm

比例尺 1:20000

坐標 45425.5 / 1524945.2

經緯度 454°25'45" / 15°24'62"

關鍵字

Search

Mountain road monitoring



國道邊坡管理系統-監測

資料管理

資料查詢

系統管理



GPS



地表伸縮計



地下傾斜管



地下水位計

TM-4
名稱：地表伸縮計4
位置：國道3號
3K+350 南頂邊坡

ETM3

TM4

ETM4

TM3

UWL1

圖例說明

正常

注意

警戒

疏散

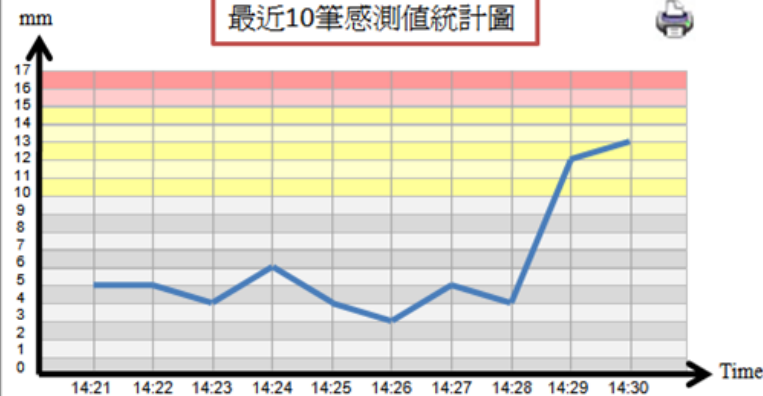


最近10筆資料

最近10筆感測值

序號	感測時間	感測值	狀態
1	2010/5/26 14:30	13mm	警戒
2	2010/5/26 14:29	12mm	警戒
3	2010/5/27 14:28	4mm	
4	2010/5/27 14:27	5mm	
5	2010/5/27 14:26	3mm	
6	2010/5/27 14:25	4mm	
7	2010/5/27 14:24	6mm	
8	2010/5/27 14:23	4mm	
9	2010/5/27 14:22	5mm	
10	2010/5/27 14:21	5mm	

最近10筆感測值統計圖



國道邊坡管理系統-監測

資料管理

資料查詢

區段

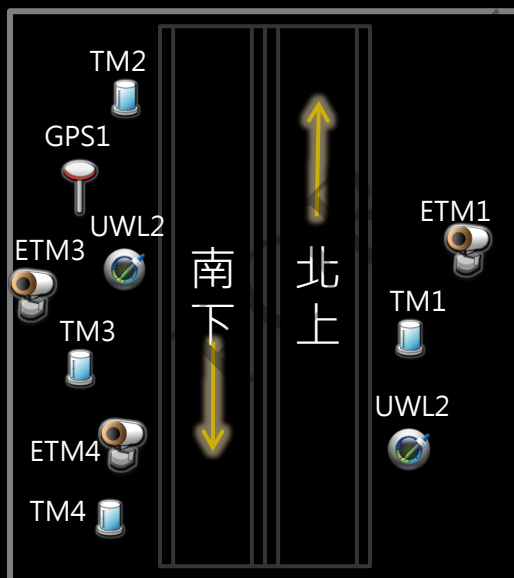
- ☐ 正常值
☐ 超過警戒值
☐ 超過行動值

系統管理

-  GPS
 地表伸縮計
 地下傾斜管
 地下水位計

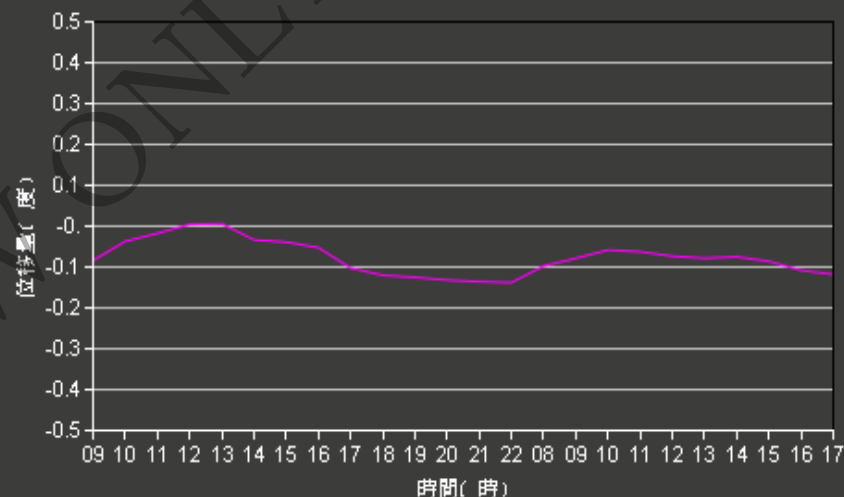
起
迄

- ☐ 正常值
☐ 超過警戒值
☐ 超過行動值








監測資料查詢

傾度盤 X



傾度盤：基準值 0度

-  綠燈：顯示目前監測結果安全。
 黃燈：顯示目前監測結果有微量變化，應進行疏散避難勸告。
 紅燈：顯示目前監測結果有顯著變化，得視實際狀況進行強制疏散。

-  警戒值(黃燈)：每分鐘位移量達到0.1度時發佈。
 行動值(紅燈)：每分鐘位移量達到0.3度時發佈。

River Monitoring



Mobilized monitoring

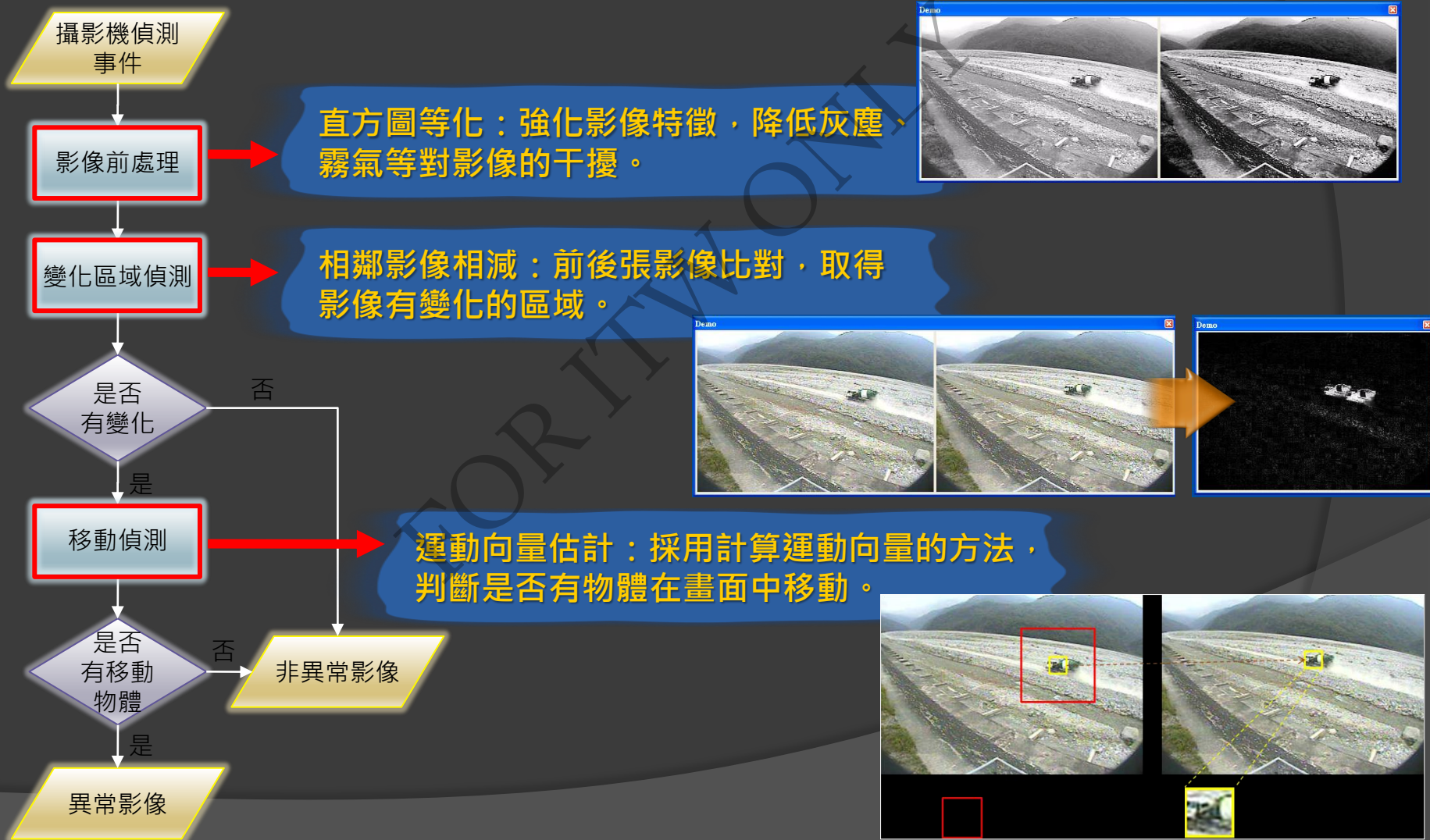


行動版-事件影像查詢

行動版-即時影像查詢

BIG data for river monitoring

影像判釋模組



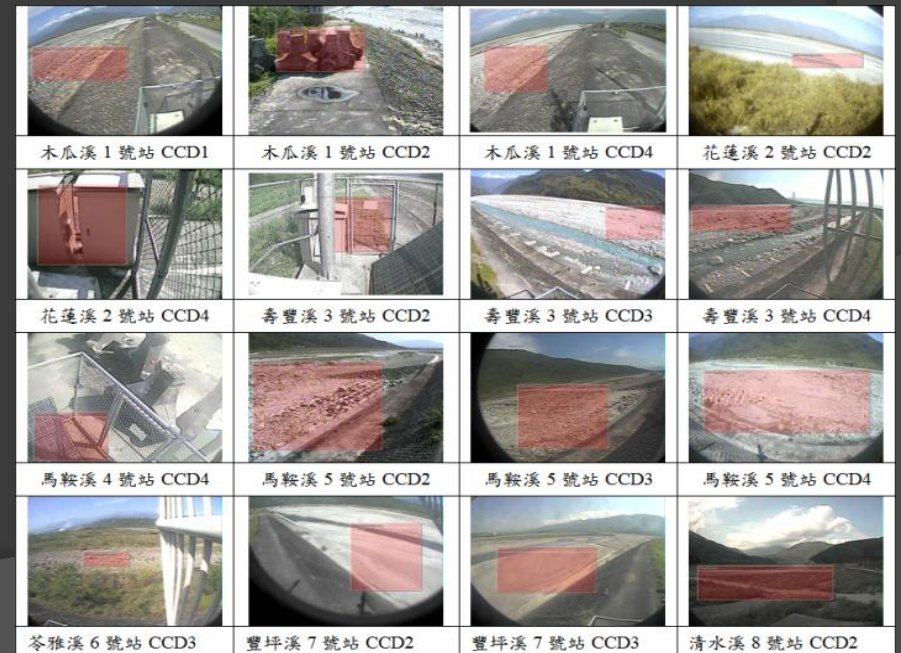
Analyze BIG data



Target on the area of interest

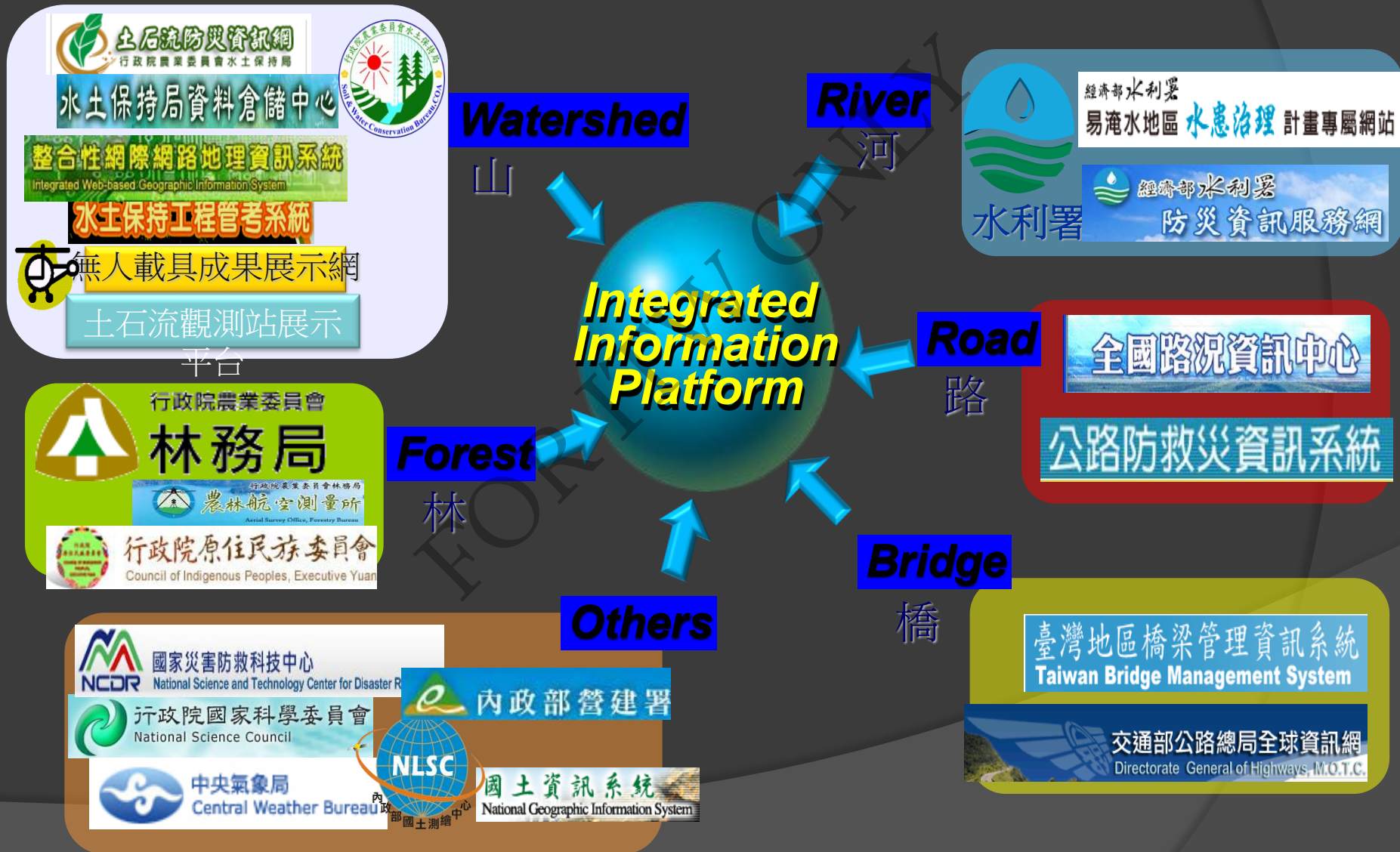
Filter the edge of images, shadow area
and movement of trees and bush

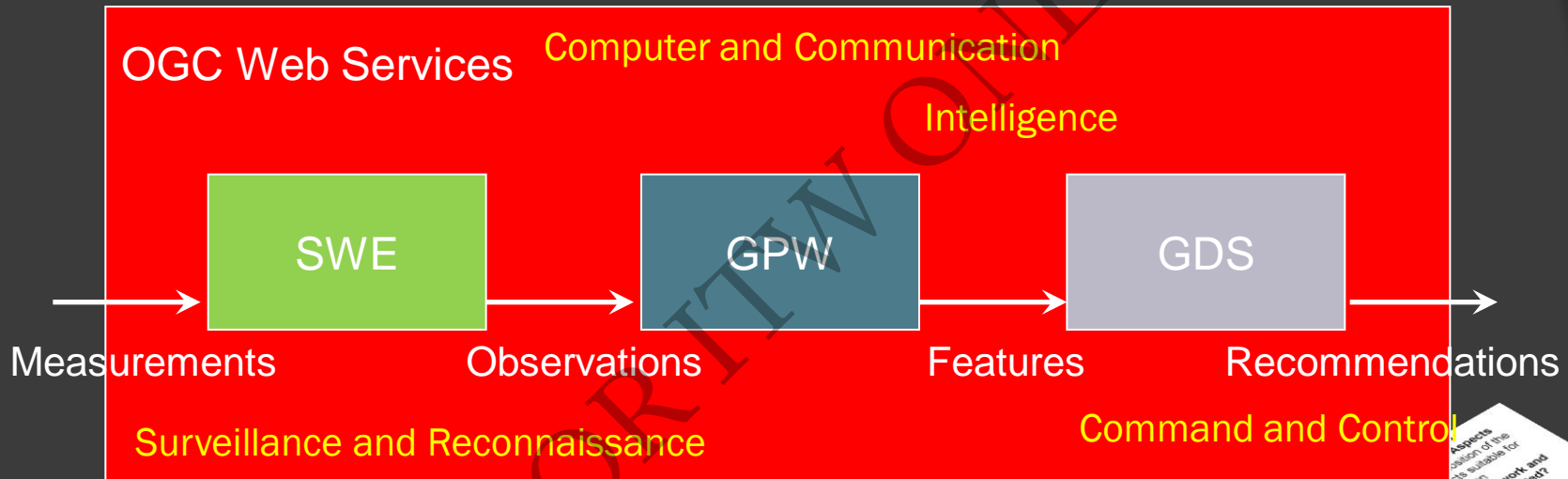
Define the size of object to reduce the
effect of noise



Integrated Information Platform

Information sharing & integration between agencies





SWE = Sensor Web Enablement
 GPW = Geo-Processing Workflow
 GDS = Geospatial Decision-support Services



C4ISR

A lot of applications needed

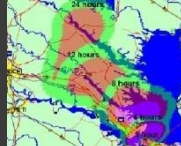
(most of them involving GIS technology...)



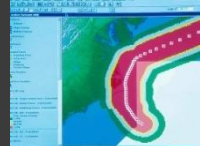
Explosives



Indoor Air



Weather



Hurricane



River Spill



Chemical



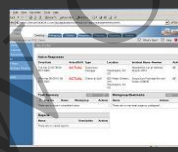
Vulnerability



Common Operating Picture



Social Network



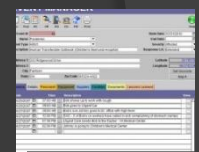
Incident Log



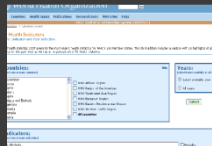
Dispatch



Resources



SOPs



Warrants



Accounting



Personnel



Pre-Plans



Permits



Investigations



Lessons



Maritime



Sensors



Detection



Unmanned Aerial



Biometric ID



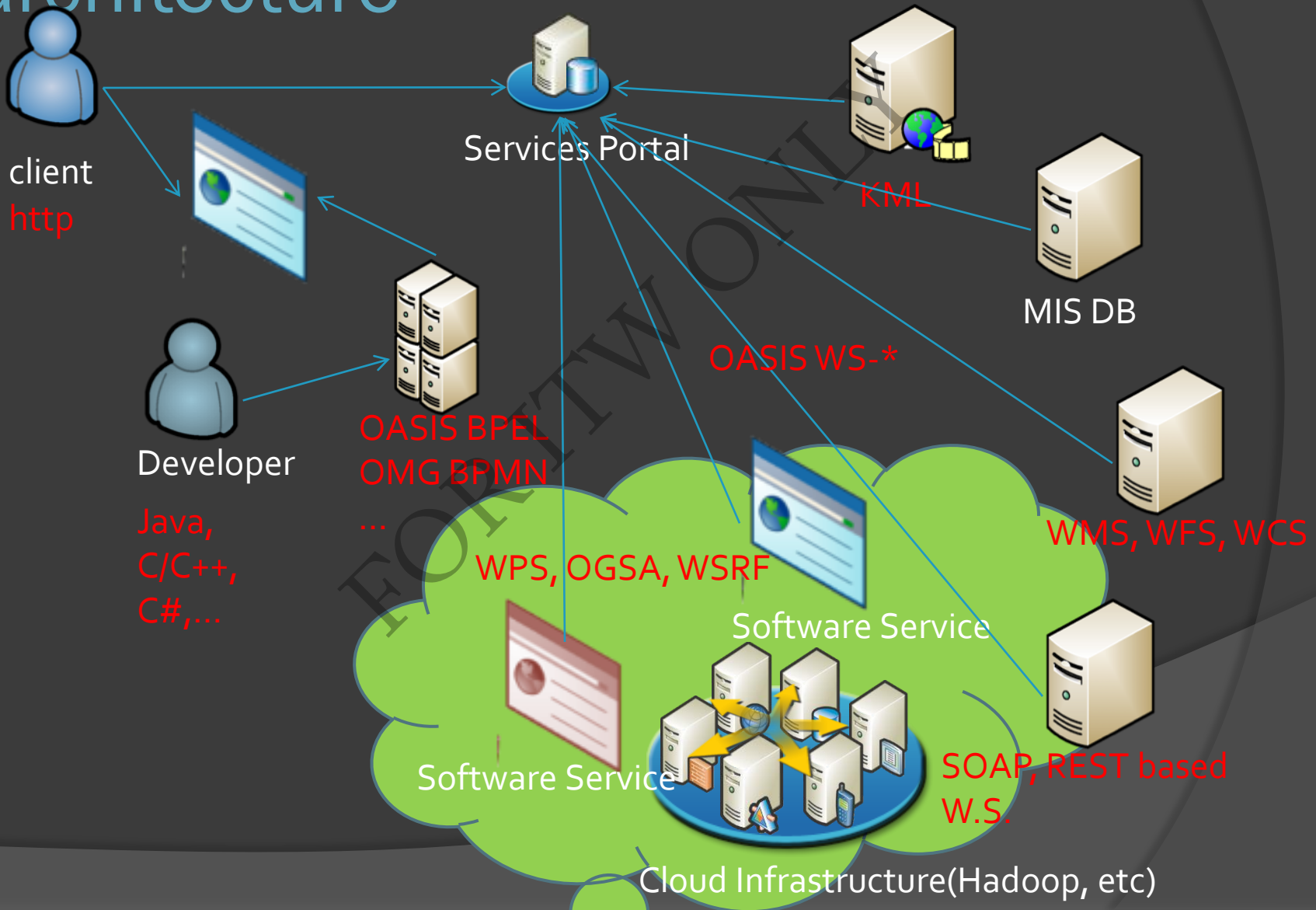
Iris Scan



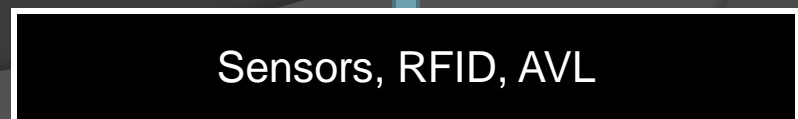
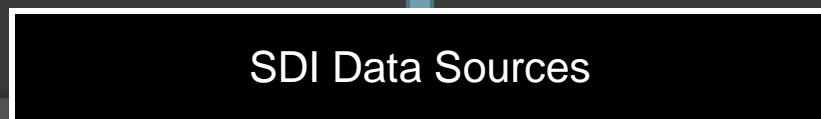
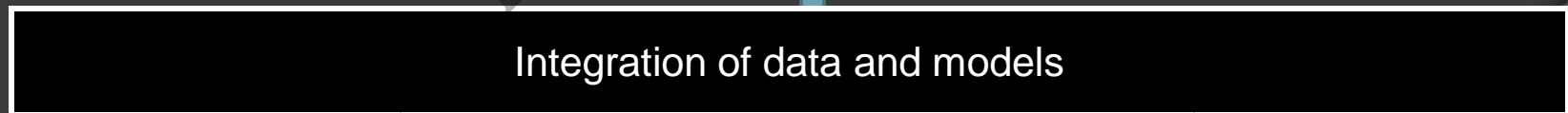
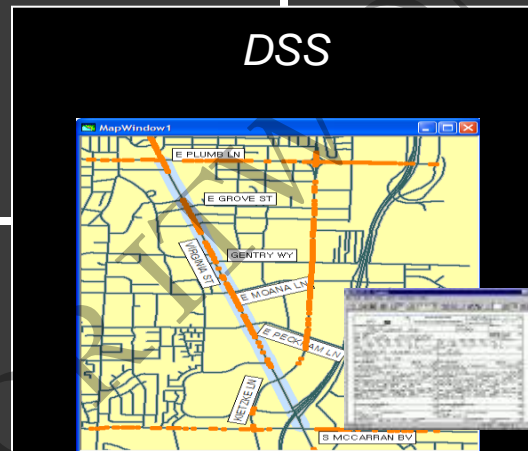
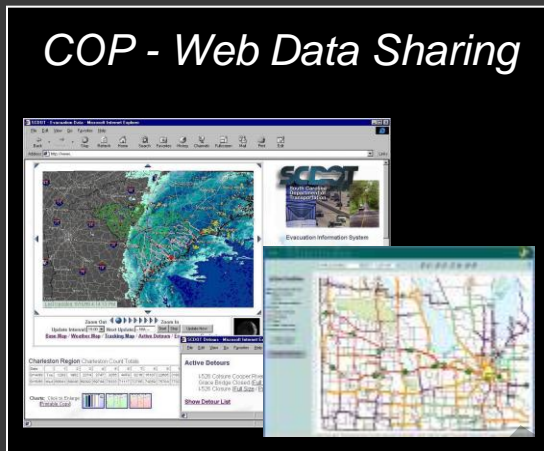
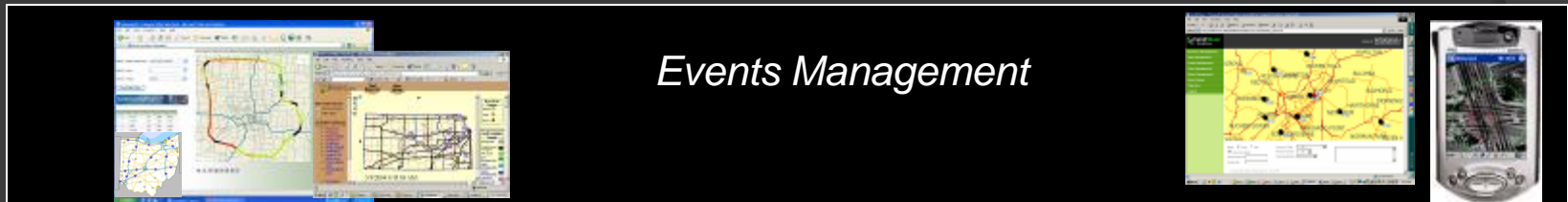
Video Analytics

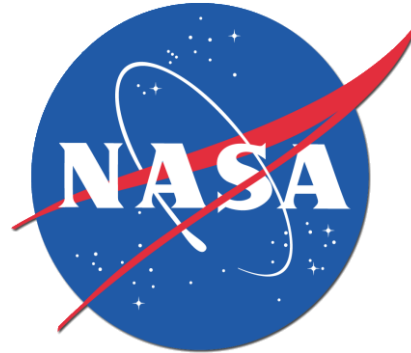


Cloud based Disaster Management architecture



Vision





HITACHI
Inspire the Next



INTERGRAPH




*National Institute of
Advanced Industrial Science
and Technology*

AIST



東京大学
THE UNIVERSITY OF TOKYO



THANK YOU FOR YOUR
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