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On-Site Visualization

as a new monitoring scheme for disaster reduction

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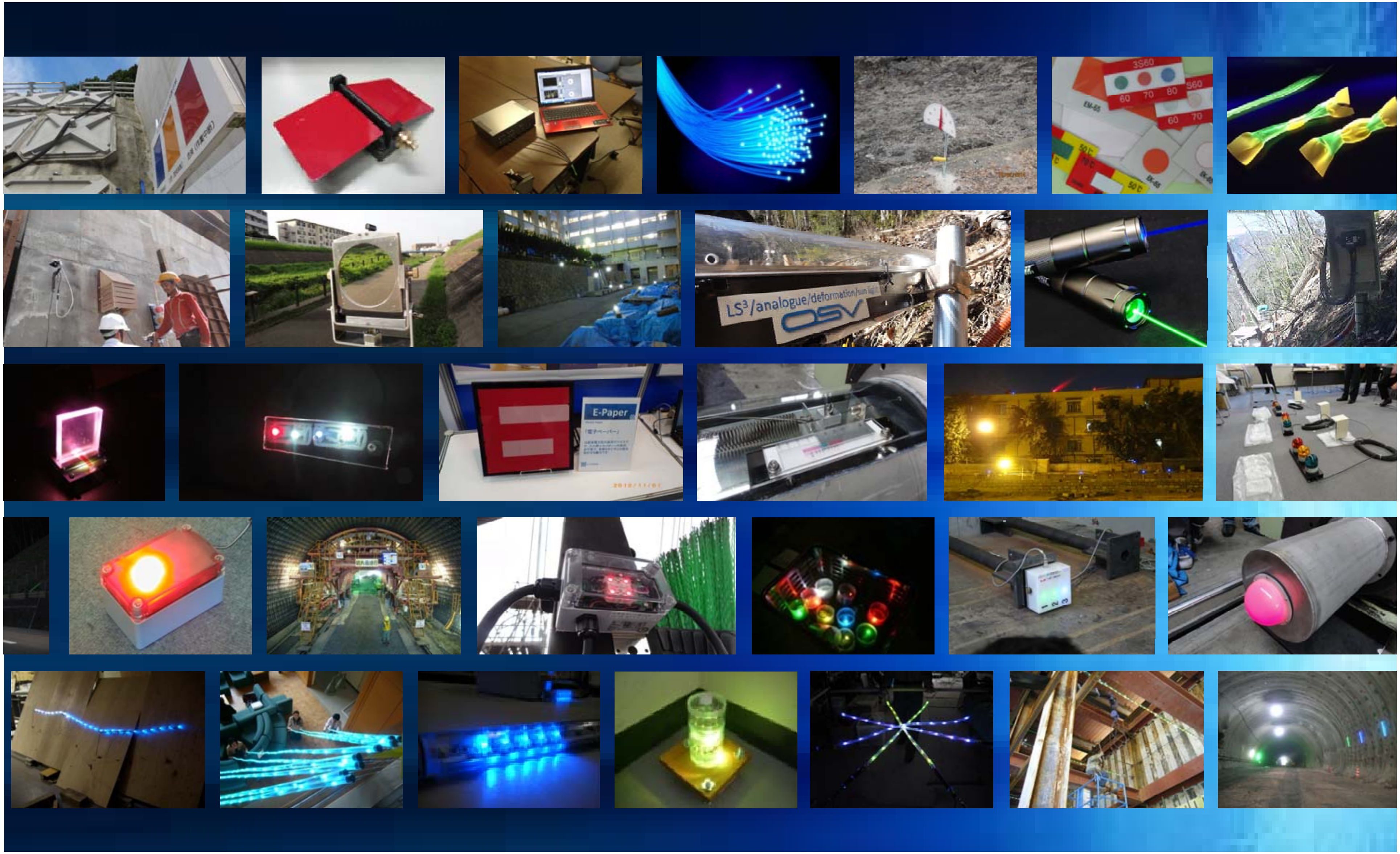
On-Site Visualization Consortium
Since 2010

1. A new approach for monitoring safety.
2. Measured information is visually shared on a real-time basis.
3. Symptoms for disaster could be found at early stages by workers and citizens.
4. Greater probability to avoid accidents or disasters from happening, or at least to evacuate before getting hurt.


New Delhi, 2010


New Delhi, 2010


New Delhi, 2010



On-Site Visualization

as a new monitoring scheme for disaster reduction

OSV

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G. contractor	Pipeline				
Bridge	Mining	Volunteer			
Slope	Oil and gas	NPO			
Lifeline	Sea bed resources				
Consulting					
Instrumentation					
Software systems	Image processing	Application for m.phone			
TBM					
Insurance	Business strategy	ICT, big data			
Ground anchor	Rock bolt	Injection			
Building material	Steel				
Special methods					
Electronics					
Survey	Optic material	Optic device	Cosmic rays	Satellite	EM wave
Optical fibers					
Mechanical devices	Plastic forming				
Printing	Nano technology				
Chemistry	Membrane	Cohesive	Paint		
Bio-sensing					
Universities					
Research institutes					

Interdisciplinary OSV members

About 70 private companies, research institutions, and etc.

OSV
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2010, New Delhi, India

"Special Assistance for Project Implementation (SAPI) applying the monitoring method by On Site Visualization at Delhi Metro construction sites" was conducted successfully, funded by JICA. The OSV monitoring was conducted at the selected sites of Phase II Delhi Metro construction project. The primary goal of employing the monitoring by OSV at a construction site is to improve safety awareness both of workers and citizens so that an advanced safer working environment with, hopefully, zero accident could be built. The questionnaires confirmed that the proposed method was well accepted by workers, residents, and engineers in India.

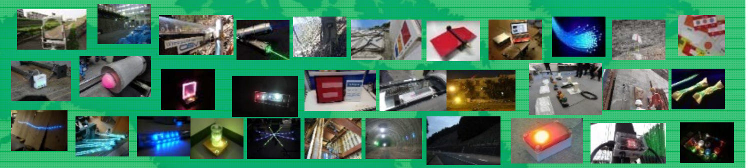

2013, Vietnam

A medium-scale low-cost OSV monitoring was conducted to successfully monitor rock slope deformation sensitive to heavy rain.



2006～present, Japan

The new scheme "On-Site Visualization" proposed by Professor S. Akutagawa of Kobe University, Japan, is for monitoring safety for arbitrary structures encountered during construction or service time of infrastructures whereby so-called Light Emitting Sensors are used as the key technology. Employment of the new leads to better understanding of what is going on for the monitored structures, faster detection of abnormalities, quicker reactions to minimize further structural damages, and realization of safer working and living environment for workers and citizens. Monitoring based on OSV has been applied to more than 50 sites in Japan, as of July 2015.



(*) These photos are light emitting sensors of various kinds used in the OSV.

OSV

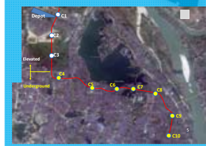
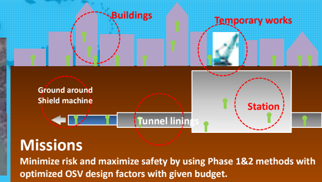
Going global to improve safety for all.

Hot tips of OSV

- Easy to understand.
- Fast data processing.
- All you need to do is to WATCH!
- Information is visually opened for all.
- Improving safety awareness among workers.

201x, Hanoi, Vietnam

Execution of OSV monitoring is specified in the tender document for upcoming Hanoi Metro Line-2 where construction of stations and tunnels are expected to be in very soft ground. Strategic planning of OSV monitoring is required.

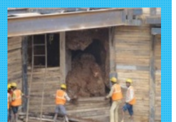
2010, Philippines

A small scale OSV monitoring was conducted in an underground powerhouse water tunnel.

2011, Bangalore, India

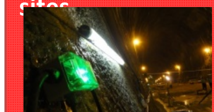
"Special Assistance for Project Implementation (SAPI) applying On Site Visualization and Dust Monitoring at Bangalore Metro construction sites" was conducted successfully, funded by JICA. Japanese made OSV devices were jointly used with Indian made sensors to confirm compatibility. The monitoring was an overall success; however, there was an incident of a possible soil-mass collapse, suggesting that cost required to install sufficient number of OSV sensors be reduced so that wider area could be monitored.



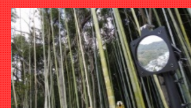


2015, Jakarta, Indonesia

"Construction Safety Improvement applying OSV monitoring at Jakarta MRT Project" is scheduled to be performed as a JICA supported project for promoting technologies developed by small and medium-sized Japanese firms. Light Emitting Converters, portable Light Emitting Inclination Sensors, Electric papers and Mirrors (optional), manufactured in Japan, are going to be used at a site in Jakarta to see how Japanese-born technology is accepted by Indonesian community for improving safety at construction sites.

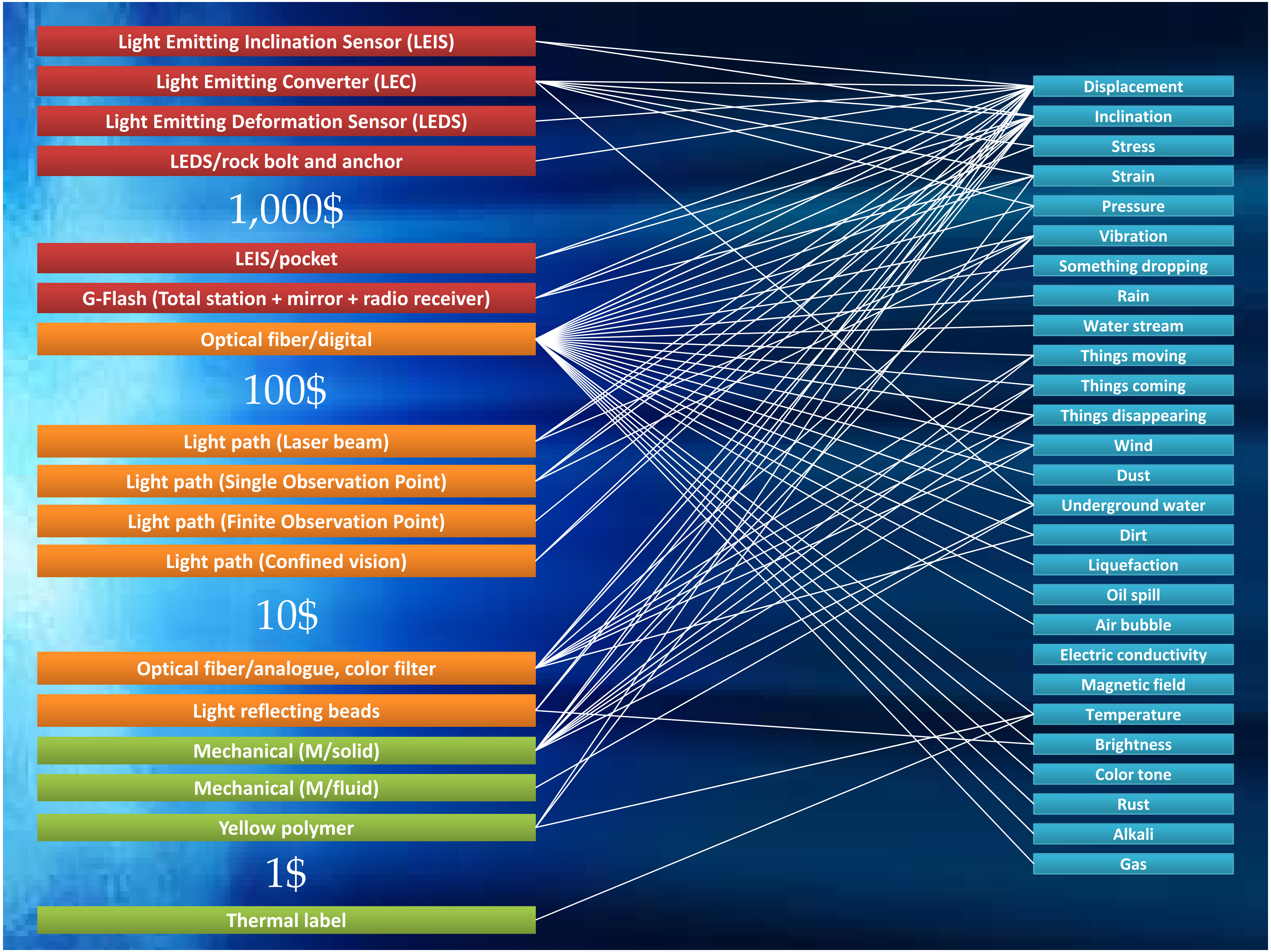







x

Cost to measure and visualize 1 datum


Light Emitting Inclination Sensor (LEIS)
Light Emitting Converter (LEC)
Light Emitting Deformation Sensor (LEDS)
LEDS/rock bolt and anchor
1,000$
LEIS/pocket
G-Flash (Total station + mirror + radio receiver)
Optical fiber/digital
100$
Light path (Laser beam)
Light path (Single Observation Point)
Light path (Finite Observation Point)
Light path (Confined vision)
10$
Optical fiber/analogue, color filter
Light reflecting beads
Mechanical (M/solid)
Mechanical (M/fluid)
Yellow polymer
1$
Thermal label
Displacement
Inclination
Stress
Strain
Pressure
Vibration
Something dropping
Rain
Water stream
Things moving
Things coming
Things disappearing
Wind
Dust
Underground water
Dirt
Liquefaction
Oil spill
Air bubble
Electric conductivity
Magnetic field
Temperature
Brightness
Color tone
Rust
Alkali
Gas

$$x < 1\$$$

A challenging project

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$x < 1\$ +$ ICT, SNS, image processing

A challenging project

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OSV in your country

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Potential risk rank

considering Heinrich's law

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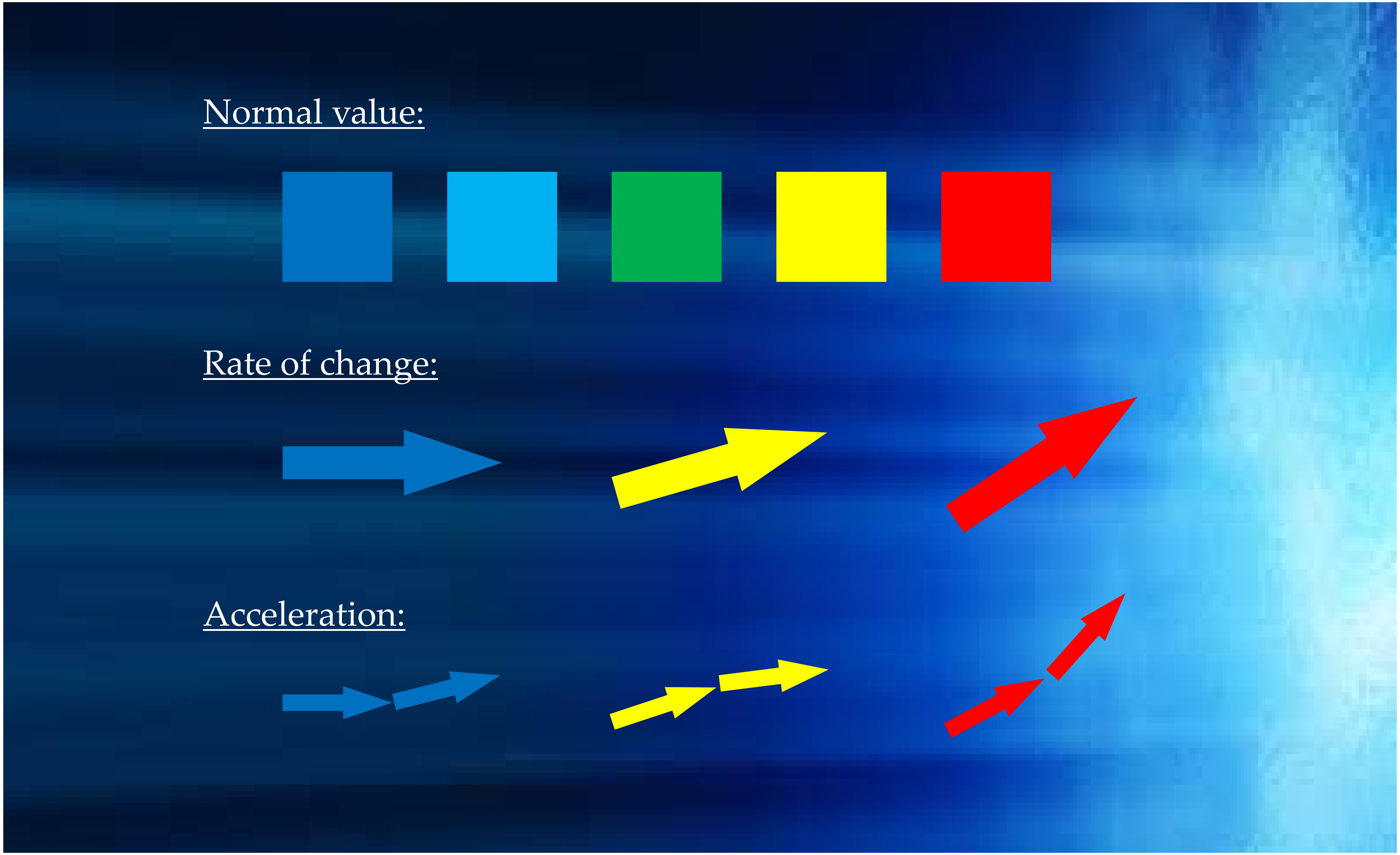

Type of data presentation

with regards to a datum and its time variation

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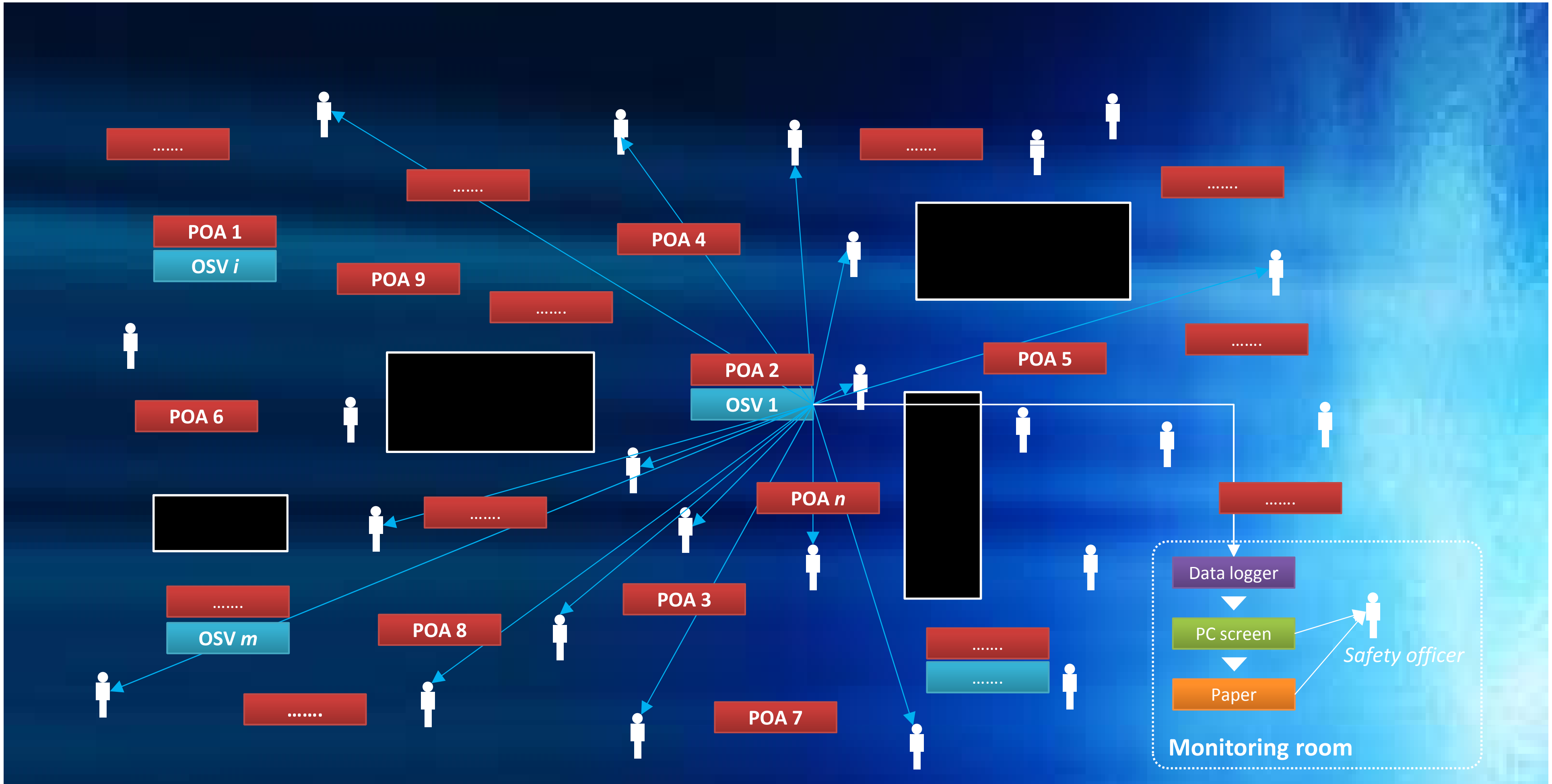

POA = Potential Origin of Accident

OSV coverage ratio = m/n

Optimizing resource allocation

under the given budget

OSV

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Given conditions:

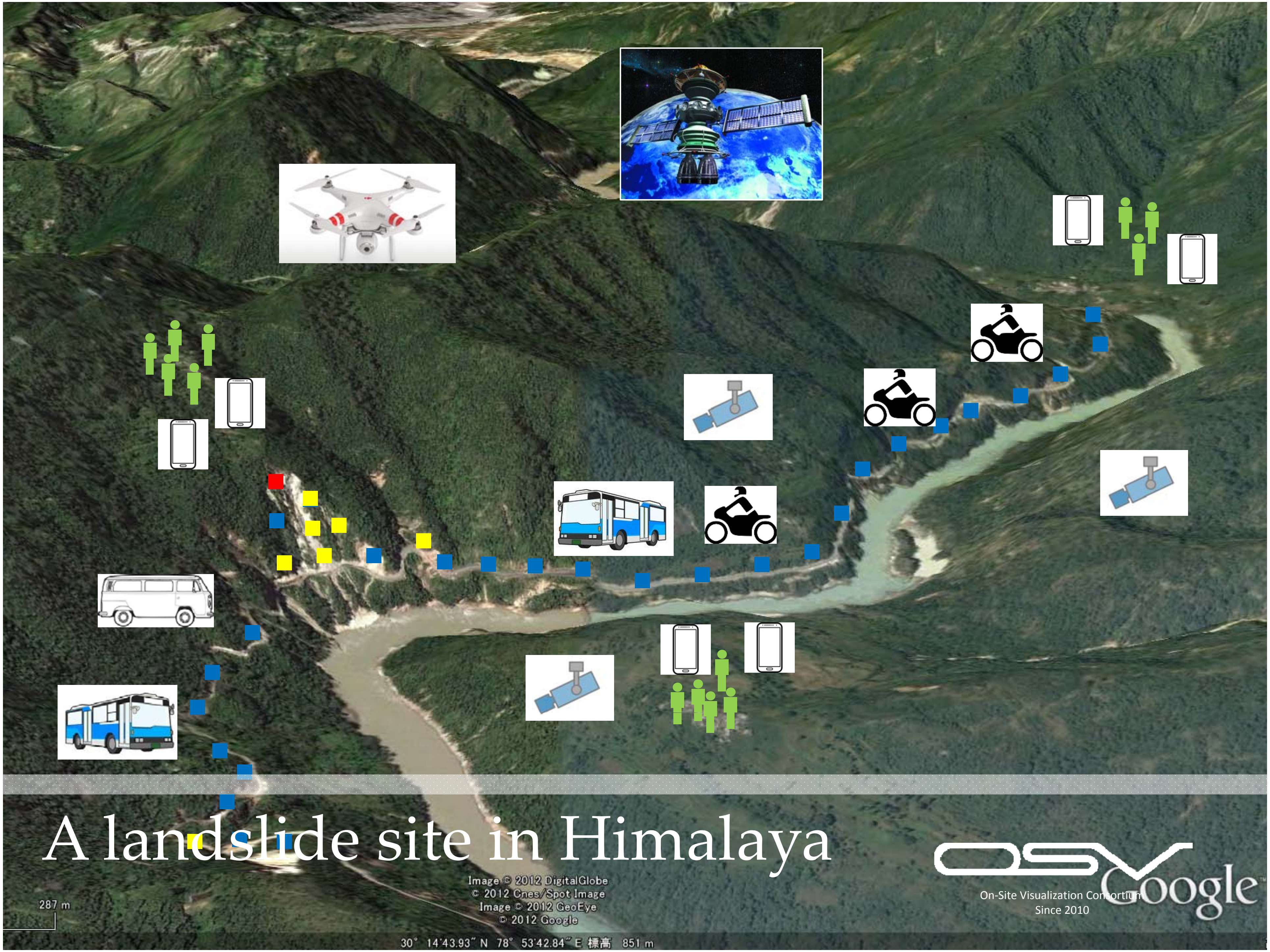
1. Site to be monitored.
2. Budget.

Steps to be taken:

1. Divide the site into finite zones of potential risks.
2. Decide what needs to be monitored in each zone considering its potential risk rank.
3. Decide which OSV sensors should be used.
4. Decide the type of data presentation (a, da/dt, d^2a/dt^2).
5. Decide threshold values and corresponding colors of light, for example.
6. Install the OSV sensors.
7. Hold educational and training seminars for workers and citizens so that they could react correctly to visual messages sent from the OSV sensors.
8. Think of clever usage of ICT with the OSV sensors.
9. Make sure that the whole project is undertaken within the given budget.

Steps

for setting up a monitoring project based on OSV


A landslide site in Himalaya
Image © 2012 DigitalGlobe
© 2012 Cnes/Spot Image
Image © 2012 GeoEye
© 2012 Google
287 m
30° 14'43.93" N 78° 53'42.84" E 標高 851 m
Google
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OSV and satellite image processing
Seminar
Sensor design and development
Safety education in schools and communities
Model site
Networking
Manufacturing
Industrial promotion
OSV to support community efforts to minimize damage due to natural disasters
Research collaboration
International collaboration
OSV
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Appendix

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Problem statement	Site	Timing	Data	Rank
	Natural slope	During construction	Deformation	A
	Cut slope	During work break	Strain	B
	Embankment	In service	Pressure	C
	Dam	Normal time	Temperature	
	Landslide	During mitigation	Jammed pipe	
	Pavement	Heavy rain	Underground water	
	Bridge	Erthquake	Environmental data	
	Tunnel	Aging	Reinforcement	
	Underground works	…..	Rusting	
	Temporary works		Loosening	
	Reclamation		Loss of material	
	Earthquake		…..	
	Liquefaction			
	…..			

OSV strategy	Sensor	Type of data	Visualization	Message	Disclosure	Viewers	Data management
	LEDS	Normal value	Color	Notice	Complete	Workers	Phone call
	LEC	Rate of change	Brightness	Report	Limited disclosure	Contractors	E-mail
	LEIS	Acceleration	Shape	Evacuation	Not allowed	Owner	Internet
	Laser beam		Position	…..	For aerial observation	Citizens	Existing routine
	SOP		Message		…..	Drivers	New routine
	LS^3/analogue		…..			Cameras	…..
	LS^3/Digital					Headquarters	
	M					…..	
	T label						
	Polymer						
	Light reflection						
	…..						

OSV specification	Time interval	Distance	Size	Cost per sensor	N of data	N of viewers	N of cameras
	0.001 sec	0.001 mm	0.1 mm	1	1	0	0
	0.01 sec	0.01 mm	1 mm	10	10	1	1
	0.1 sec	0.1 mm	1 cm	100	100	10	10
	1 sec	1 mm	1 m	1,000	1,000	100	…..
	1 min	1 cm	10 m	10,000	…..	1,000	
	1 hour	1 mm	…..	100,000		…..	
	1 day	10 m		…..			
	1 week	100 m					
	1 month	1000 m					
	…..	…..					

Factors

associated with design of an OSV project

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