

Open Community Approach (OCA)

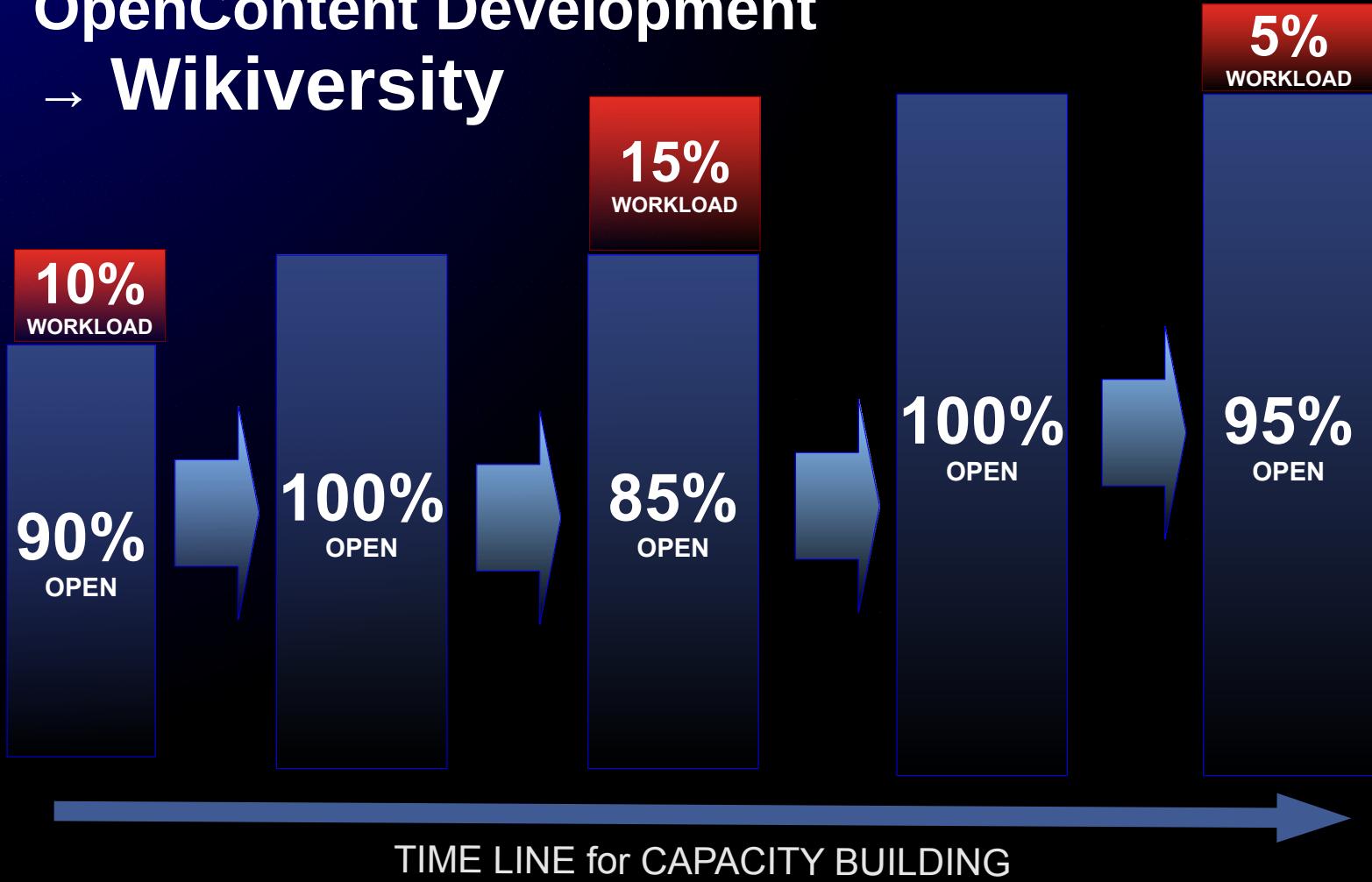
Definition: Open Community Approach

Open Community is a generalization of the concept of OpenSource to other collaborative effort. The term “*open*” for an open community refers to the opportunity for anyone to join and contribute to the *collaborative effort*. The direction and goals are determined collaboratively by all members of the community.

The *resulting work (“product”)* is made available under a free license, so that other communities can adapt and build on them. In this context the “product” of the open community is an “*improved public health by application of space technologies*”.

Open Community Approach

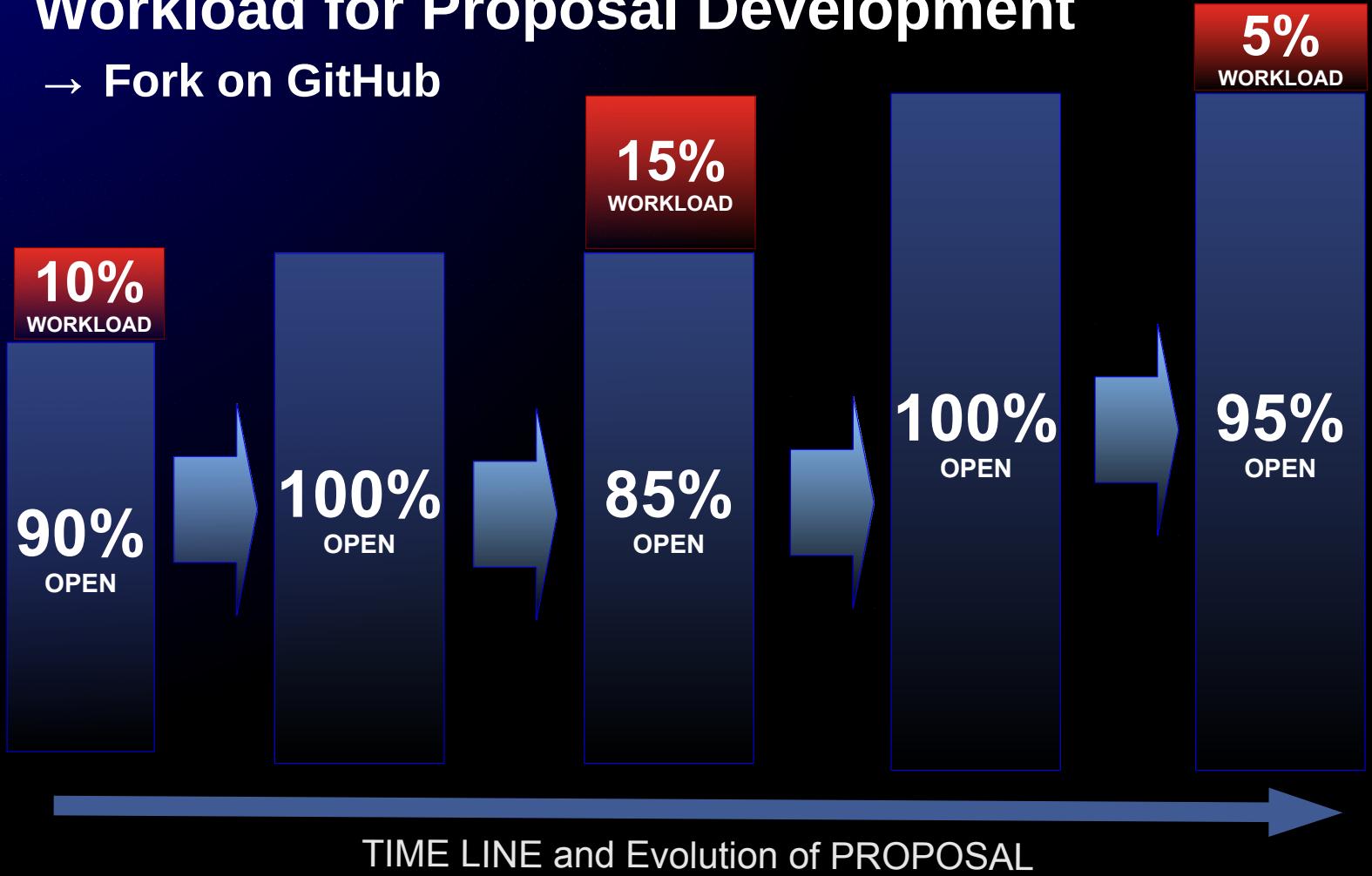
**OpenContent Development
→ Wikiversity**



Open Proposal Management

Workload for Proposal Development

→ Fork on GitHub



OCA & One Health

One Health

Environmental Health

+

Public Health

Mitigate Risk / reduce number
of people exposed to One Health Risks

NOT: Maximize the Use of a certain Piece
of Technology or Concept

ONE HEALTH

One Health

Environmental Health

+

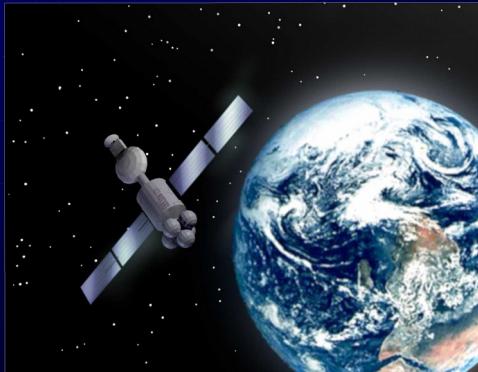
Public Health

Mitigate Risk / reduce number
of people exposed to One Health Risks

Environmental Health has an impact on
Public Health

Holistic One Health Approach

Space



Health



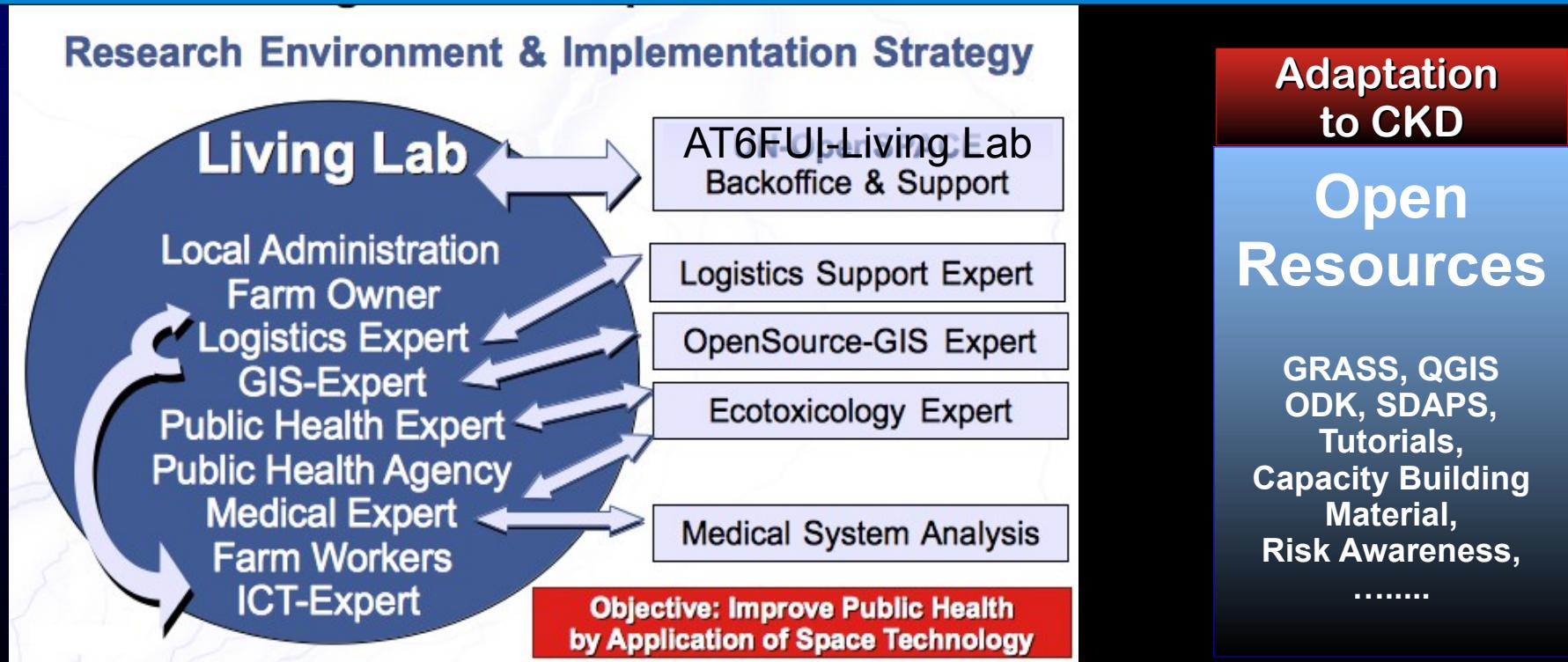
LowCost Precision Farming
GPS-Tailored Decision Support
Monitoring – Health
m-Health Risk Awareness

"Bridge" from Space to (One) Health Impact



Living Lab & Application of Space Technology

User-driven Innovation – Rural Areas



Activity of OpenSource-Community

Statistics of on OpenSource Plattform

OpenSource-Plattform sourceforge.net

Statistical data of 11h on 16. Jan 2012

4.349.930 Downloads (*100% open usage*)

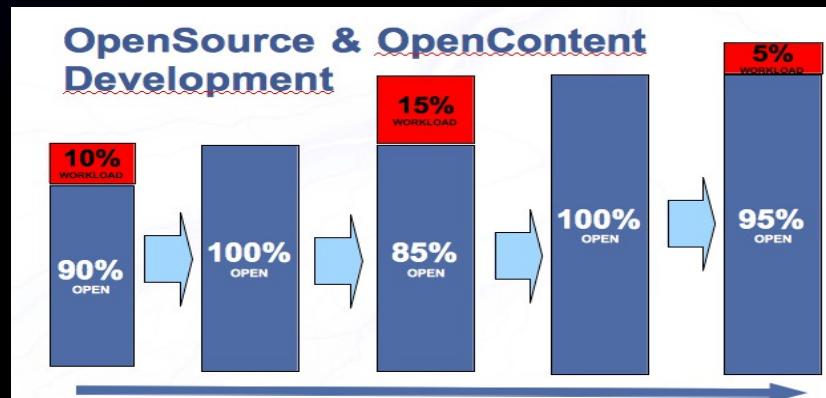
3.963 Code Commits (*0.1% Improvement*)

4.105 Forum Posts (*0.1% Discussion*)

443 Bugs Tracked (*0.01% Error Report*)

Open
Usage

Workload



Definition: Spatial Decision Support System



GIS: Spatial Patterns of Risk & Spatial Distribution of Resources



SDSS: Spatial Decisions: Risk & Resources

DSS: Water Treatment – Public Health Warning
Water Supply / Dynamic Systems – continuous temporal-spatial Monitoring

Definition: Spatial Public Health

SPATIAL



**PUBLIC
HEALTH**

Spatial Patterns of Public Health Risk &
Spatial Planning of Public Health Interventions
Spatial Allocation of Public Health Resources

Spatial Public Health

LOW-COST



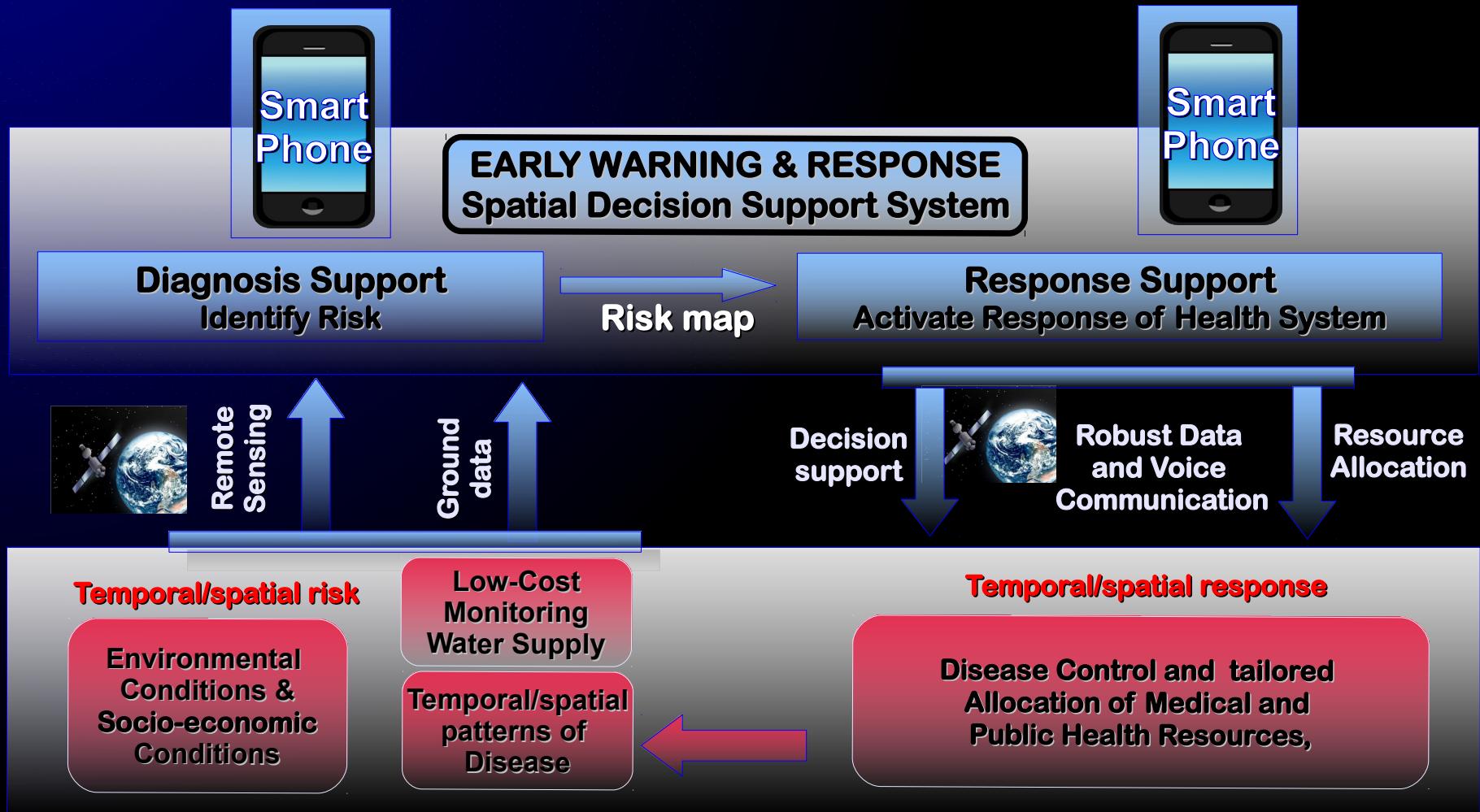
Monitoring generates Ground Data for
Spatial Decision Support System

Spatial Resolution
of Monitoring System

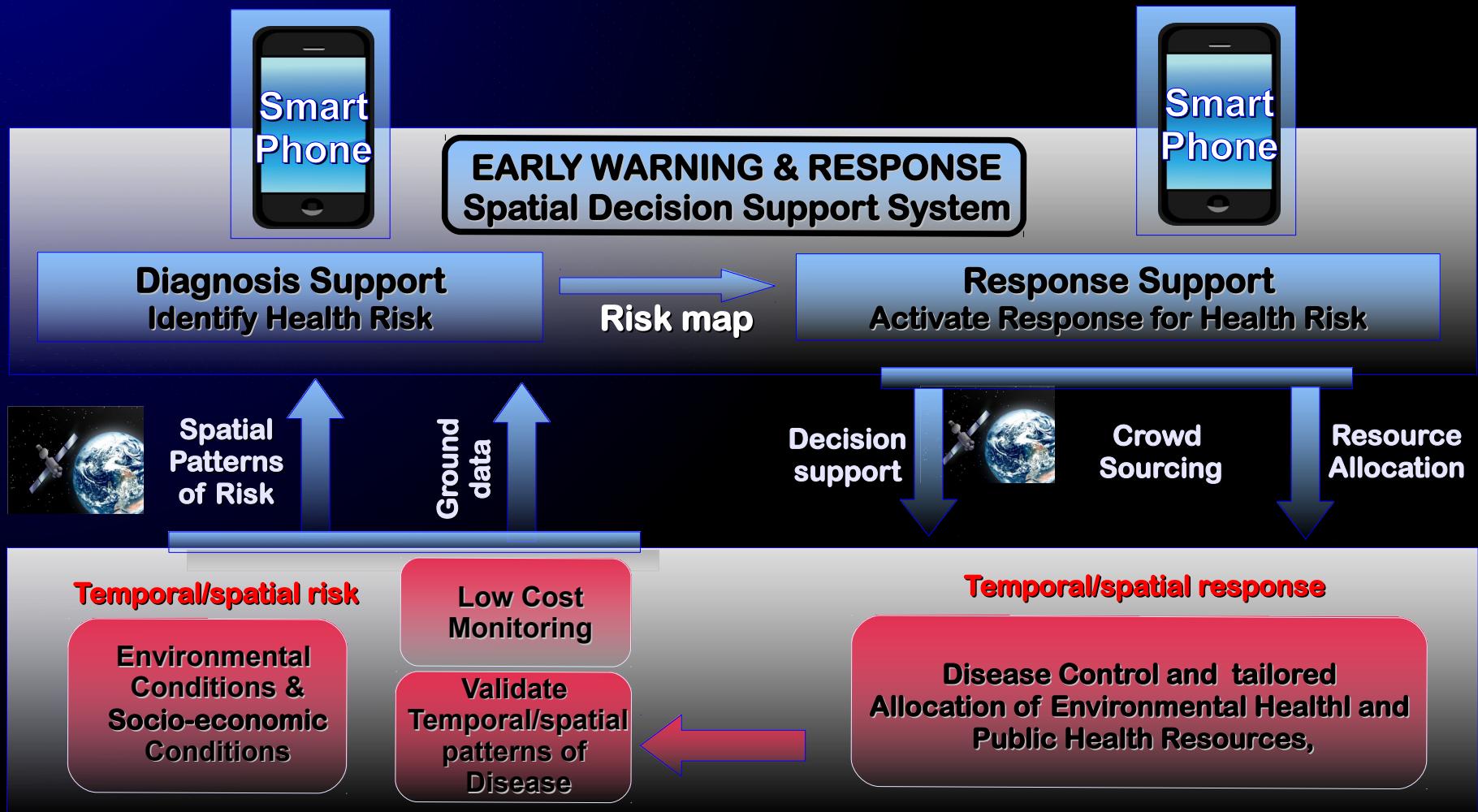
Temporal Resolution
of Monitoring System

Access to Technology
of Monitoring System

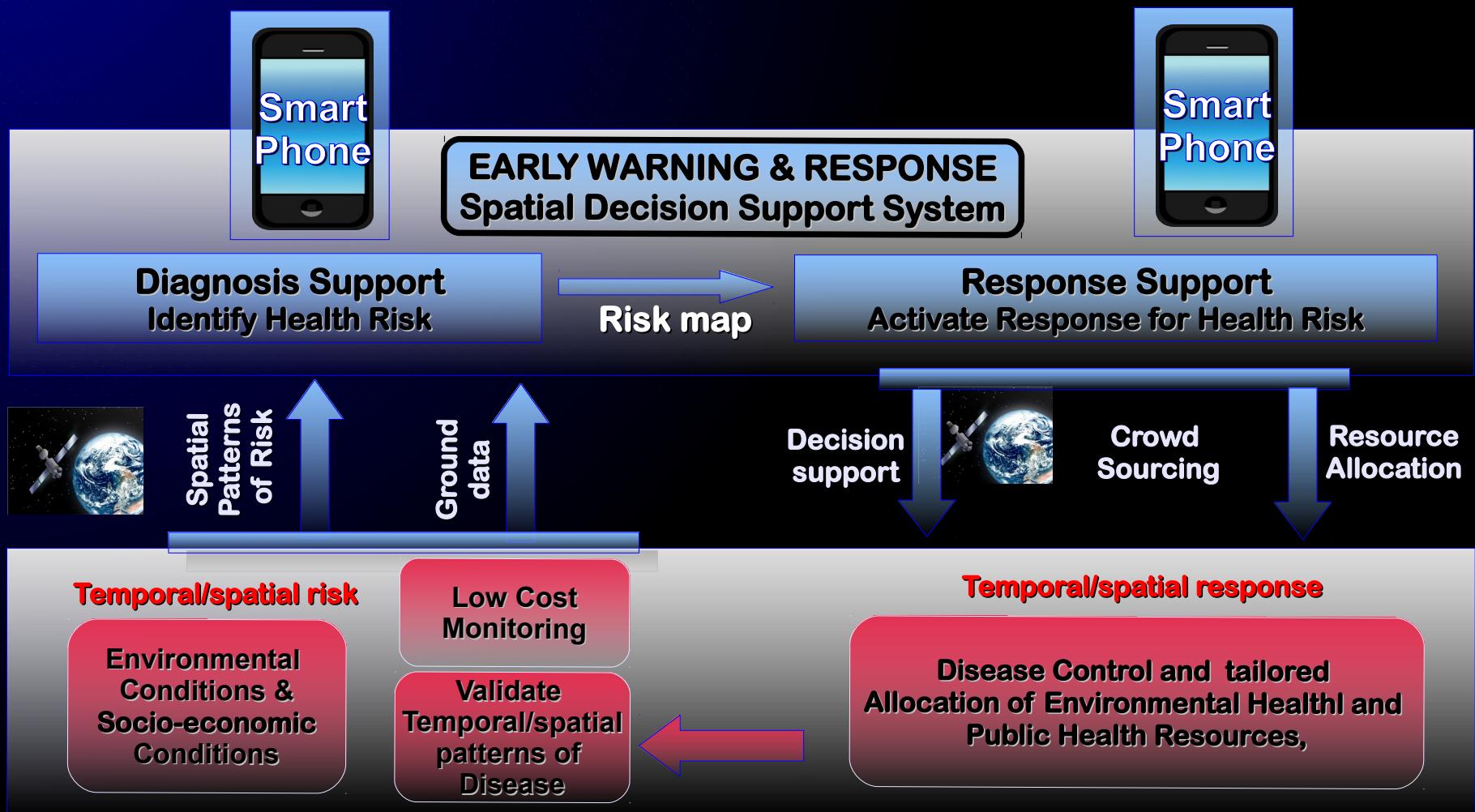
Risk & Response Cycle



Risk & Response Cycle



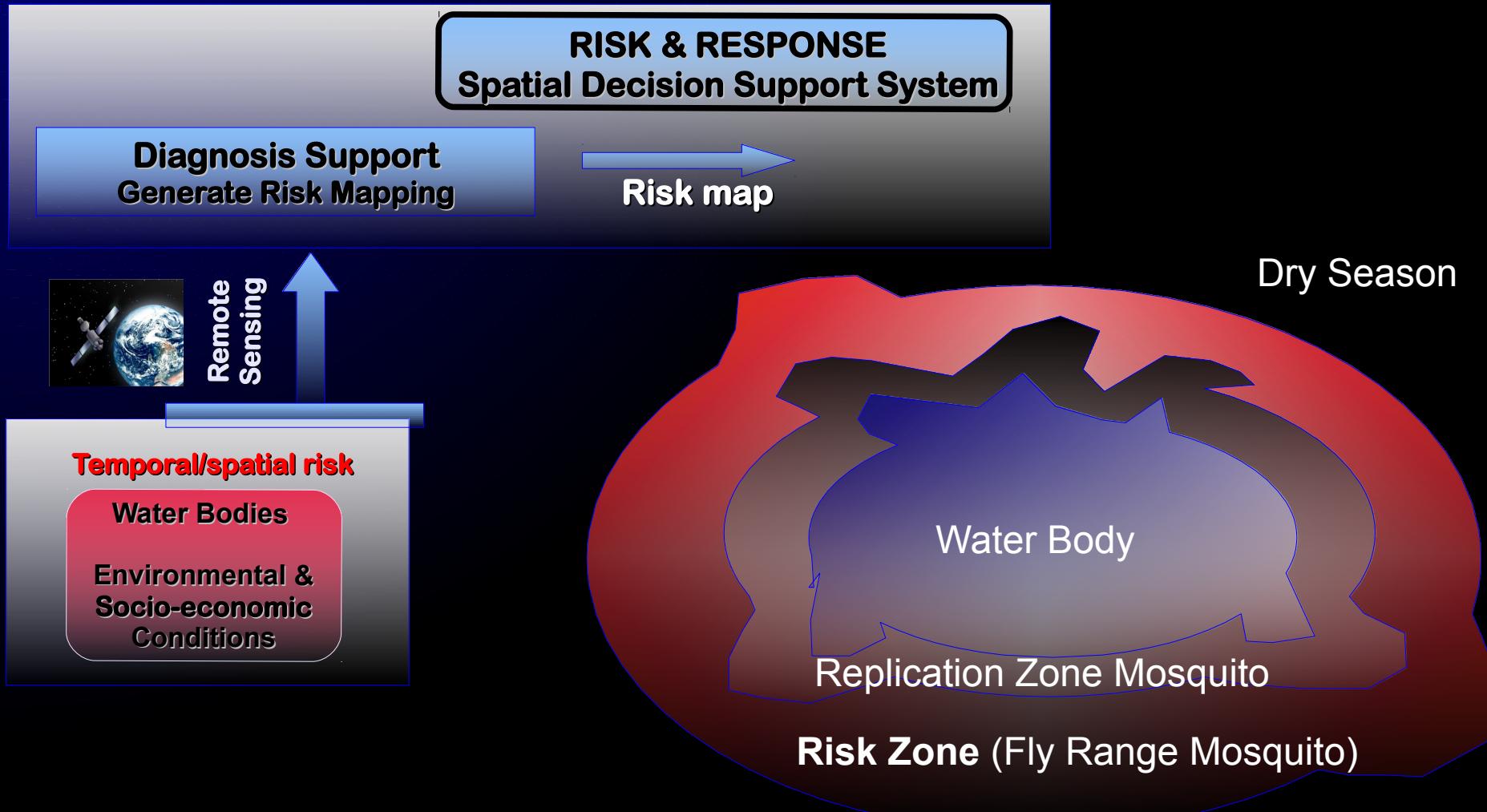
Risk & Response Cycle



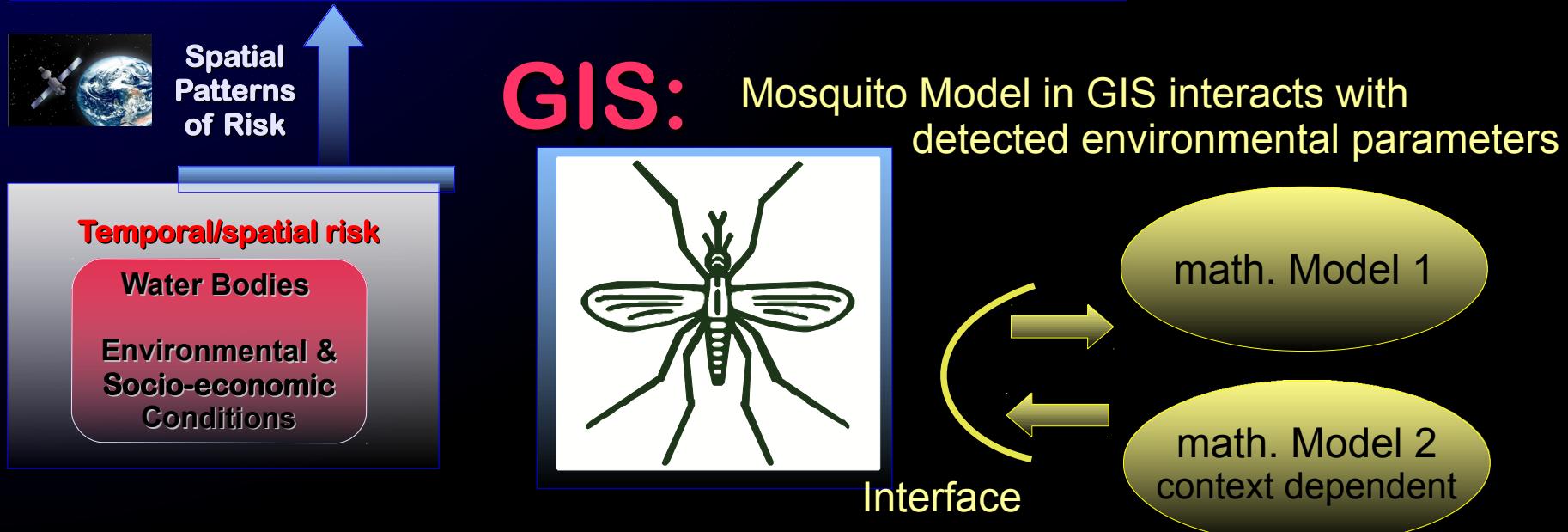
Risk & Response Cycle



Risk Mapping & Remote Sensing



Risk Mapping & Math Modelling



Context Dependency on environmental conditions

Fuzzy Logic

REASONING

Extend Logical Representation

Classical Logic

Statements are true ($x=1$) or false ($x=0$)

Fuzzy Logic

Statements can have grades of validity $0 \leq x \leq 1$

Consider Equation/Inequations

$5 > 3$ (true 1)

$4+2=7$ (false 0)

Implication (rules)

IF $x > 3$ THEN $x+7 > 3$ (true 1)

IF $x < 3$ THEN $x^2 < 9$ (false 0)
counter example $x = -4$

Weather Condition for Mosquitos

Humidity is good for Mosquito Life Cycle
(true with grade 0.7)

Temperature is good for Mosquito Life Cycle
(true with grade 0.1)

Fuzzy Implication (rules)

IF humidity good AND temperature good
THEN apply larvicides
(true with grade 0.2)

Fuzzy Logic

REASONING

Extend Logical Representation

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IF $x > 3$ THEN $x+7 > 3$ (true 1)

IF $x < 3$ THEN $x^2 < 9$ (false 0)
 $x = -4$

Consider Raccoon with age 13

Raccoon is old (true with grade 0.7)

Raccoon is in stage 3 (paralytic stage)
damage to motor neurons
(true with grade 0.1)

Fuzzy Implication (rules)

IF Raccoon is old AND rabies infected
THEN paralytic stage is 2 days long
(true with grade 0.2)

Spatial Fuzzy Logic

EARLY WARNING & RESPONSE Spatial Decision Support System

Validity of Properties
Attached to a spatial location

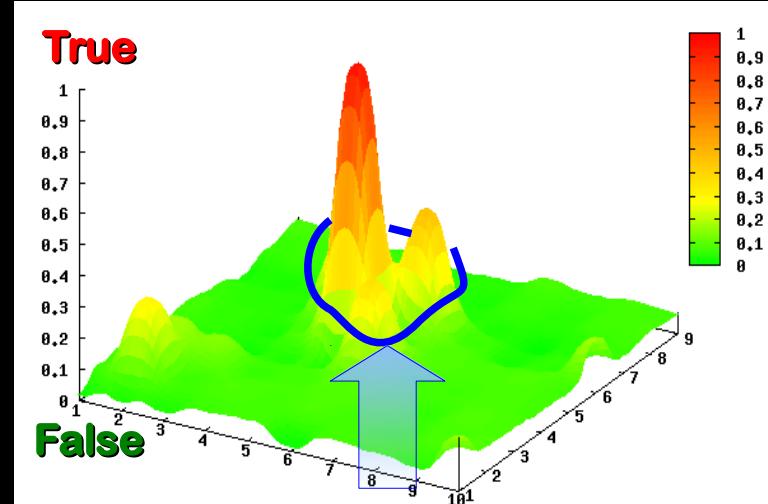
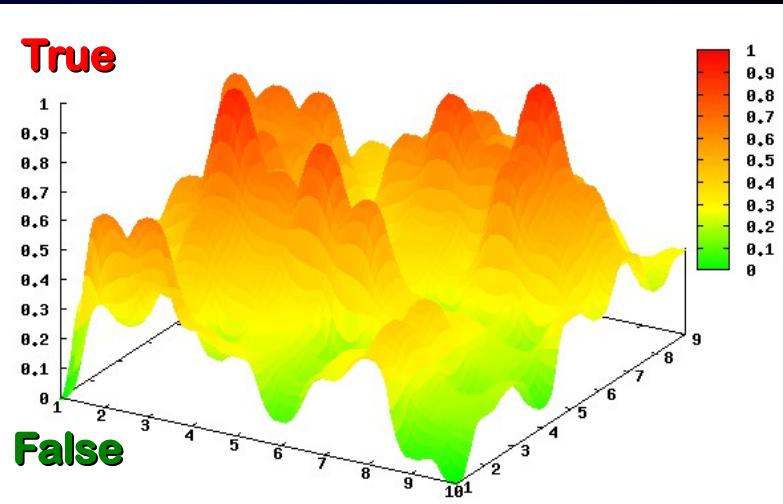
Fuzzy Rules
Operating on Fuzzy spatial properties

Linguistic Value

Temperature is optimal
for Mosquito A

Decision support

IF Temperature is optimal AND
high rainfall THEN Application
of Lavicides have no impact on
Mosquito Population



Resource Optimization
No Application of Larvicides in that Area

Risk & Response Cycle

RISK & RESPONSE Spatial Decision Support System

Diagnosis Support
Generate Early Warning

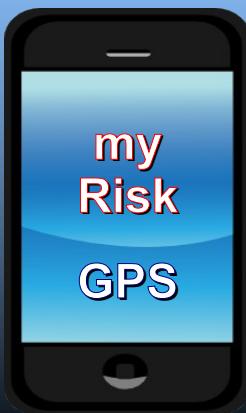
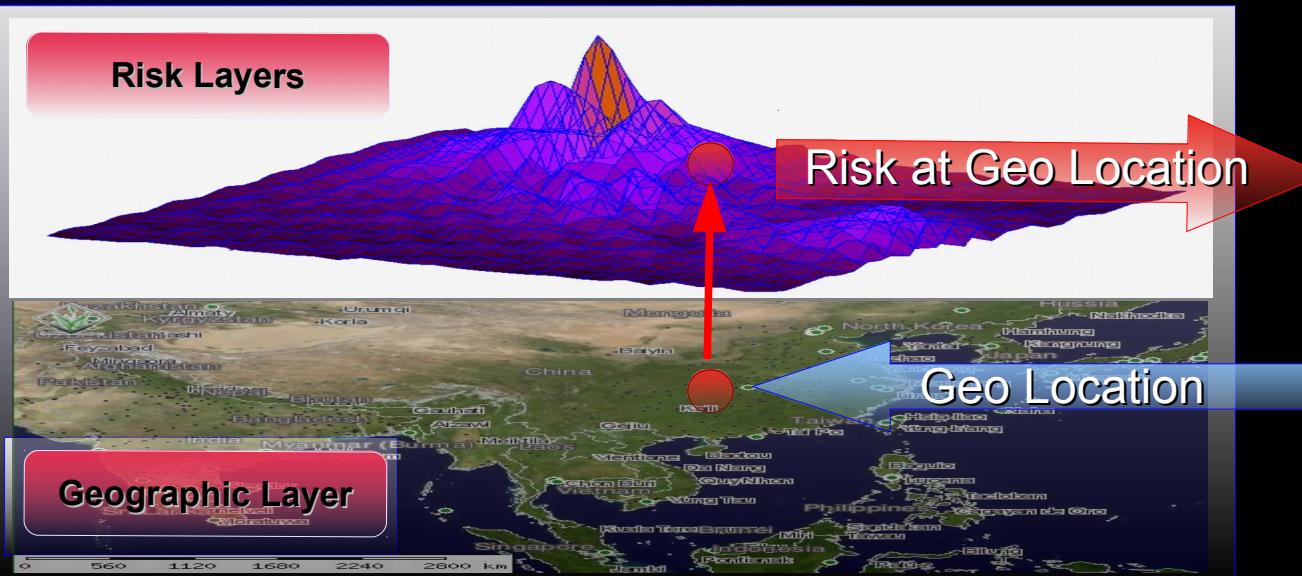
Risk map

Risk Layers

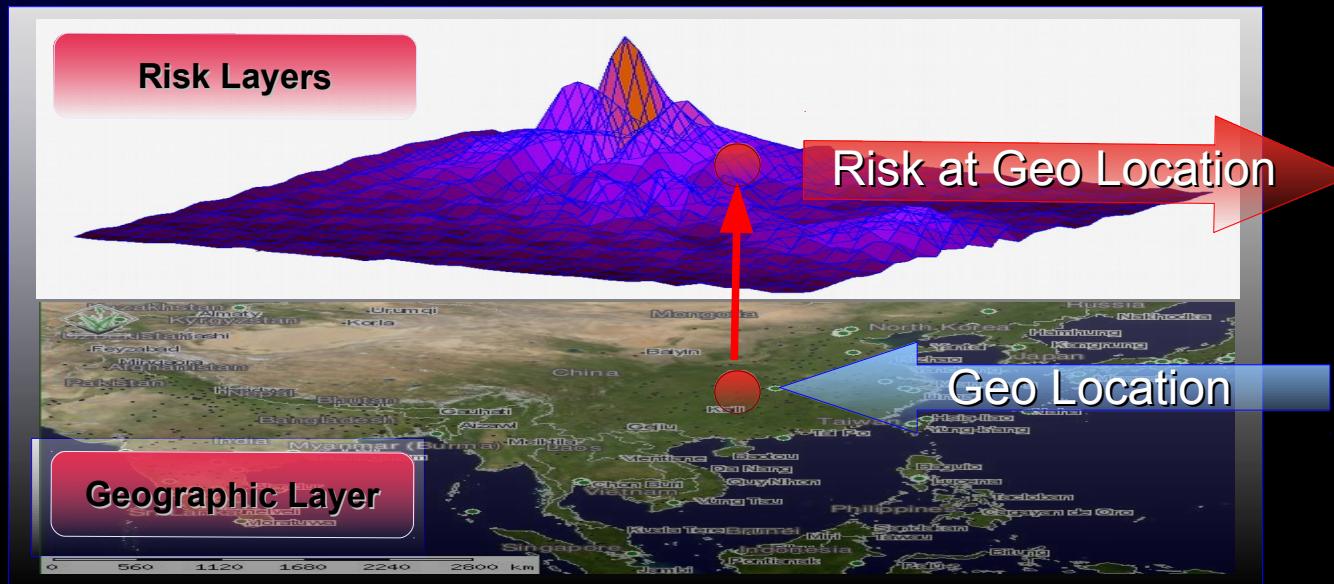
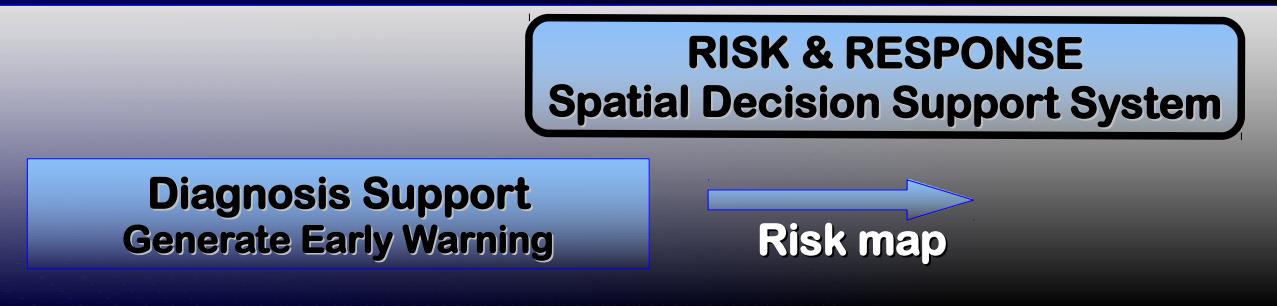
Risk at Geo Location

Geo Location

Geographic Layer



Risk & Response Cycle



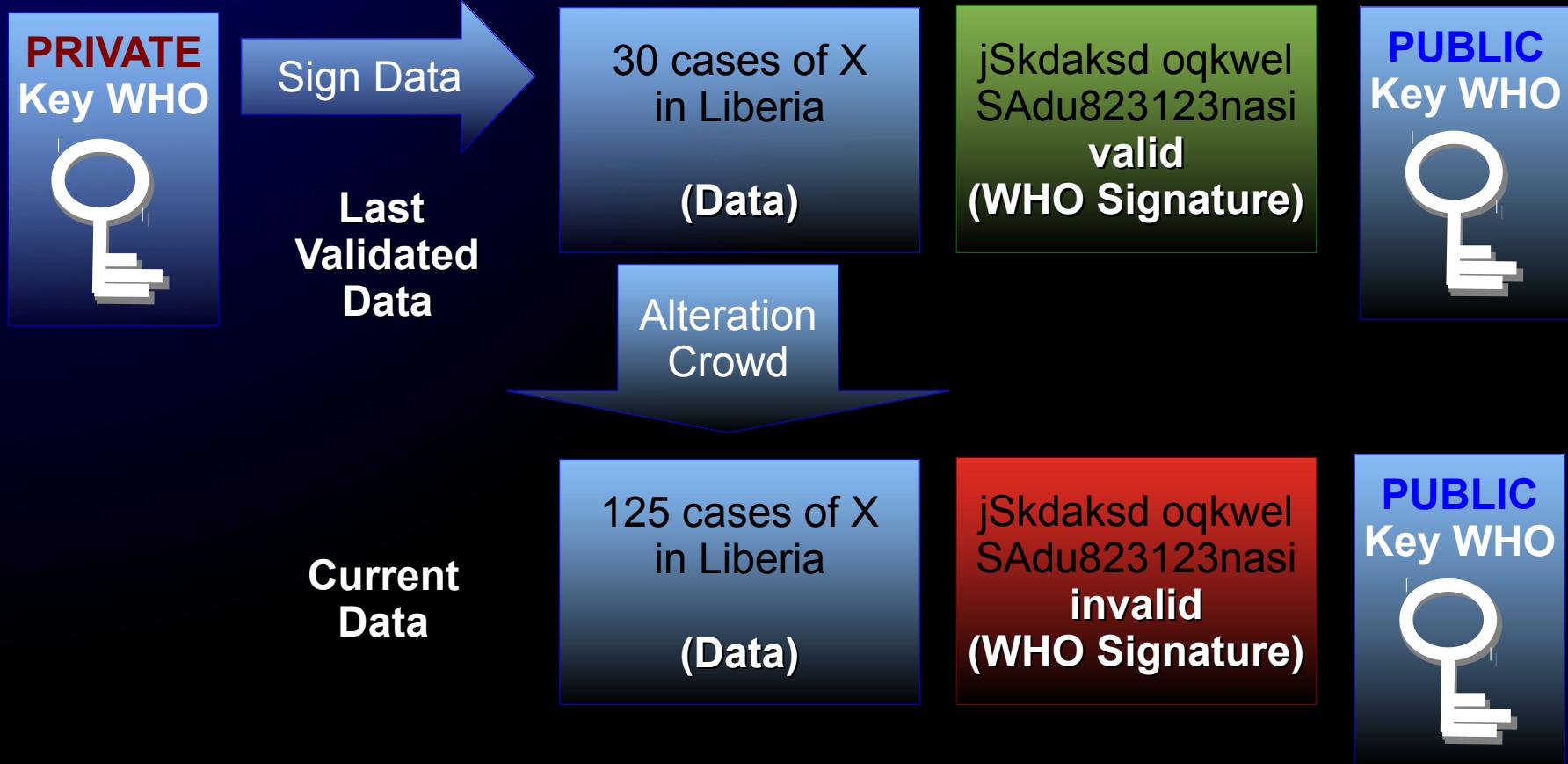
Types of GPS-Pseudo Measurement

- Contamination of Water, Soil, Air ...
- Contamination of Fruit, Vegetables, Meat, ...
- Radioactive Radiation as Public Health Risk
- Epidemiological Risk at GPS location

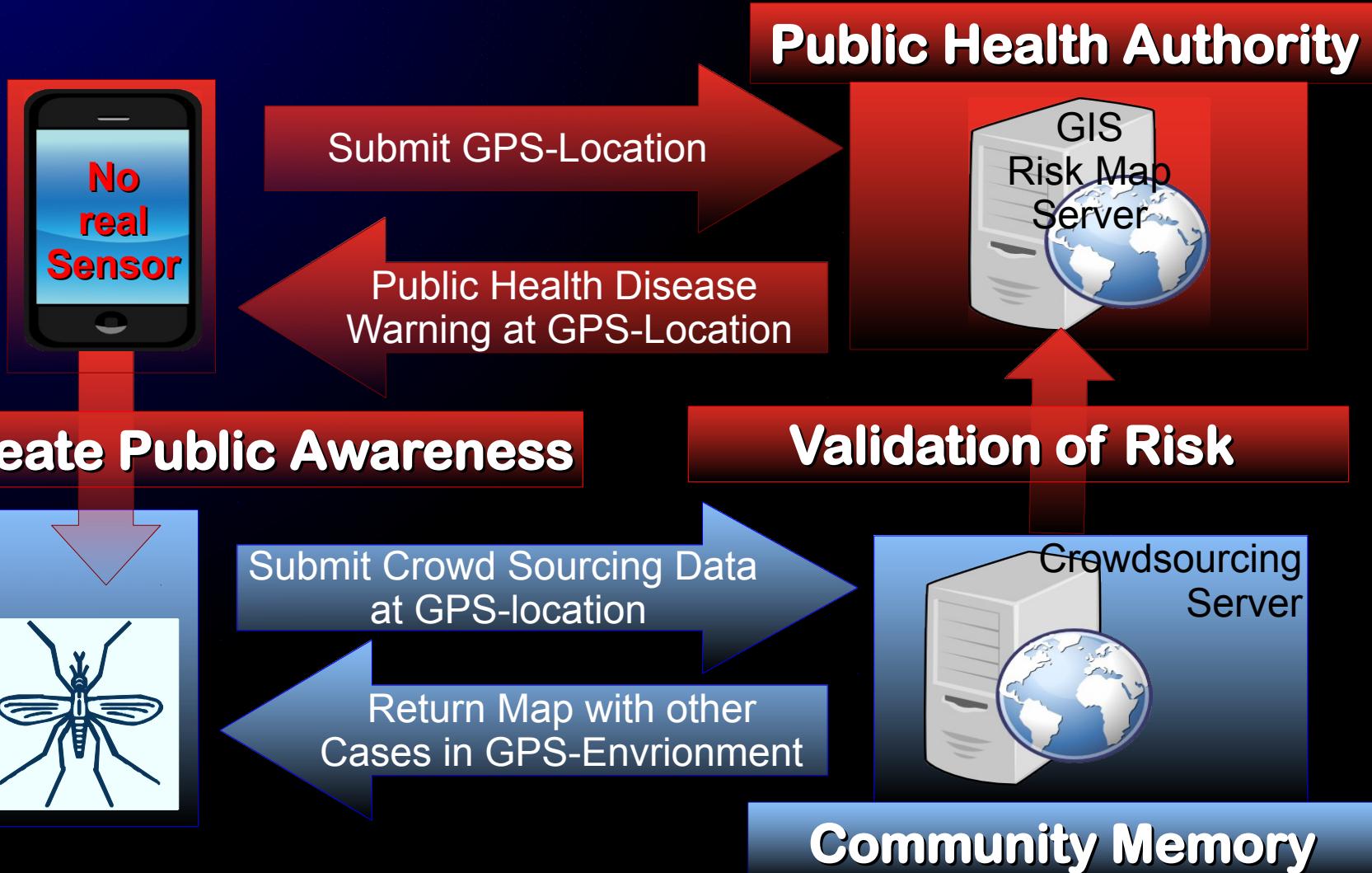


**Mobile Devices as a
Decision Support Client for Public Health Risk**

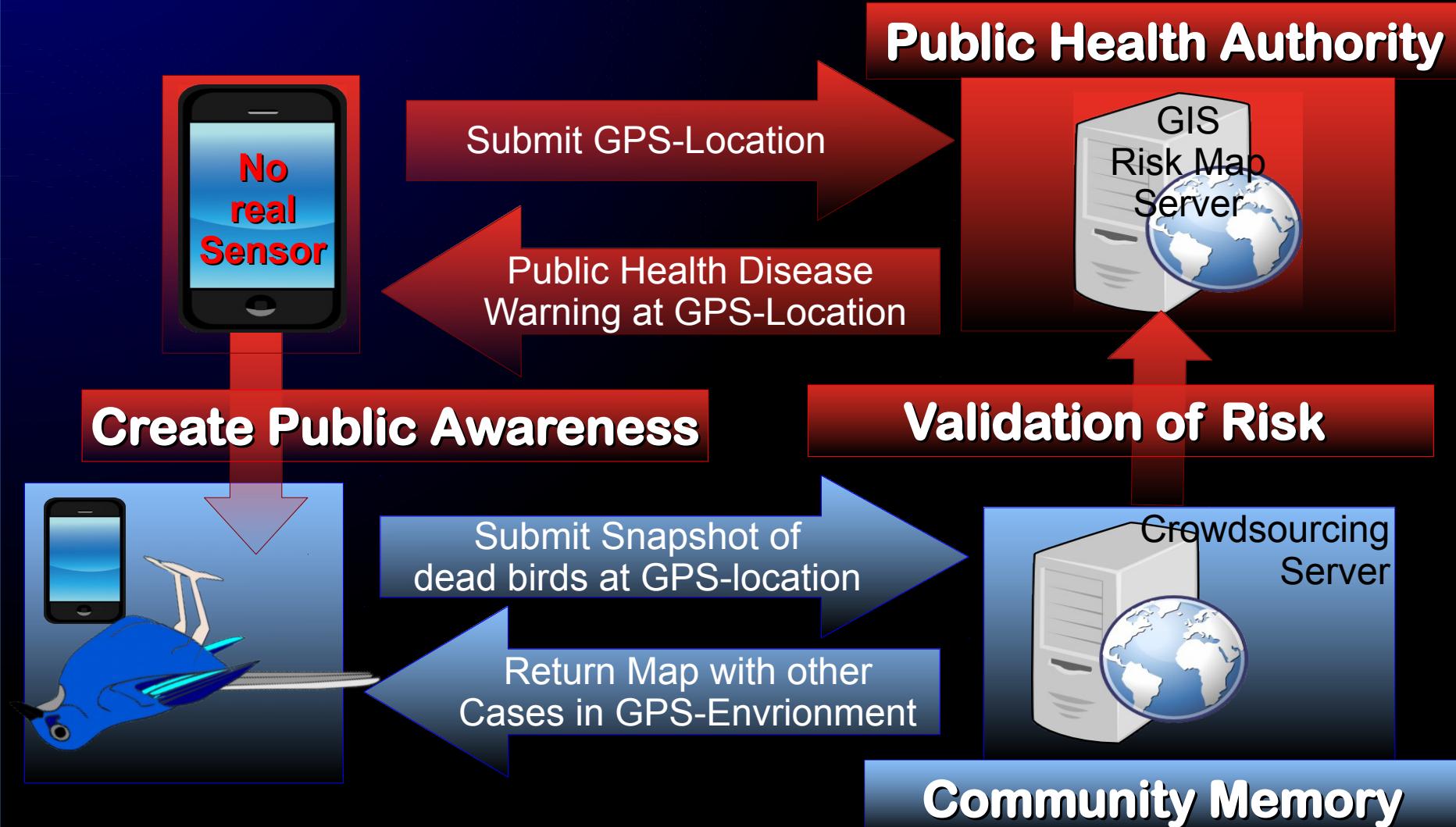
Digital Signature - Trust



Public Awareness, Crowdsourcing & Public Health Authorities



Public Awareness, Crowdsourcing & Public Health Authorities



Chronic Kidney Disease

CKD
Common
Chronic Kidney Disease

Old Age
USA, Canada, Europa, Australia

Hypertension, Obesity



CKDu
Chronic Kidney Disease
non traditional Cause

Working Age
Central America, India, Sri Lanka

Dehydration, Toxic Poisoning

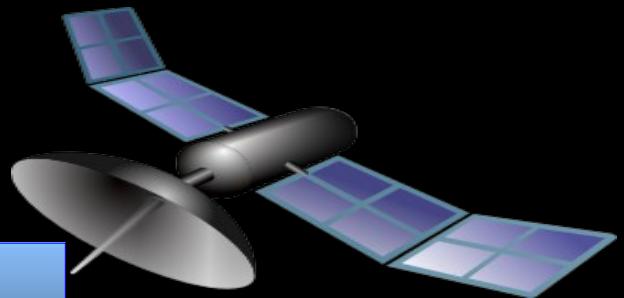
FARM WORKERS, ...



AGRICULTURE, ...

Response & Public Health Risks

**Mobile Devices as a
Decision Support Client
Spatial Application of Agrochemicals**



**NDVI / EVI
Crop Health**



Economic Benefits & Public Health Benefits

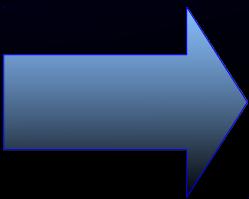
OpenSource-Development
e.g. Augmented Reality-Toolkit
LookAR! for Android Phones

Objectives

- Objective:** APPLICATION OF LOW COST TECHNOLOGY
FOR ECOTOXICOLOGICAL MONITORING
(Spatial Decision Support)
- HOW?** PROVIDING A LOW COST TRACKING
FRAMEWORK IMPLEMENTED WITH OPEN
SOURCE SOFTWARE
- WITH:** SOURCEFORGE PROJECT (LC-TrackMon?)
<http://www.sourceforge.net>
(Open Source)
- TO WHOM?** OPEN COMMUNTIY OF PRACTICE
(Action Team 6 Follow-Up Initiative AT6FUI)

Collaborative Mapping & Trust

- (1) Communities contribute (**IN**) and benefit from Collaborative Global Health Mapping (**OUT**)
(Communities)
- (2) Agencies & Academic Institutes contribute to Risk Analysis (**IN**) & allocation of Resources (**OUT**)
(Agencies – WHO / PAHO)
- (3) Humanitarian Open Streetmap Team (HOT)
(Humanitarian Open Decision Support)



Analysis and Validation
of Crowd Sourcing Data
Mixed Data Source Decision Making

Definition: GPS-Pseudo Measurement

GPS-Pseudo Measurement is defined as an indirect provision of Sensor Data without a physical Sensor by using the GPS-Location of the Mobile Device.



**Mobile Devices as a
Decision Support Client for Public Health Risk**

Response & Public Health Risks

Mobile Devices as a Decision Support Client



Remote Sensing Data



Navigation, Crop Health Map

Minimize Overlap of Spraying Track

Plants in different areas get different application rates.

Economic Benefits: Optimized Farming with Low-Tech IT-environment => Developing Countries

Workflow Optimization for Farm Workers

Response & Public Health Risks

Mobile Devices as a Decision Support Client



Public Health Objective

Food Security

Minimize Exposure to Agrochemical for Farm Workers and Environment. Workflow optimization & self protection of Workers

Optimize spatial patterns for Application of Agrochemicals

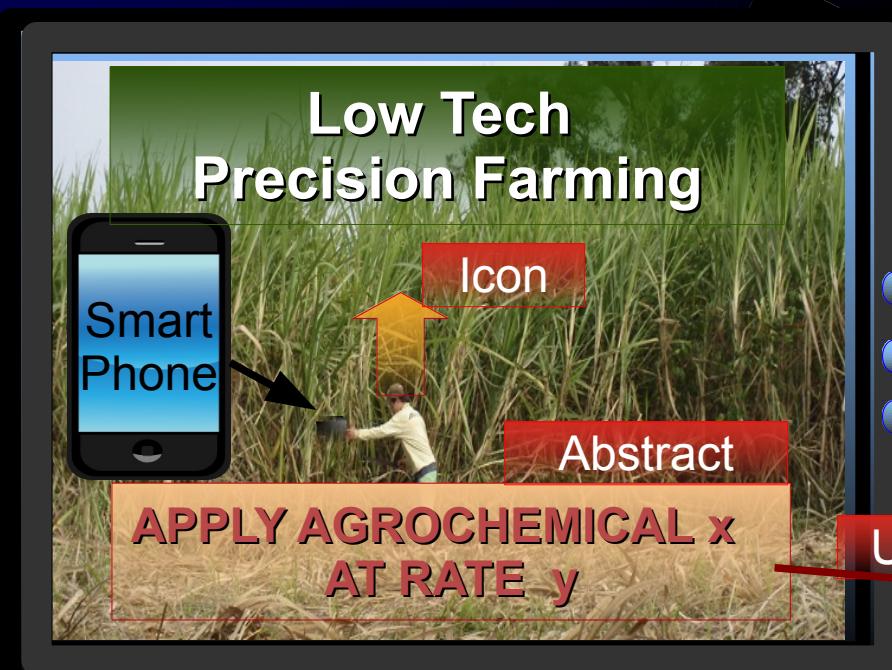
Economic Benefits: Optimized Farming with Low-Tech IT-environment => Developing Countries

Response & Public Health Risks

Mobile Devices as a Decision Support Client



GPS-Location



Attached Information
ICON + ABSTRACT + URL

APPLY AGROCHEMICAL x
AT RATE y

APPLICATION VIDEO FOR
AGROCHEMICAL

WIKI – MULTIMEDIA
CONTENT

Economic Benefits: Optimized Farming with
Low-Tech IT-environment => Developing Countries

GIS-RISK & RESOURCE
INFORMATION

IT-Infrastructure

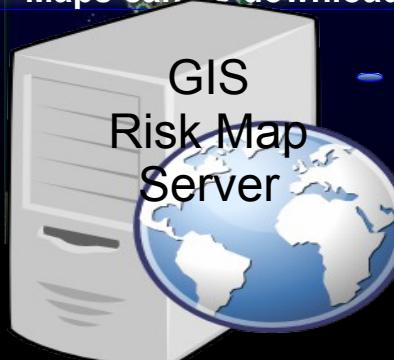
Offline Usage – OpenSource & OpenContent

<http://maps9.navit-project.org>



Attaching Digital Information to a GeoLocation

<http://maps9.navit-project.org>

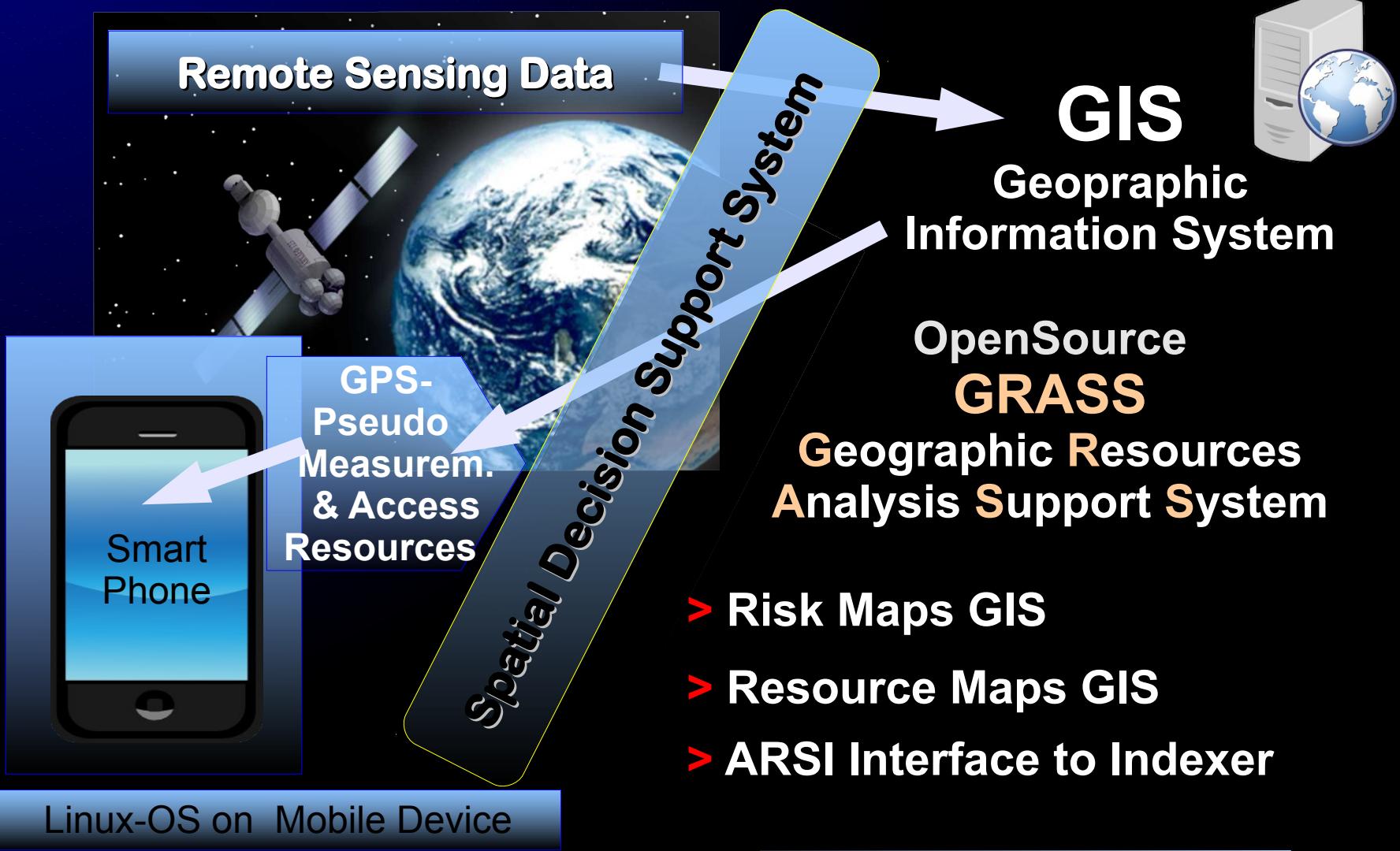


Digital Content (Risk/Health)
Tailored to the Geolocation
of Smartphone User
People at RiskVector Control Unit

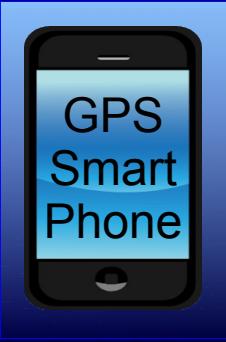
Demo Images
of Skin Manifestation
of CKD for Public
Health Works



ARSI Interface to GIS (Risk & Response)



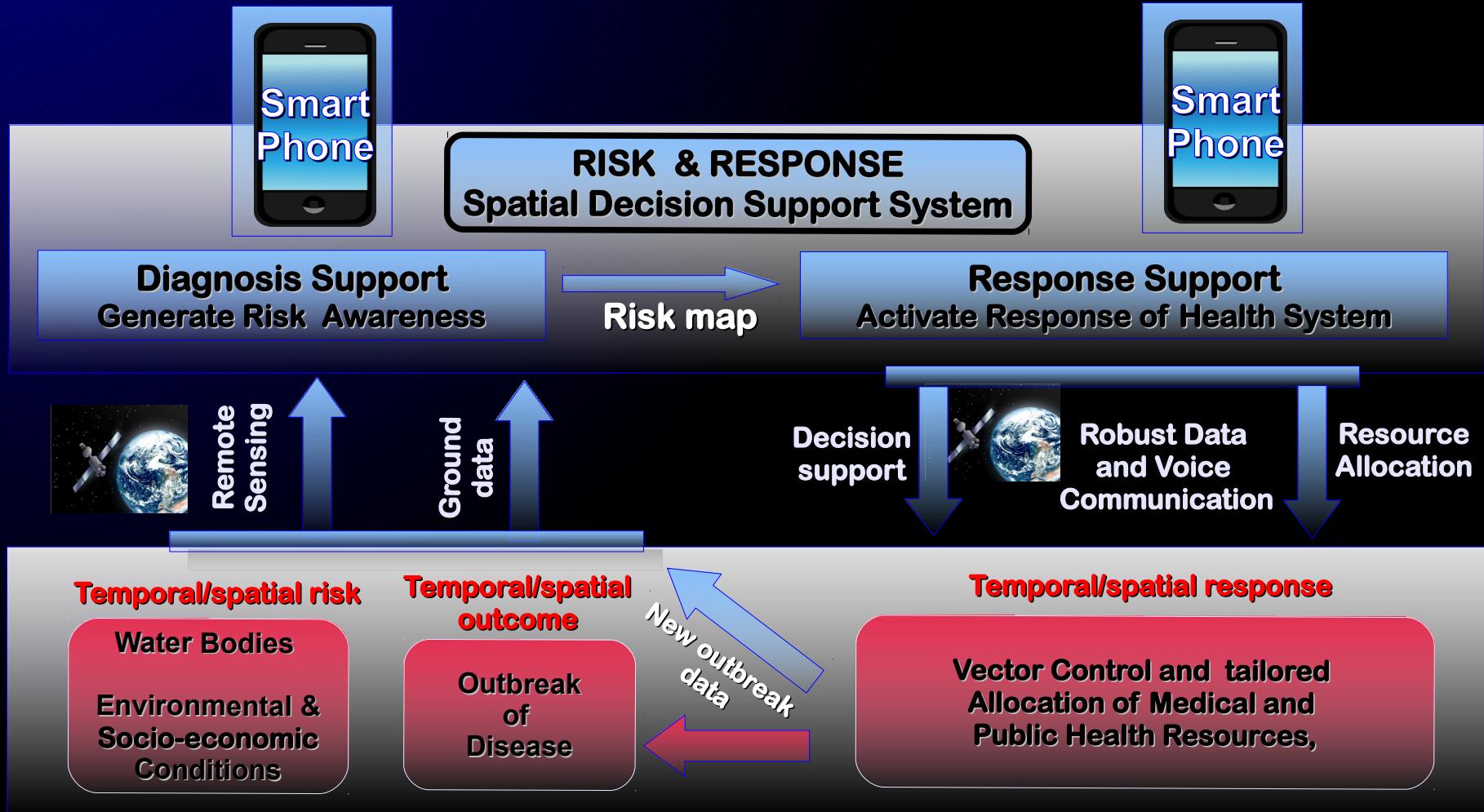
GPS-Pseudo Measurement

- 
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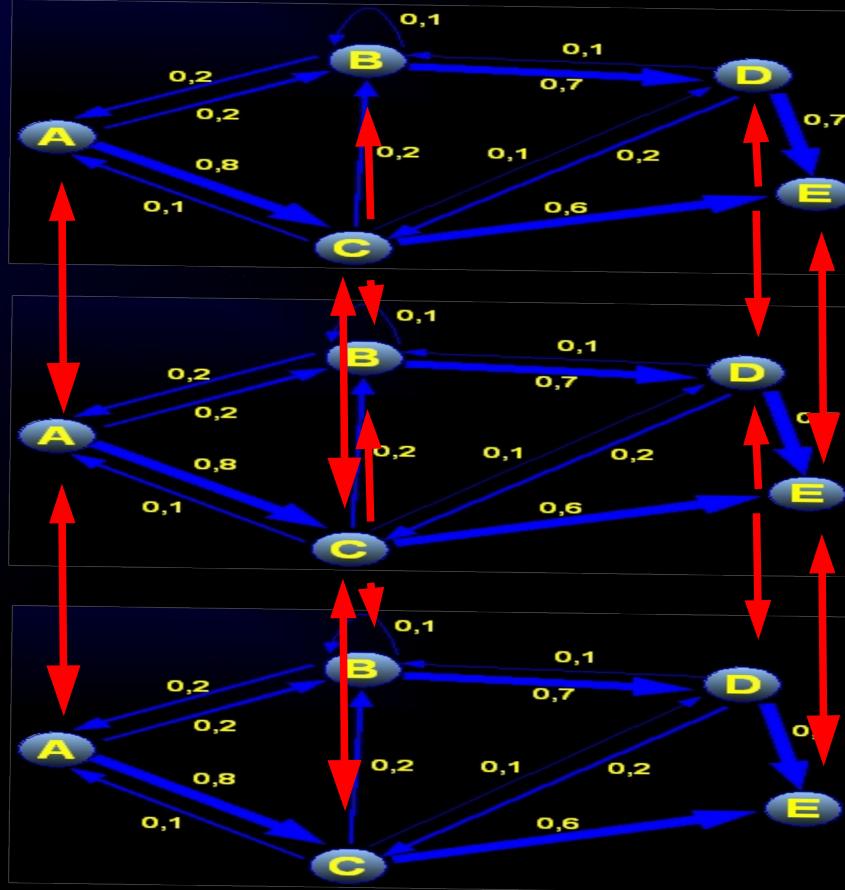
These Types of Public Health Risks are not
DETECTABLE directly for the public.

- Crowd Sourcing can be used to detect first indirect signs of Public Health Risks.
- Early Warning and Public Health Response can be triggered if and only if Public Health Agencies have approved a Public Health Risk.

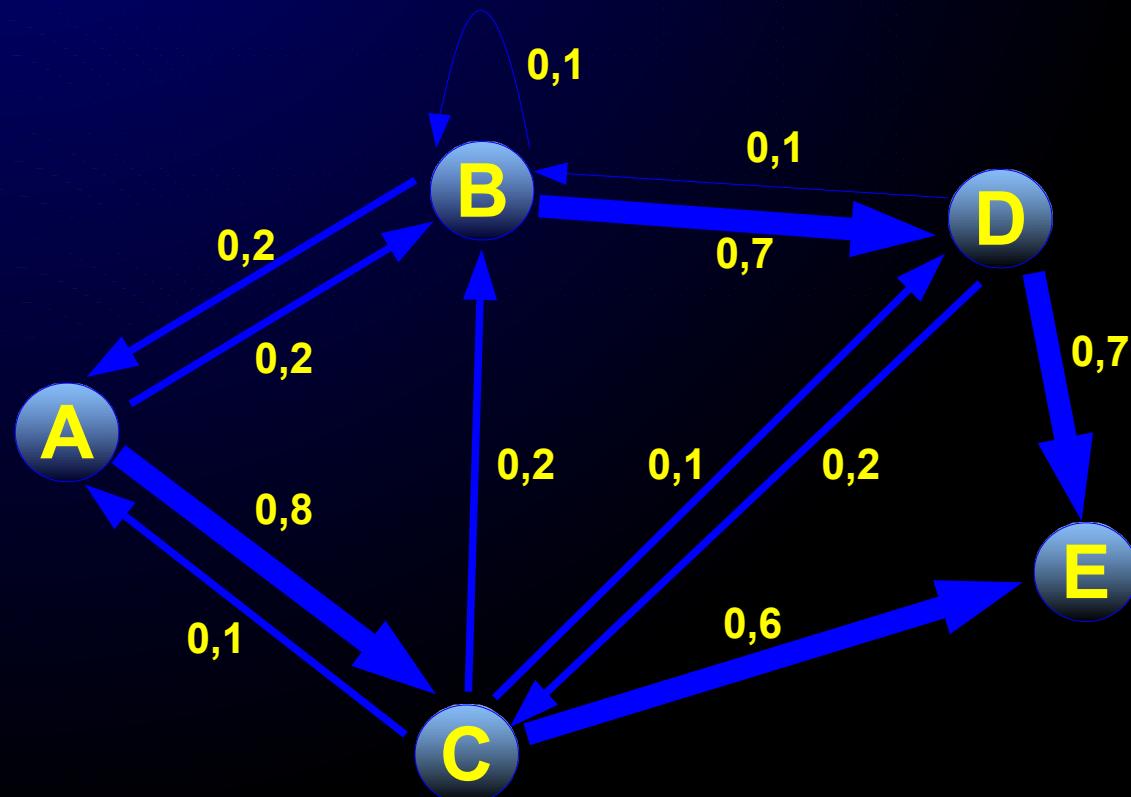
Smart Phones Usage Risk & Response Cycle



Networks & Matrices



Networks & Matrices



	A	B	C	D	E
A	0	0.2	0.1	0	0
B	0.2	0.1	0.2	0.1	0
C	0.8	0	0	0.2	0
D	0	0.7	0.1	0	0
E	0	0	0.6	0.7	0

Networks & Matrices

