Mapping of Risks and Resources in Public Health for Decision Support Clients on Mobile Devices

University of Koblenz-Landau
ReGLaN – Health & Logistics
Research Group Learning and Neurosciences
Prof. Dr. E. Niehaus

United Nations: Committee on the Peaceful Uses of Outer Space
Scientific and Technical Subcommittee - 49. Session - Vienna, 07 February 2012

Project Objectives

AIM: EARLY WARNING: TELE-EPIDEMIOLOGY & LOGISTICALLY OPTIMIZED RESPONSE (Spatial Decision Support)

HOW? SPATIAL MODELLING OF PUBLIC HEALTH RISK AND EFFICIENT ALLOCATION OF MEDICAL & PUBLIC HEALTH RESOURCES

WITH: DELIVERY OF AN ADAPTIVE SPATIAL DECISION SUPPORT SYSTEM (Open Source)

TO WHOM? GOVERNMENT, ADMINISTRATION, DOCTORS, PUBLIC HEALTH WORKERS, PEOPLE EXPOSED TO PUBLIC HEALTH RISKS (Decision Makers)

Definition:
Spatial Decision Support System

GIS
Geographical Information System

+

DSS
Decision Support System

=

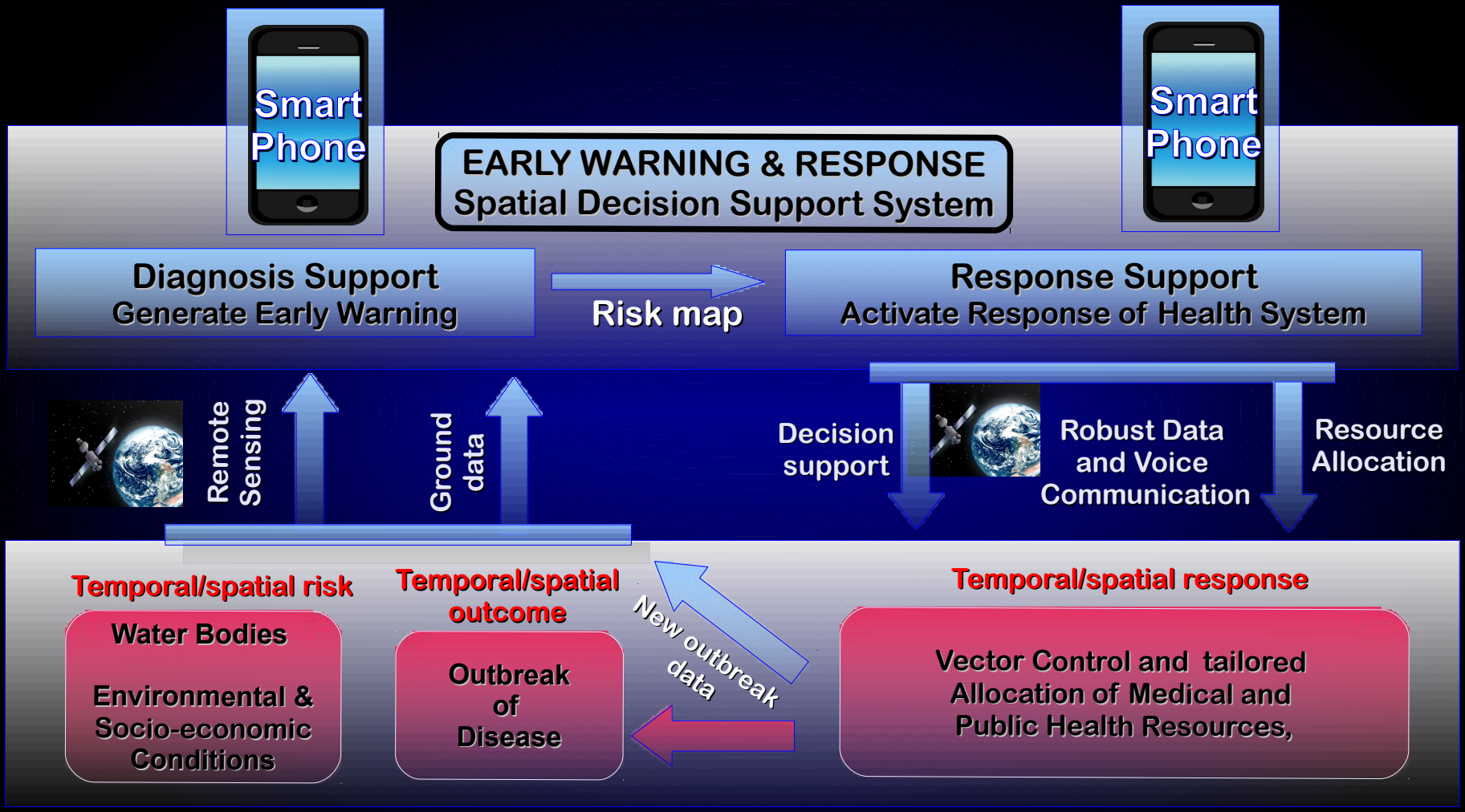
SDSS
Spatial Decision Support System

GIS: Spatial Patterns of Risk & Spatial Distribution of Resources

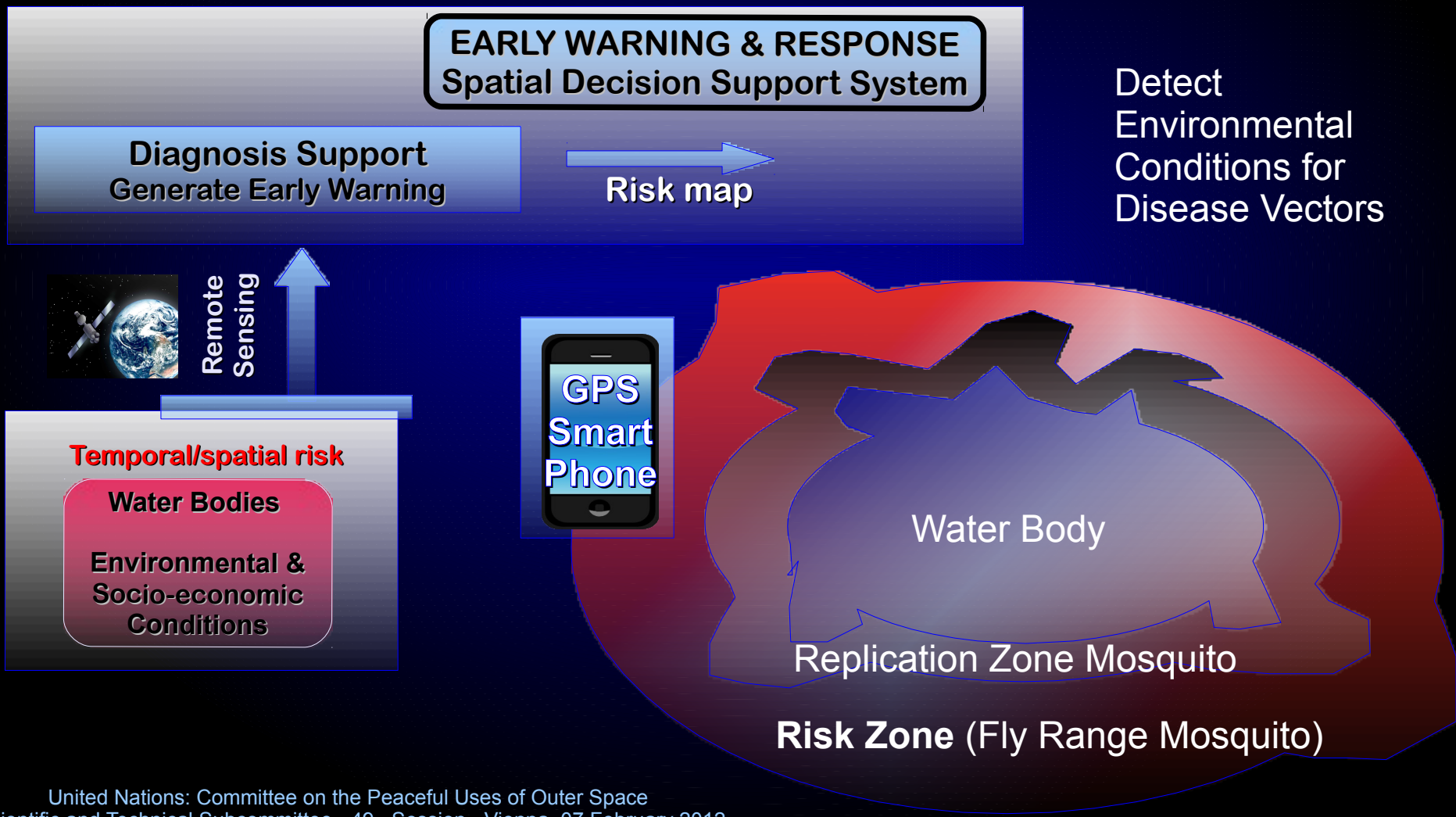
SDSS: Spatial Decisions: Risk & Resources

DSS: Medical Environments are Complex Dynamic Systems – Support Decision Makers in complex environments

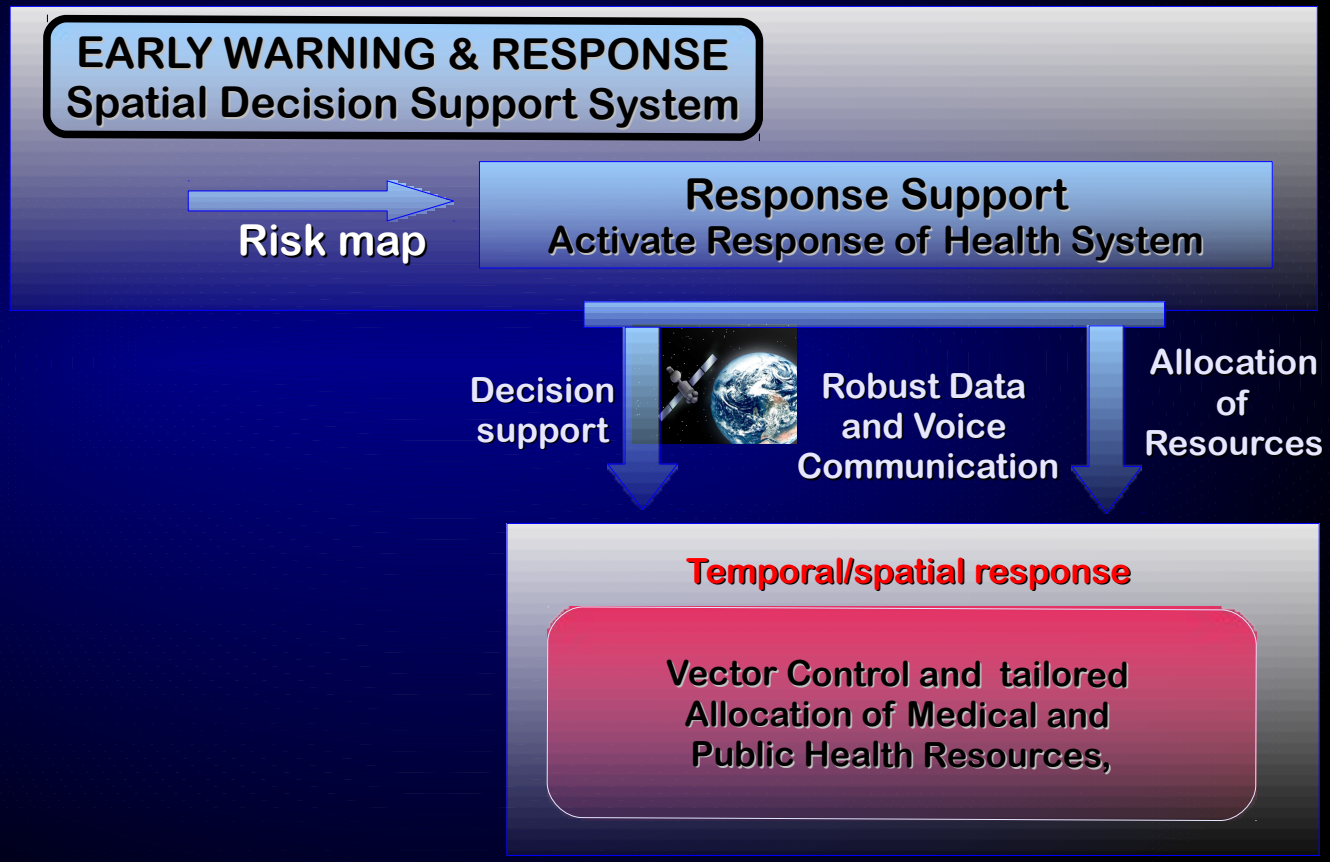
Early Warning & Response Cycle



Early Warning & Response Cycle



Early Warning & Response Cycle



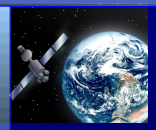
Early Warning & Response Cycle

EARLY WARNING & RESPONSE
Spatial Decision Support System

Risk map

Response Support
Activate Response of (Public) Health System

Decision support



Robust Data and Voice Communication

Allocation of Resources

Spatial Support for Vector Control Units

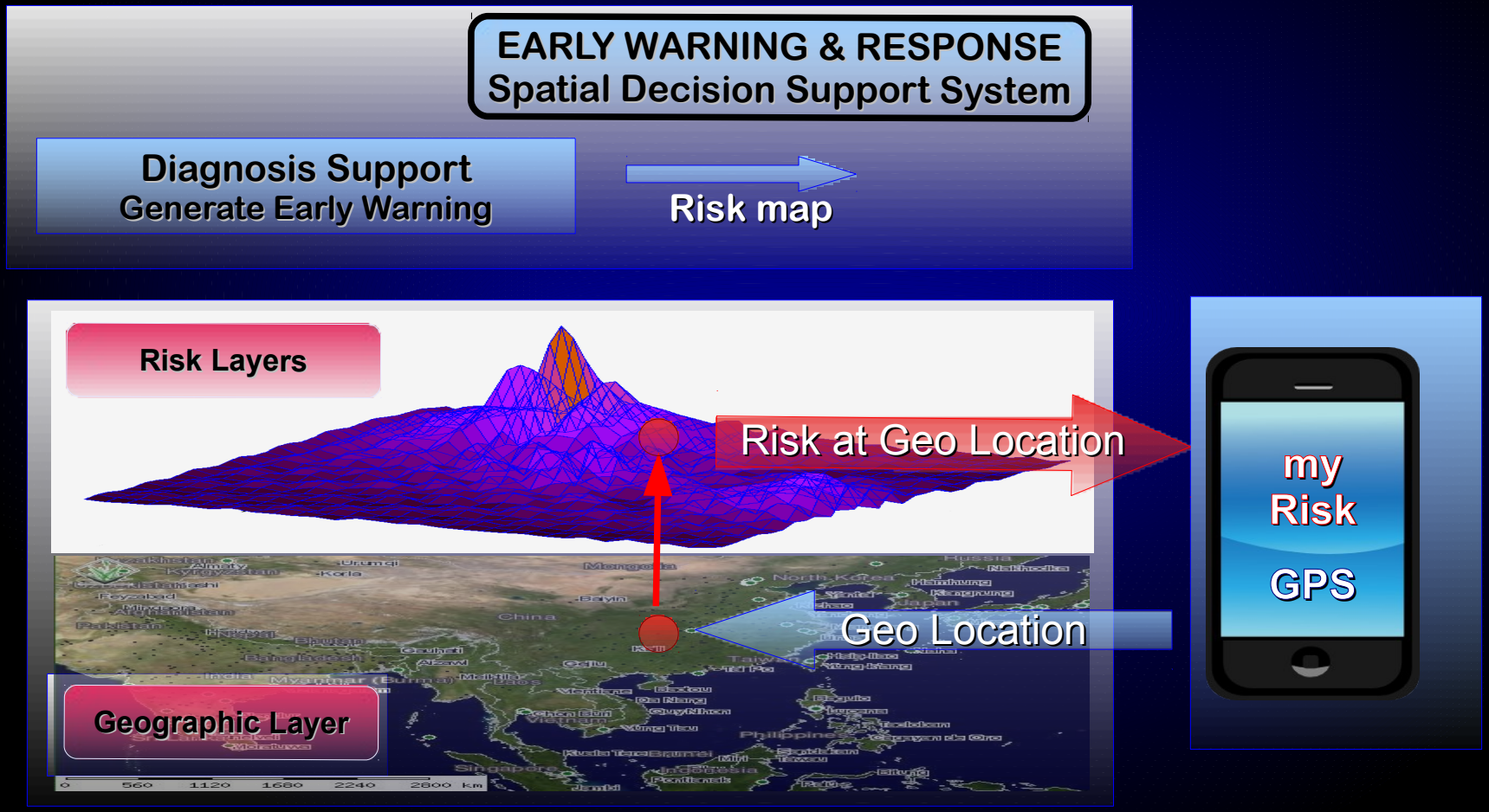
GPS-tailored Application of Larvicides

Checking of previous Public Health Interventions

Temporal/spatial response

Vector Control and tailored Allocation of Medical and Public Health Resources,

Early Warning & Response Cycle



Early Warning & Response Cycle

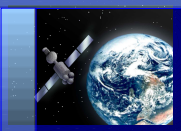
GPS Navi-gation

EARLY WARNING & RESPONSE
Spatial Decision Support System

Risk map

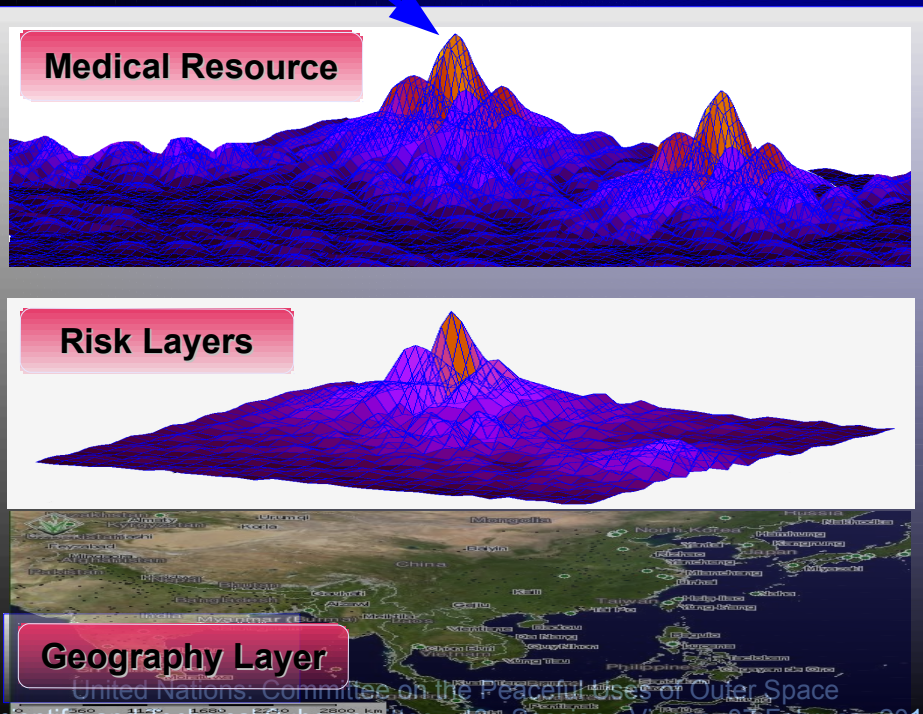
Response Support
Activate Response of Health System

Decision support



Robust Data and Voice Communication

Allocation of Resources

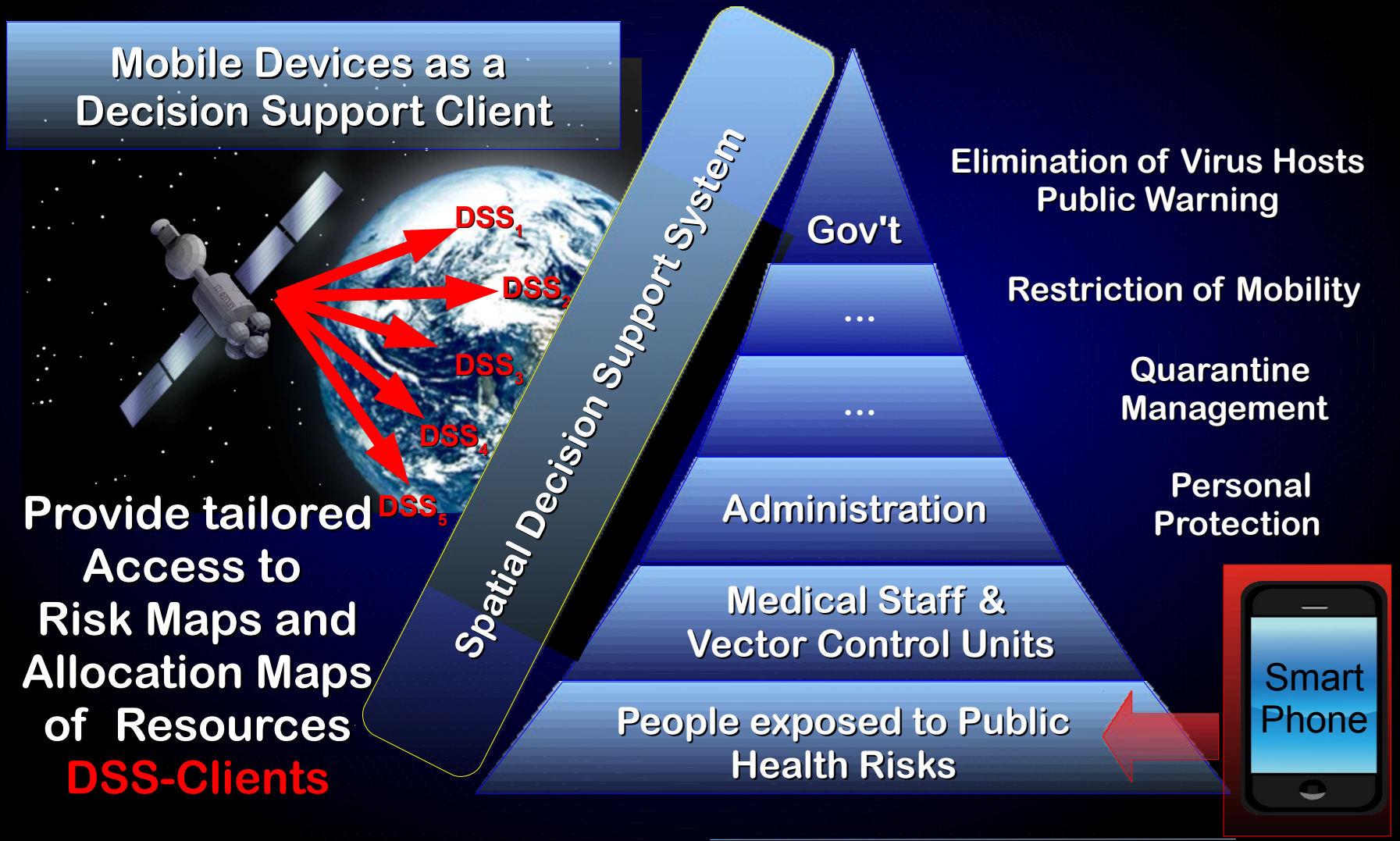


Temporal/spatial response

Vector Control and tailored Allocation of Medical and Public Health Resources,

http://www.navit-project.org/

Mobile Devices & Decision Support



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

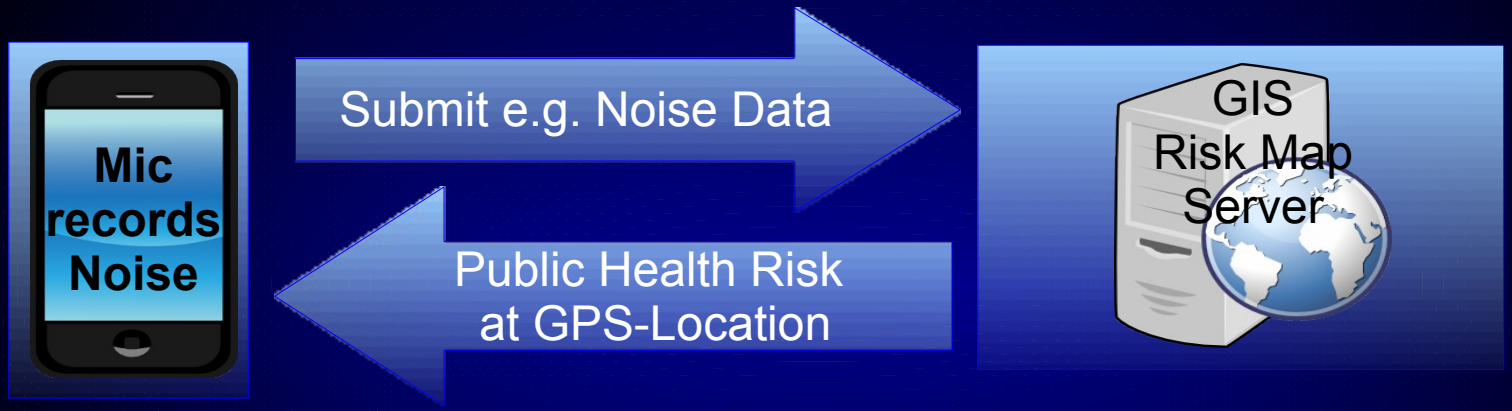
Types of GPS-Pseudo Measurement

- 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

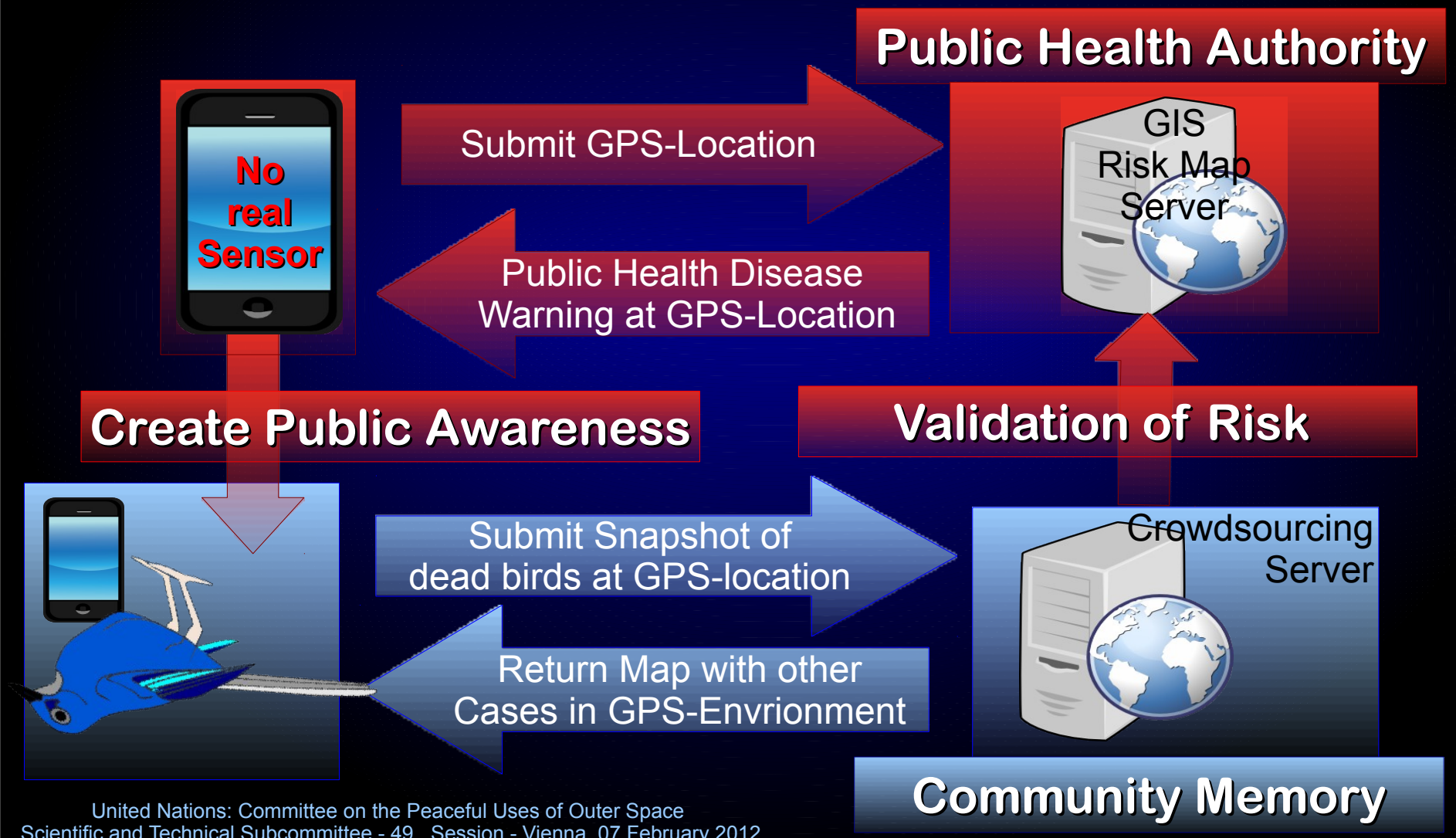
Differences: Crowdsourcing GPS-Pseudo Measurement

Crowdsourcing (e.g. NoiseTube, UN-SPIDER Disaster Mgmt)



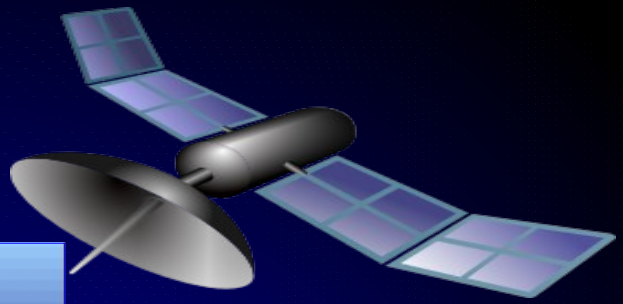
GPS-Pseudo Measurement

Public Awareness, Crowdsourcing & Public Health Authorities



Response & Public Health Risks

Mobile Devices as a
Decision Support Client
Spatial Application of Agrochemicals



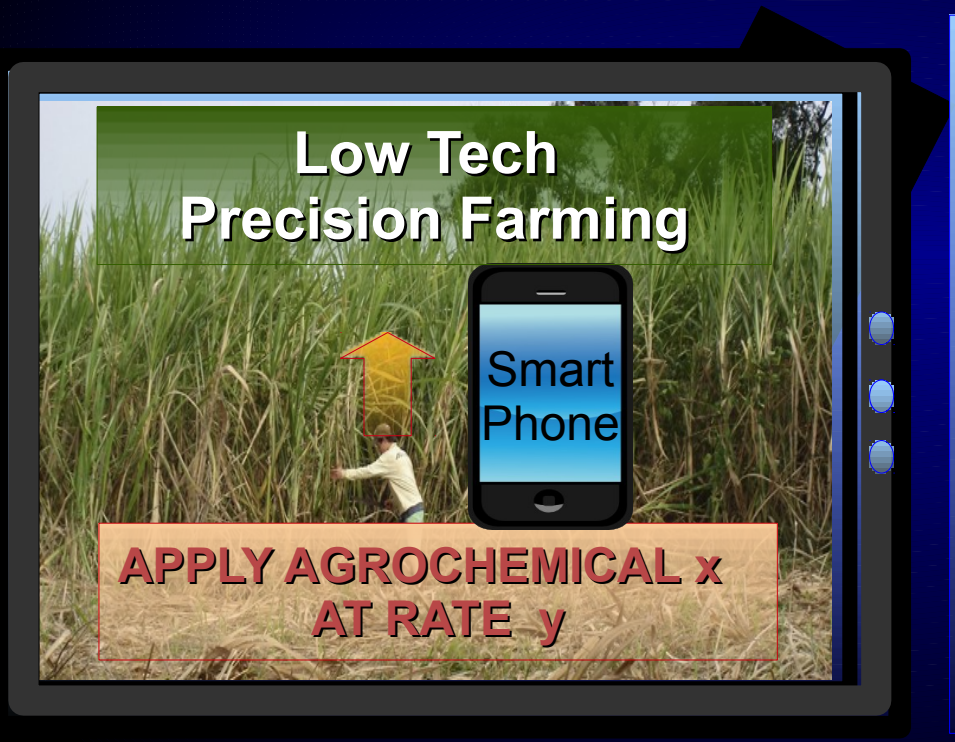
NDVI / EVI
Crop Health

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

Economic Benefits & Public Health Benefits

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

Space Technology & Decision Support

Remote Sensing Data

Spatial Decision Support System

GIS
Geopraphic
Information System

OpenSource
GRASS
Geographic Resources
Analysis Support System

GPS-
Pseudo
Measurem.

Smart
Phone

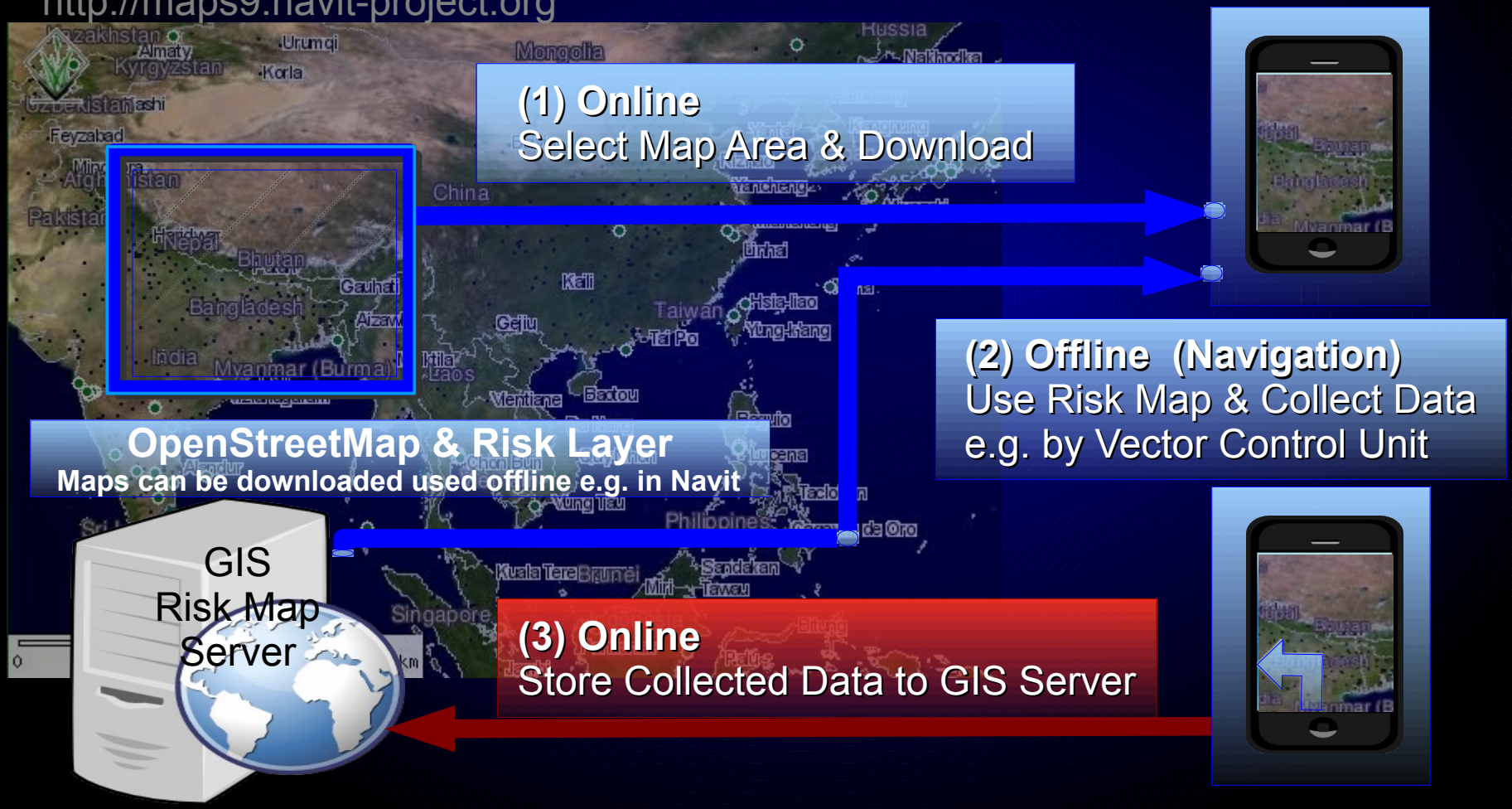
Linux-OS on Mobile Device

- > Free Availability
- > Adaption to Early Warning
- > Multiplatform [Windows Linux Mac]

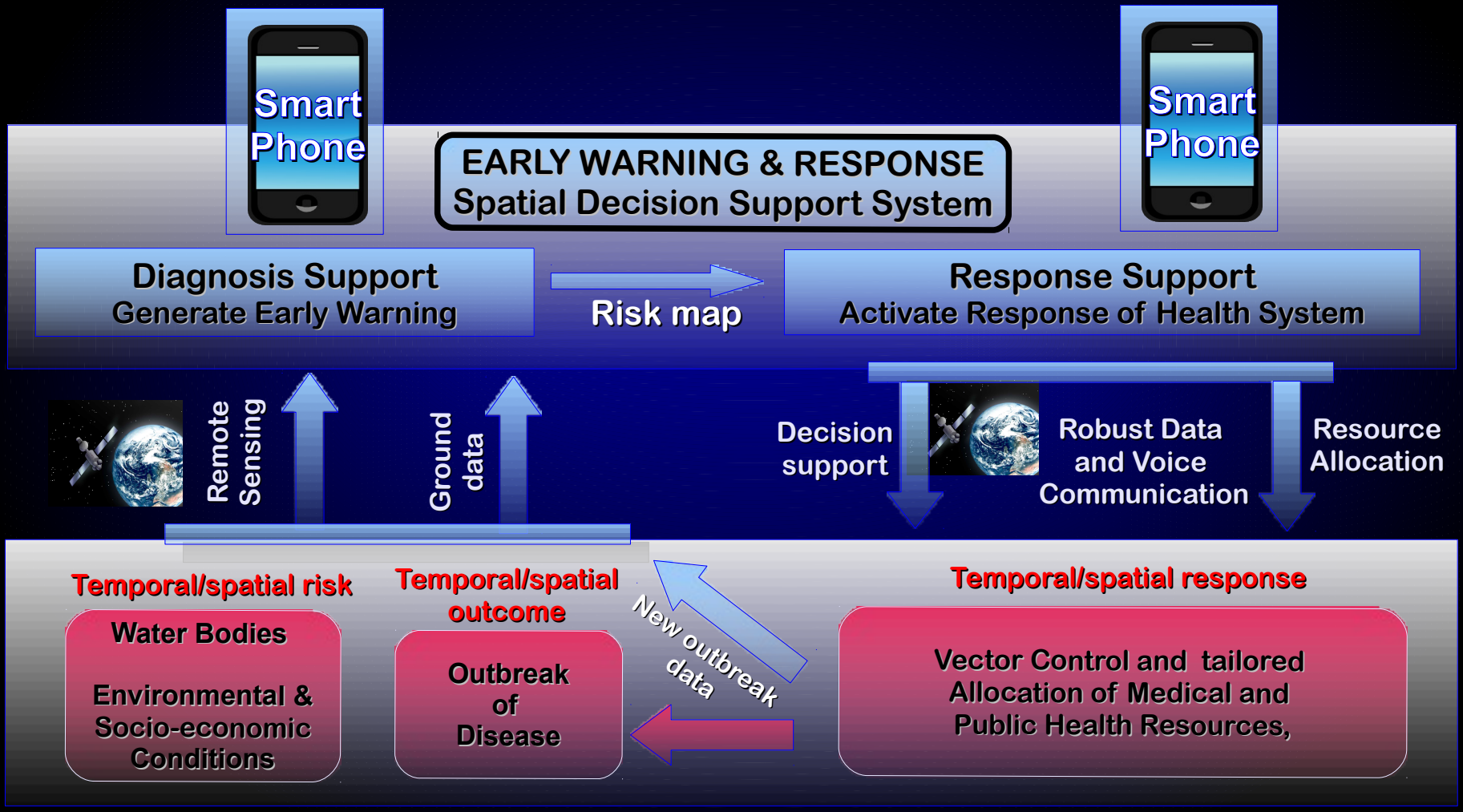
IT-Infrastructure

Offline Usage – OpenSource & OpenContent

http://maps9.navit-project.org



Smart Phones Usage
Early Warning & Response Cycle



GPS-Pseudo Measurement

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

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.

Epidemiology, vet. Medicine
Public Health

Prof. Dr. Pascal Michel
(Canada)

Application and
Ecotoxicology of
Agrochemicals

Dr. M. Hieber-Ruiz
Prof. Dr. R. Schulz
(Germany)

Business Information System
& Information
Communication Technology

Prof. Dr. Marlien Herselman
(South Africa)

Mathematical Modelling of
Decision Support

Integrated
Logistic
Support

Acquisition of Expert
Knowledge for ITS & DSS
(Psychology)

Gehard Ackermann
Health & Logistics
(South Africa/Germany)

Thank You