

Capacity Building, Wikiversity for Risk Management, Application of Space Technology and Health Open Master Programme - AT6FUI 2015



**University Koblenz-Landau
Department of Natural and
Environmental Sciences**



**Presentation by
Engelbert Niehaus**

What is Wikiversity?

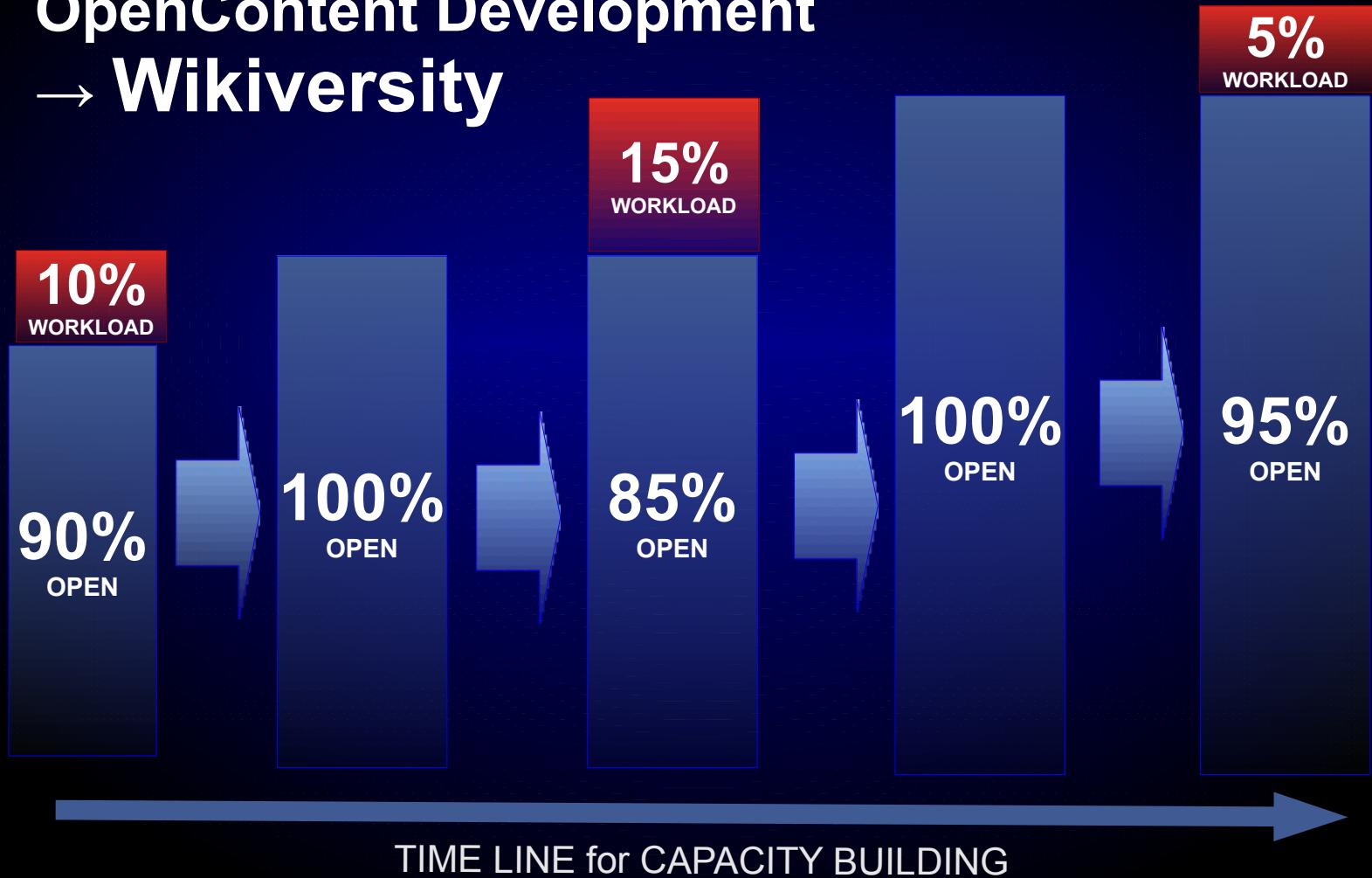
Definition: Wikiversity

Wikiversity is a Wikimedia Foundation project devoted to learning resources, learning projects, and research for use in all levels, types, and styles of education from pre-school to university, including professional training and informal learning.

Wikiversity invites teachers, students, and researchers to join the Wikiversity community in creating open educational resources and establish collaborative learning environments.

Open Community Approach

OpenContent Development
→ **Wikiversity**



Structure of Wikiversity

SCHOOL:

DEPARTMENT 1:

DEPARTMENT 2:

TOPIC 1:

...

TOPIC 2:

...

TOPIC 3:

...

TOPIC 4:

...

Structure of Wikiversity

SCHOOL: Risk Management

DEPARTMENT: Spatial Risk Management

TOPIC 1:
Spatial Decision
Support Systems

TOPIC 2:
Spatial
Epidemiology

DEPARTMENT: Risk Literacy

TOPIC 3:
Model Experiment
for invisible Risks

TOPIC 4:
Ecotoxicological
Risk Literacy

Wikiversity: Educational Level

Pre-school Education

Primary Education

Secondary Education

Non-formal Education

Tertiary Education

Research Portal



Risk Literacy
e.g. Learning
Environment,
Risk Awareness

Risk Literacy
e.g. Farm Workers

BA, MA, PhD

Research Results

Case Studies as Learning Content

URL en.wikipedia.org/wiki/United_Nations_Office_at_Vienna

WIKIPEDIA The Free Encyclopedia

Article Talk Abstract Read Edit View history Search

Geo-Loc Coordinates: 48°14'5"N 16°25'1"E

Case Study Nefro Lempa
From Wikipedia, the free encyclopedia

Wikiversity Article/Content shows case studies on Risk Mitigation in the Lempa Region in El Salvador
Application of Low Cost Precision Farming and Application on Health Risk Mitigation

GIS-Server support to APPLY AGROCHEMICAL x AT RATE y

Low Cost Precision Farming
Smart Phone

The UN headquarters at Vienna, Austria, known as the Vienna International Centre.

Learning Objective - Wikiversity

Case Studies are Guiding Learning Process

Analyse existing Case Studies => Theory

Students brings Case Studies => Documentation

- (1) Just Learn about Risk Mitigation
- (2) Use Content for Degrees:
Certificates, Bachelor, Master, ..
Research PhD

=> Contribute to Risk Mitigation in Case Study

Template

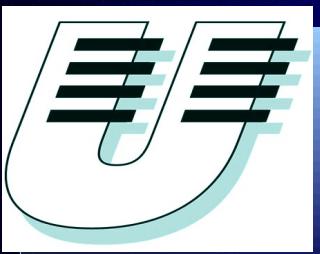
Text



← Available financial Resources

Fully Virtual

Improve Public Health by Application of Space Technology – Open Community Approach Summerschool Landau 2013

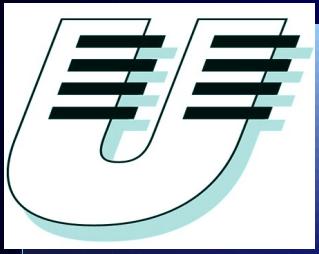


**University Koblenz-Landau
Mathematics**

Engelbert Niehaus

Improve Public Health by Application of Space Technology – Open Community Approach

Action Team 6 – Follow Up Initiative (AT6FUI)



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in cooperation with

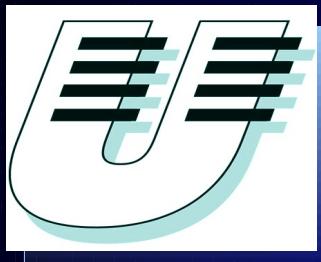
**United Nations
Office of Outer Space Affairs UNOOSA
Programme on Space Applications**

Sergei Chernikov



Low-Cost Precision Farming and Risk Mitigation for Chronic Kidney Disease

Action Team 6 – Follow Up Initiative (AT6FUI)



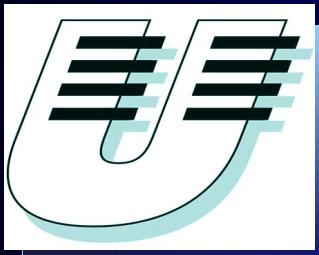
University Koblenz-Landau
Presentation by
Engelbert Niehaus

Chair AT6FUI: Pascal Michel
(Public Health Agency Canada)



Improve Public Health by Application of Space Technology – Open Community Approach

Action Team 6 – Follow Up Initiative (AT6FUI)



organized by
University Koblenz-Landau

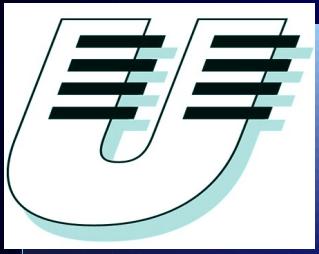


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Improve Public Health by Application of Space Technology – Open Community Approach

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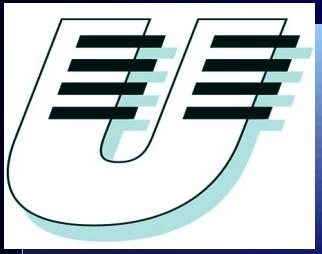
**United Nations
Office of Outer Space Affairs UNOOSA
Programme on Space Applications**

Sergei Chernikov



Improve Public Health Through Low Cost Technology & GPS tailored Access to Risk and Resources

Action Team 6 – Follow Up Initiative (AT6FUI)



virtual IT backbone organized by
University Koblenz-Landau

in cooperation with



**United Nations
Office of Outer Space Affairs UNOOSA
Programme on Space Applications**

Head Steering Committee:
Prof. Dr. Pascal Michel (Public Health Agency Canada)

Improve Public Health Through Low Cost Technology & GPS tailored Access to Risk and Resources

Regional Meeting Points - RMP



INS & Ministry of Health - El Salvador

(Main RMP – Time Zone – El Salvador)



Public Health Agency – Canada

(Chair AT6FUI)



Achutha Menon Centre for Health Science Studies - India



CSIR – Pretoria – South Africa

(Living Labs in Southern Africa)



University Koblenz-Landau - Germany

(IT-Orga Virtual Meeting)

Big Thank you for Support of the Open Community Approach

<http://at6fui.weebly.com> > Acknowledgements



**Office of Outer Space Affairs UNOOSA
Programme on Space Applications (S.Chernikov)**



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(Main RMP – Time Zone – El Salvador)



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(Chair AT6FUI)



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Studies - India**



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(Living Labs in Southern Africa)



University Koblenz-Landau - Germany
(IT-Orga Virtual Meeting)

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*”.

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

Open Community Approach (OCA) & Quality Assurance

AT6FUI
**Joint Repository
of Resources
(OCA)**

e.g. Spatial Public Health
YouTube Channel,
Course Spatial Epi,
Wiki-Books,
OLAT-Courses

**Research Evidence
for Risk Mitigation**

**Quality
Assurance
&
Formal
Require-
ments**

UNU
United Nations
University

**UNOOSA
UN-PSA**
Programme on
Space Applications

WHO
World Health
Organization

From HIGH-Cost to LOW-Cost



From HIGH-Cost to LOW-Cost

High Cost Solutions

Low Cost Solutions

Loose Precision / Performance

not necessary e.g. migrate from commercial Software
to Open Source Software

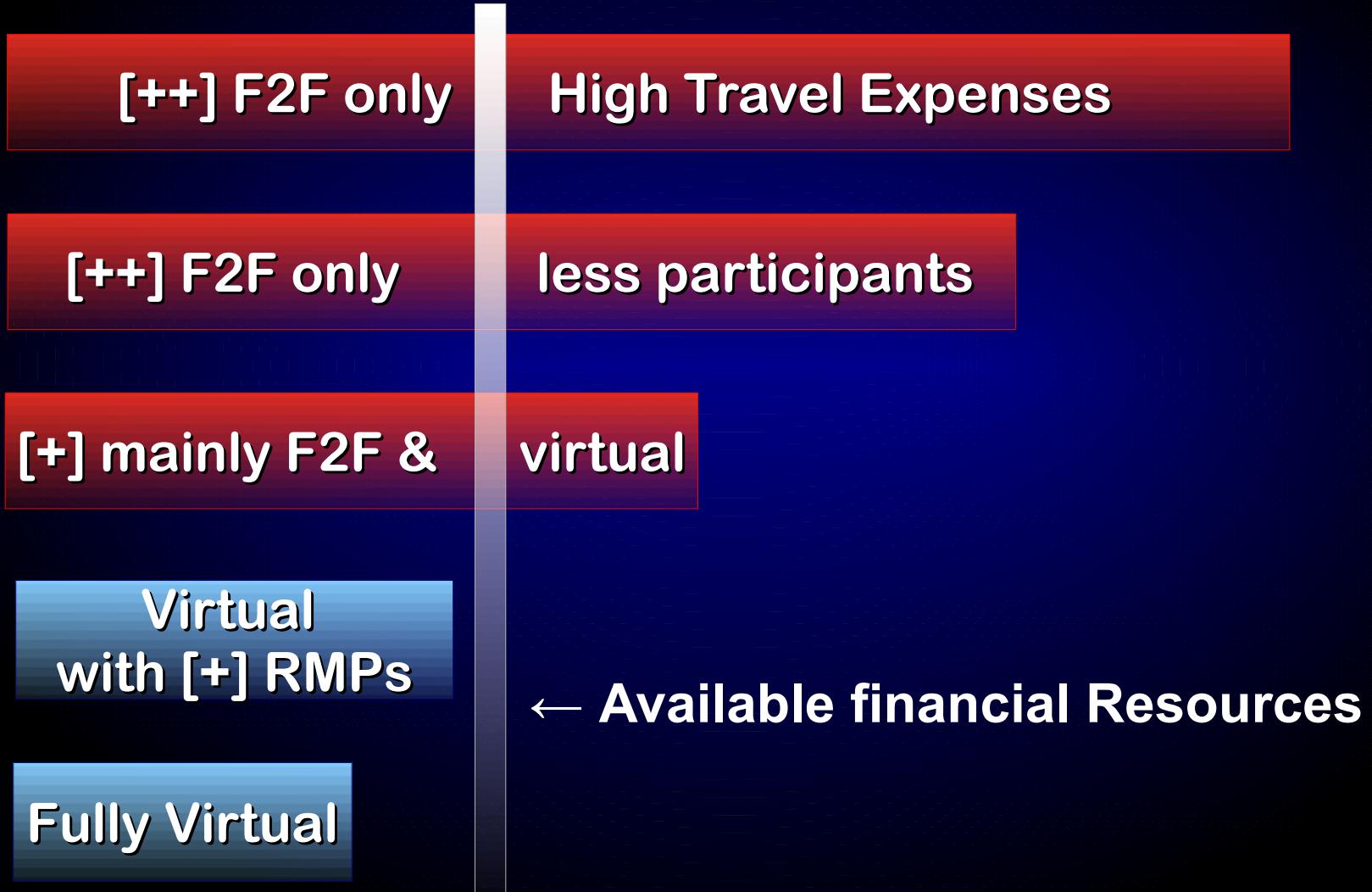
Reduce Total Cost of Ownership (TCO)

Increase Number of People, that can apply solution

Increase Repitions or Resolution of Experiments

e.g. improve spatial or temporal resolution

From HIGH-Cost to LOW-Cost



From HIGH-COST Conference to LOW-Confernce

High Cost Conference

Low Cost Conference

Loose Personal Contact F2F at LMP/RMP only

Get the Best of Two Worlds: Mix Virtual & RMP/LMP

Reduce financial & time constraints for participation

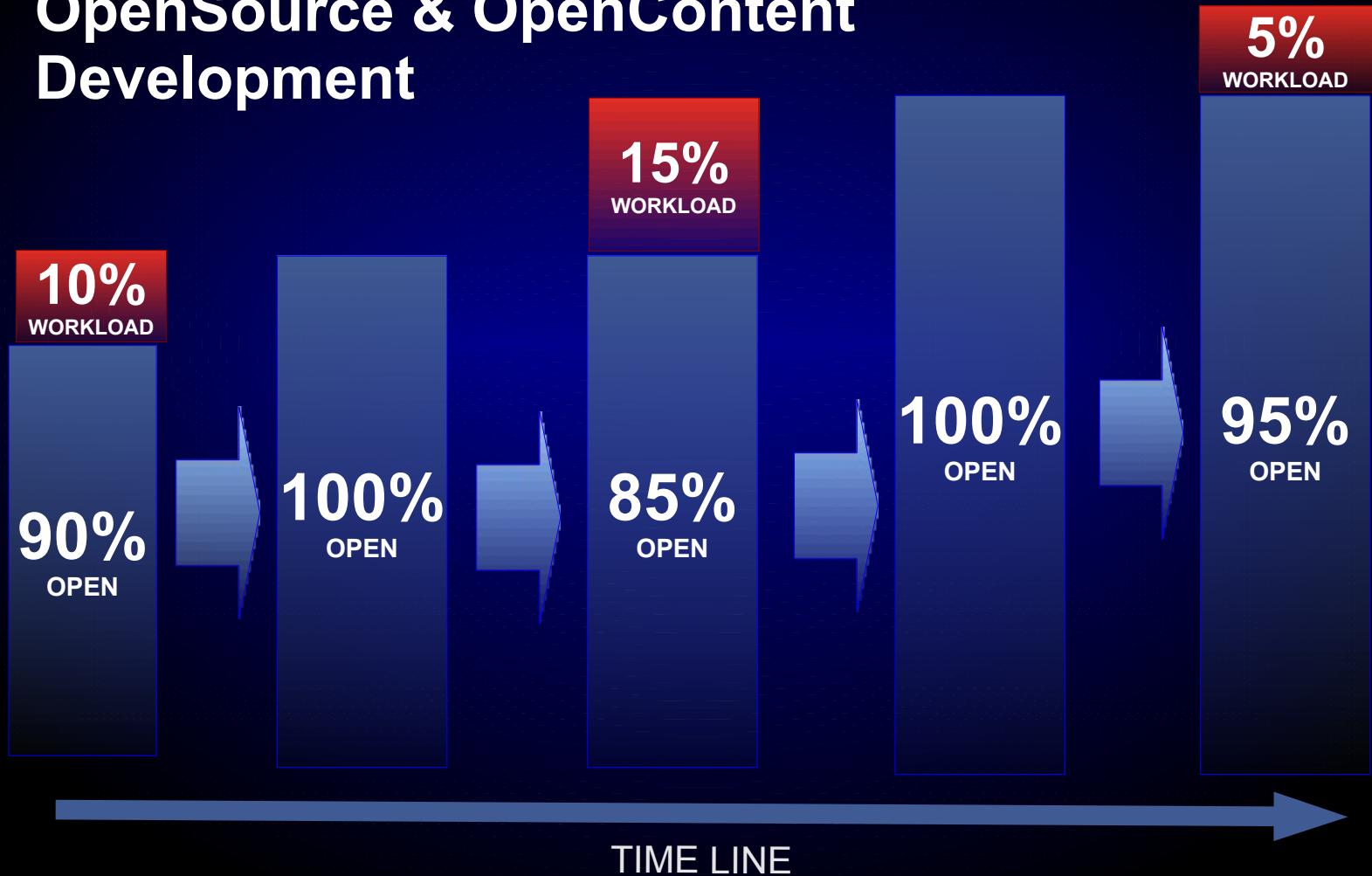
Increase Number of People, that can join Conference

Reduce the Time necessary for Presenters of Talk

minimal time for presenters is 30min for being virtual
present at flashmeeting after talk=video presentation

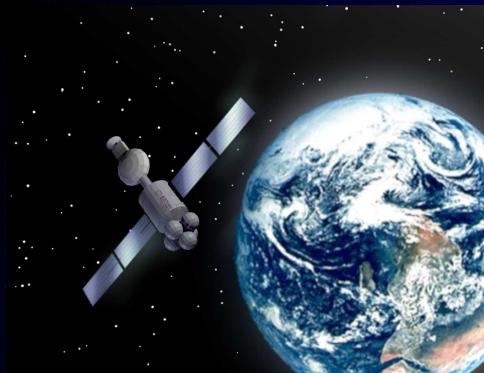
Open Community Approach

OpenSource & OpenContent Development



Holistic One Health Approach

Space



Health

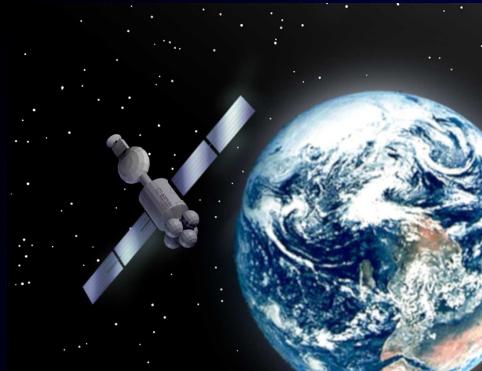


"Bridge" from Space to (One) Health Impact



Holistic One Health Approach

Space

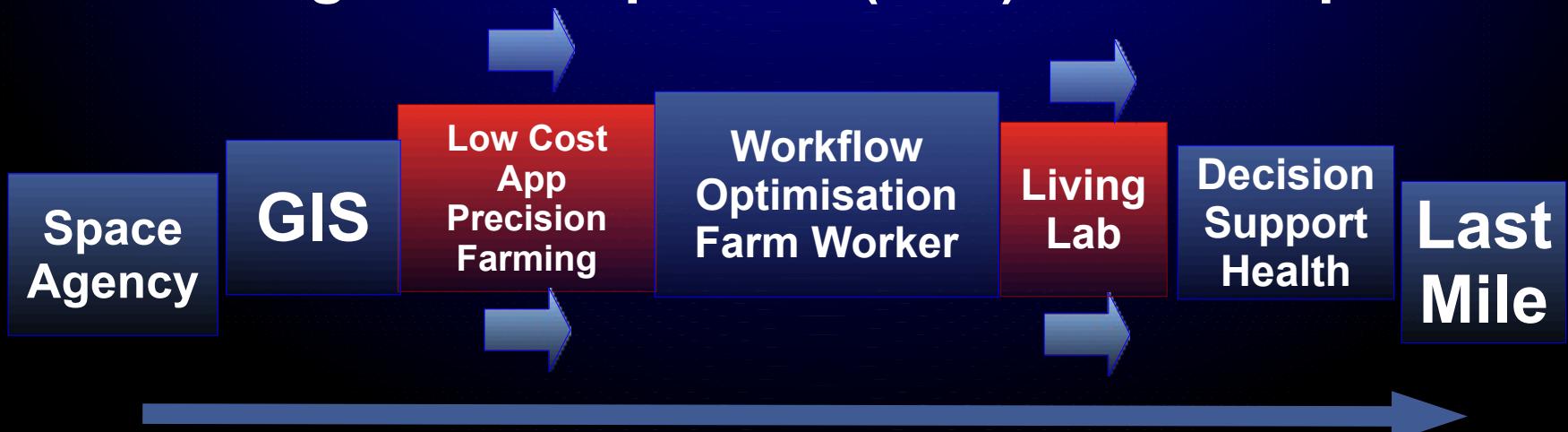


Health



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

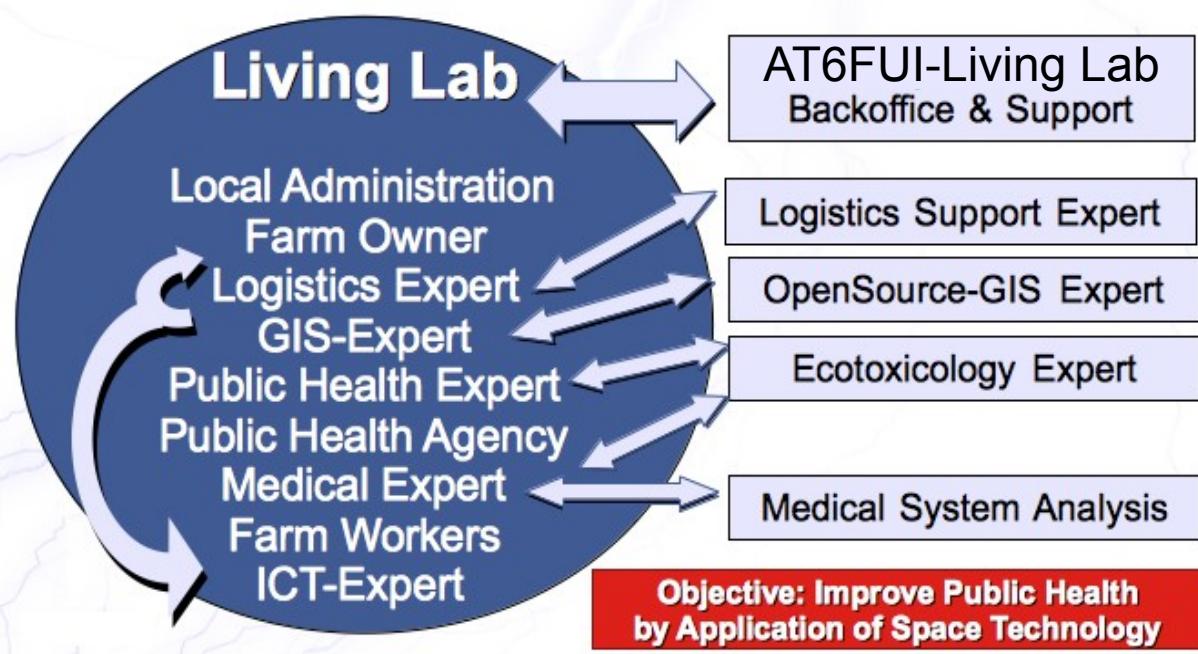
"Bridge" from Space to (One) Health Impact



Living Lab & Application of Space Technology

User-driven Innovation – Rural Areas

Research Environment & Implementation Strategy



Adaptation
to CKD

Open
Resources

GRASS, QGIS
ODK, SDAPS,
Tutorials,
Capacity Building
Material,
Risk Awareness,
.....

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*)

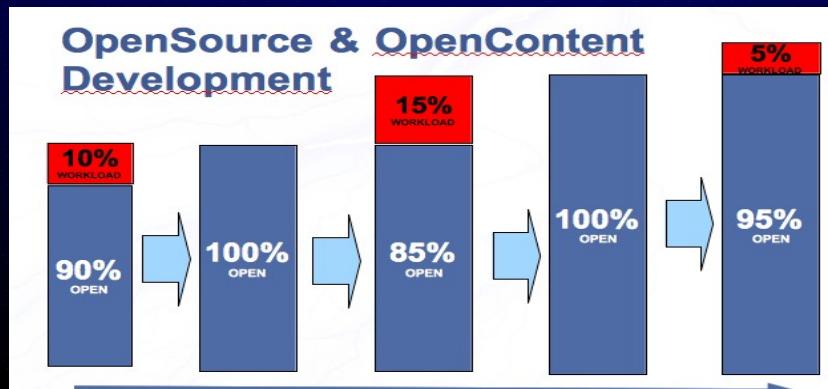
3.963 Code Commits (*0.1% Improvement*)

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

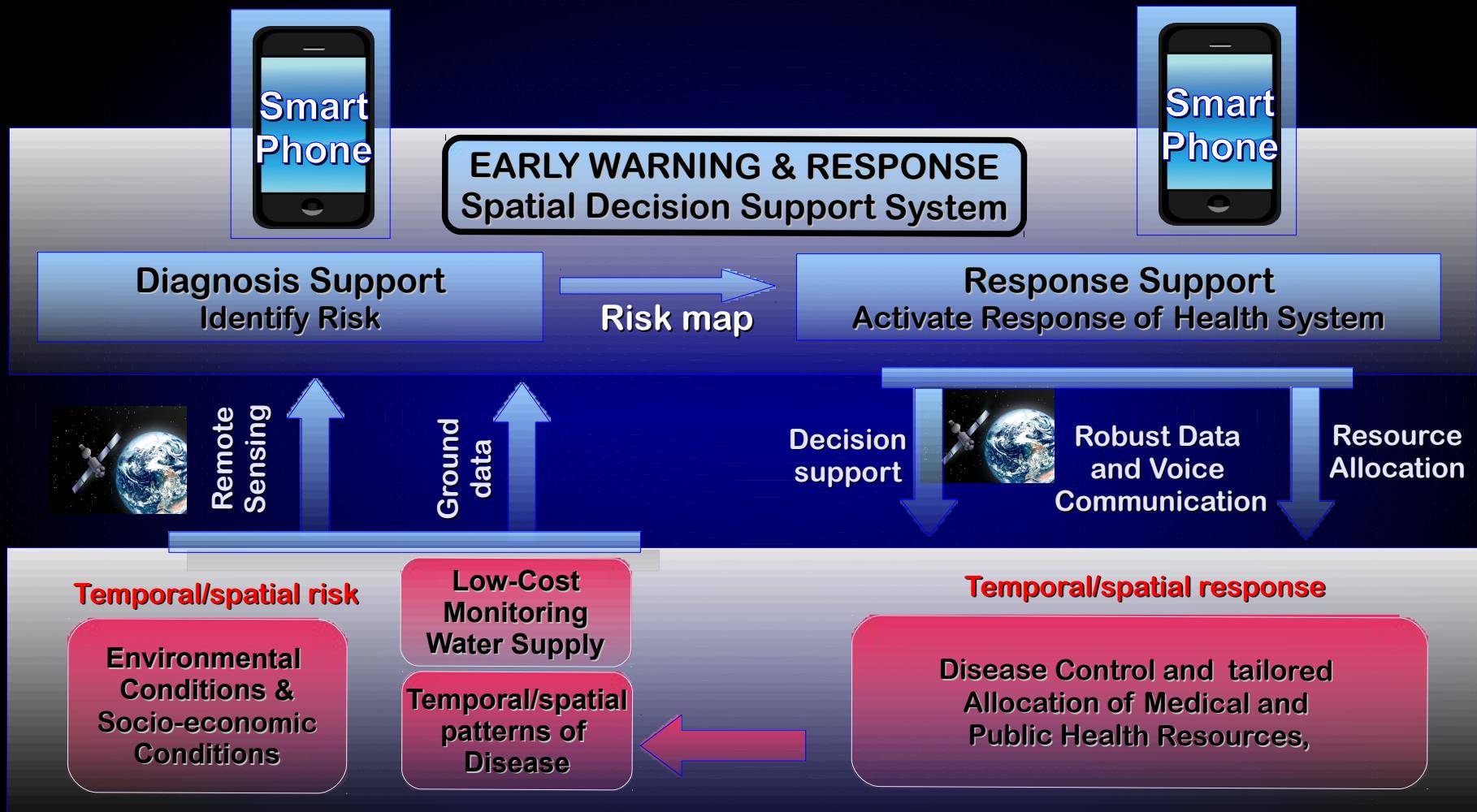
→ Monitoring generates Ground Data for
Spatial Decision Support System

**Spatial Resolution
of Monitoring System**

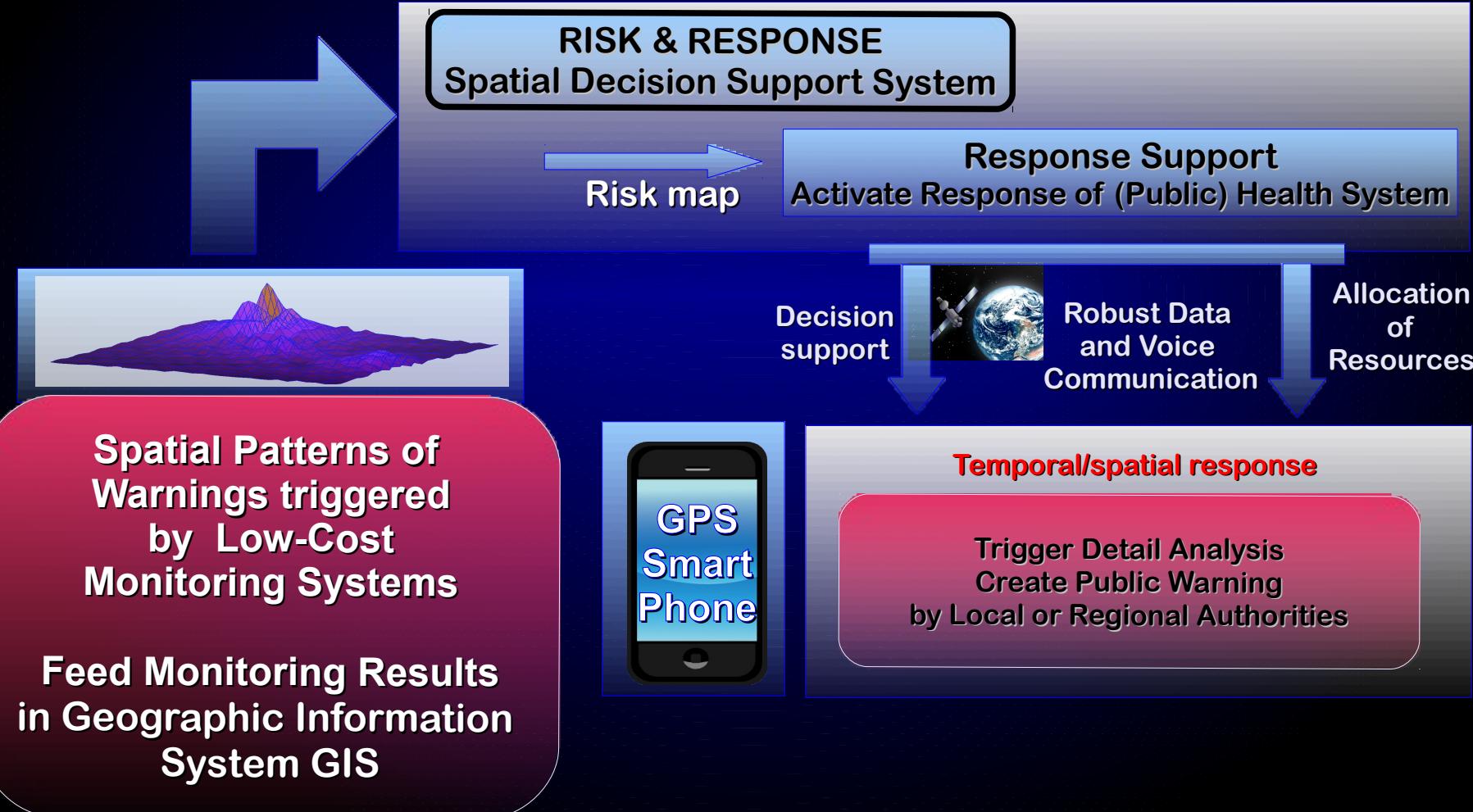
**Temporal Resolution
of Monitoring System**

**Access to Technology
of Monitoring System**

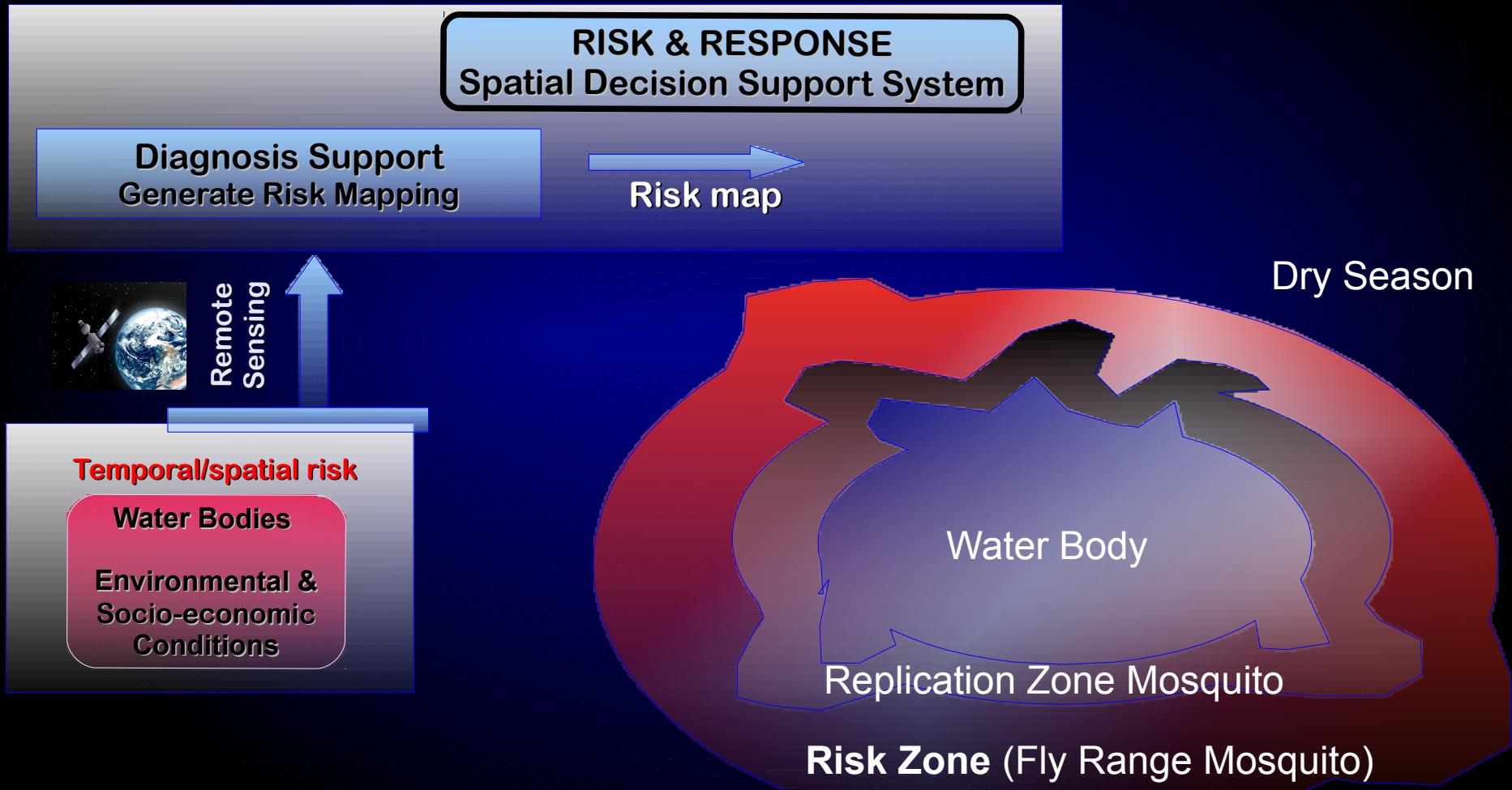
Risk & Response Cycle



Risk & Response Cycle



Risk Mapping & Remote Sensing



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

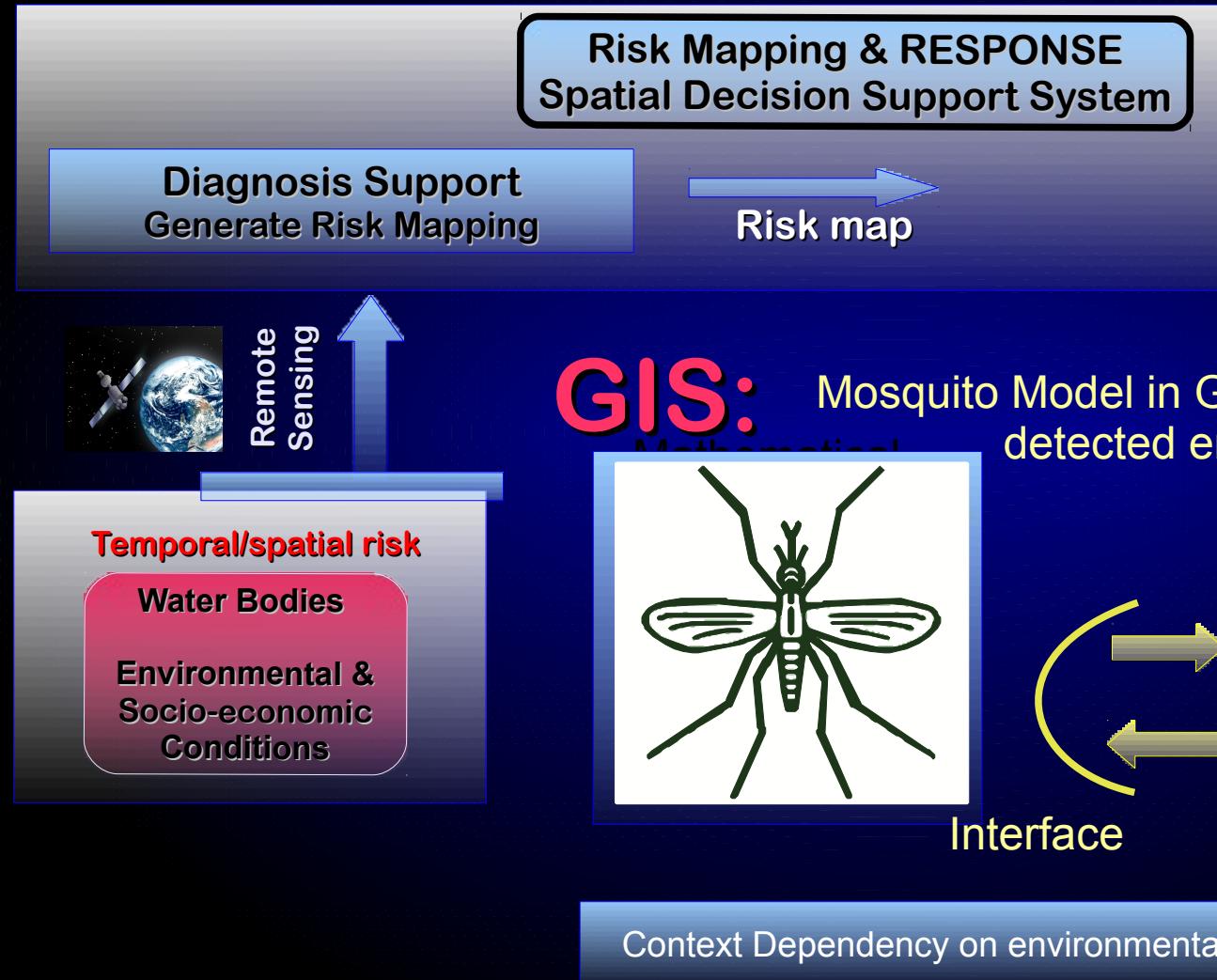
Dehydration, Toxic Poisoning

FARM WORKERS, ...



AGRICULTURE, ...

Risk Mapping & Remote Sensing



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)

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)

Implication (rules)

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

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

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

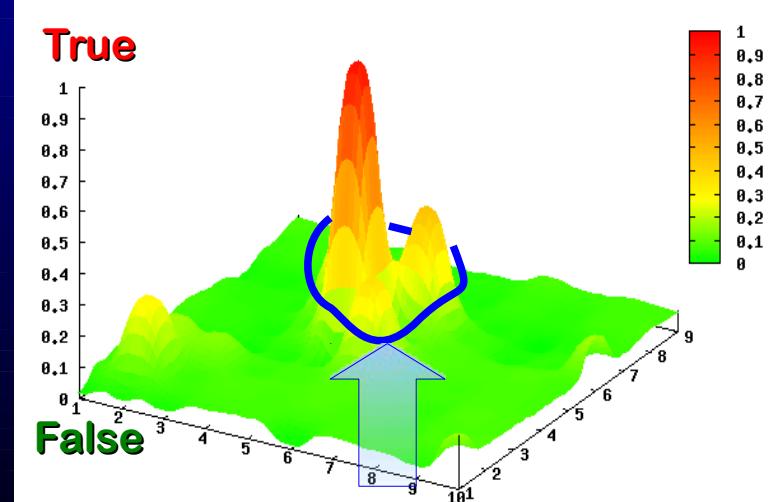
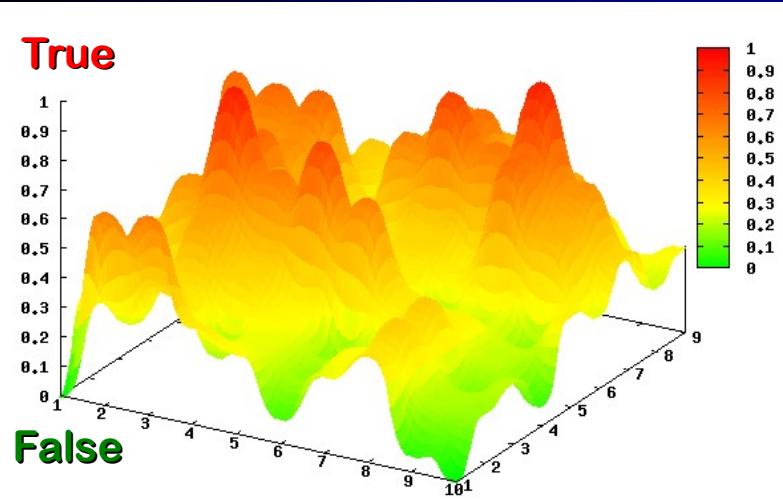
Fuzzy Rules
Operating on Fuzzy spatial properties

Linguistic Value

Temperature is optimal
for Mosquito A

Decision support

IF Temperature is optimal AND
high rainfall THEN Application
of Larvicides 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

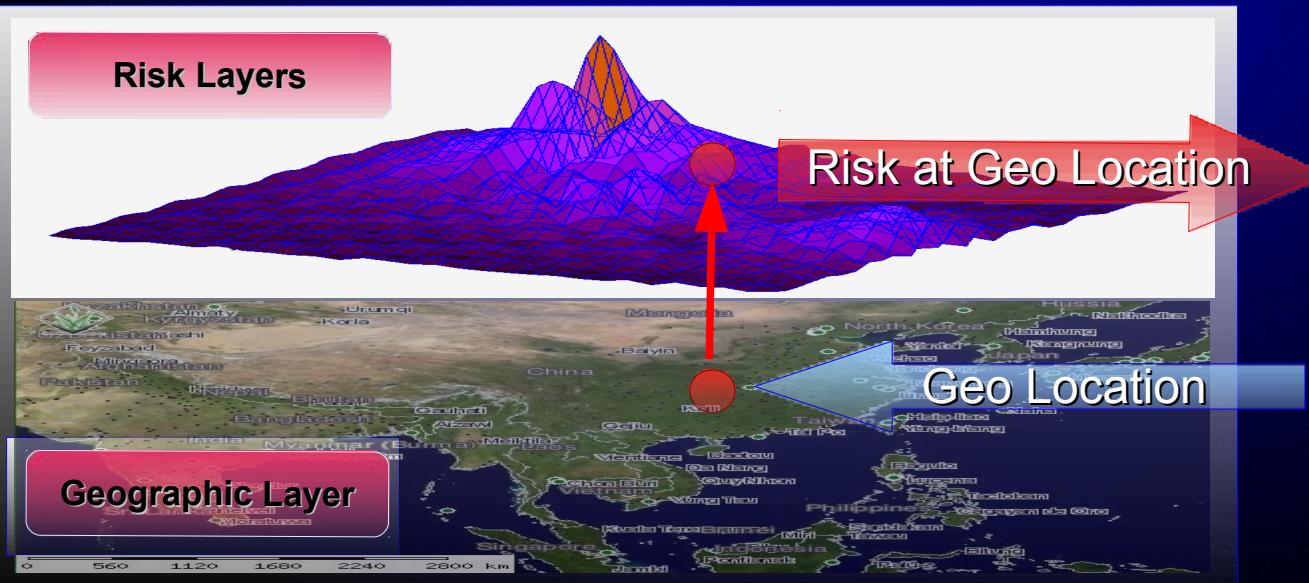
Risk map

Risk Layers

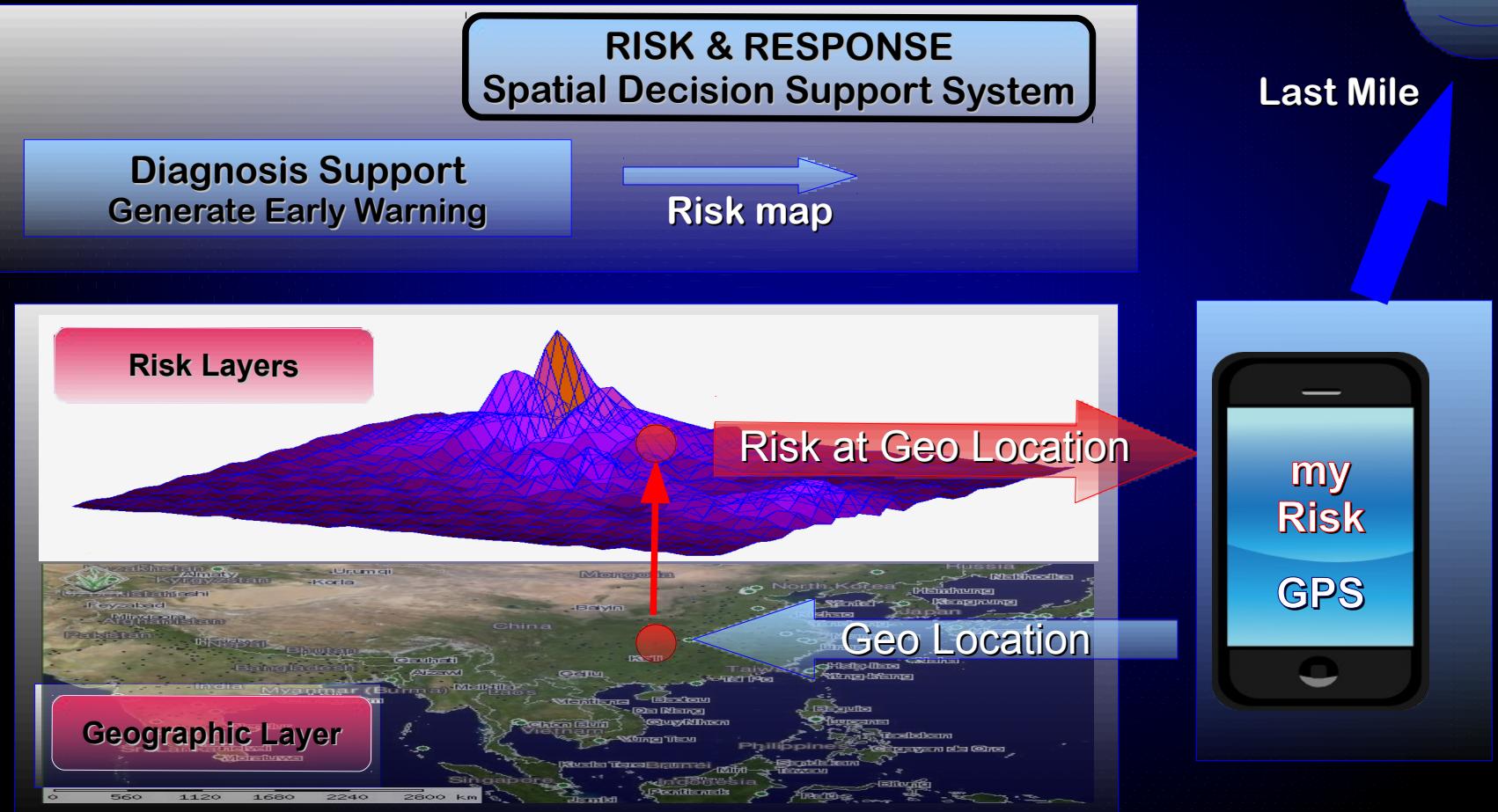
Risk at Geo Location

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**

Differences: Crowdsourcing GPS-Pseudo Measurement

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



Submit e.g. Noise Data



Public Health Risk
at GPS-Location

GPS-Pseudo Measurement

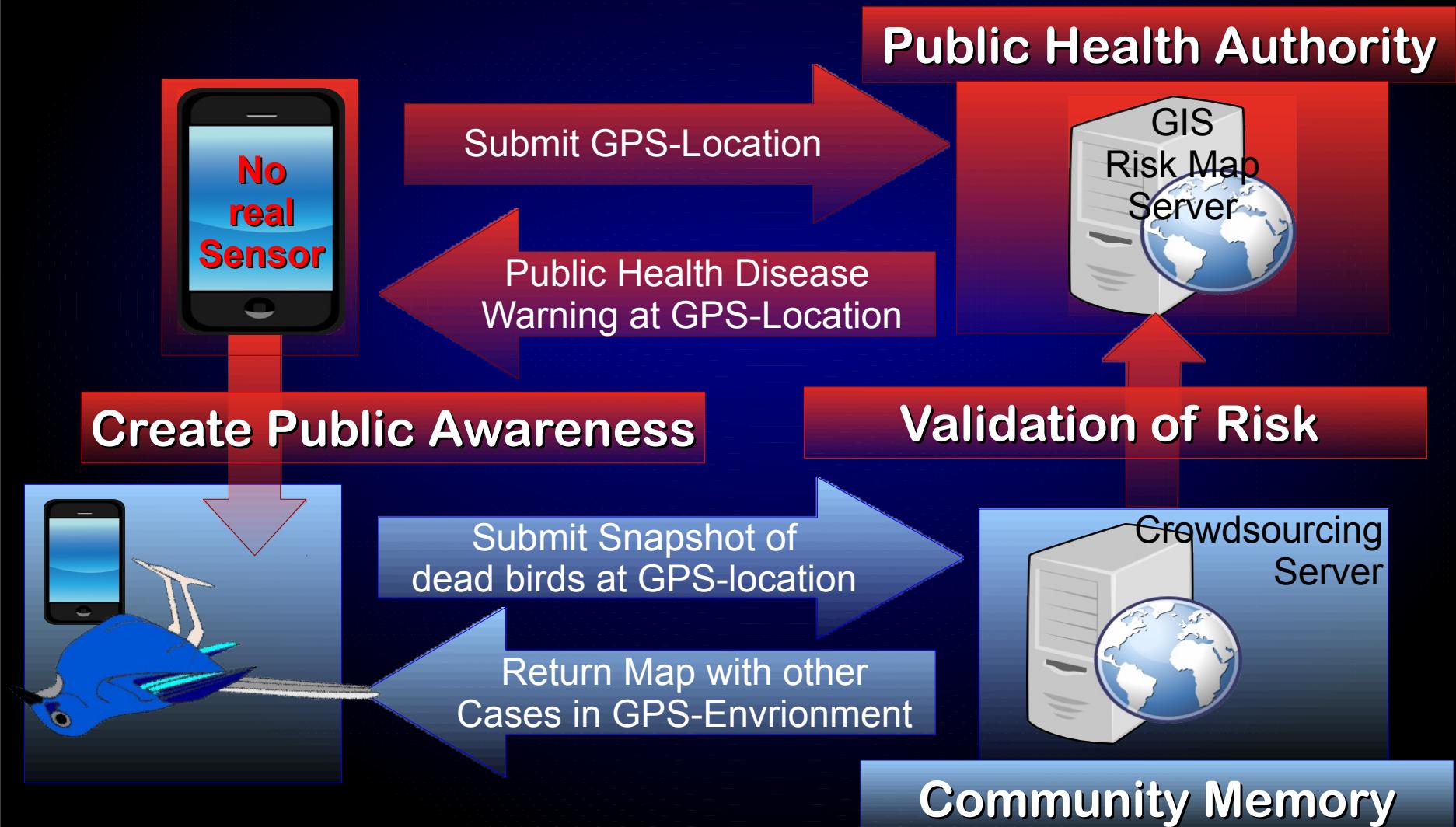


GPS-Location



Public Health Risk
at GPS-Location

Public Awareness, Crowdsourcing & Public Health Authorities



Response & Public Health Risks

Mobile Devices as a
Decision Support Client
Spatial Application of Agrochemicals



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)rcce
- TO WHOM?** OPEN COMMUNTIY OF PRACTICE
(Action Team 6 Follow-Up Initiative AT6FUI)

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



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

Remote Sensing Data



Navigation, Crop Health Map

Minimize Overlap of Spraying Track

Plants in different areas get different application rates.

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

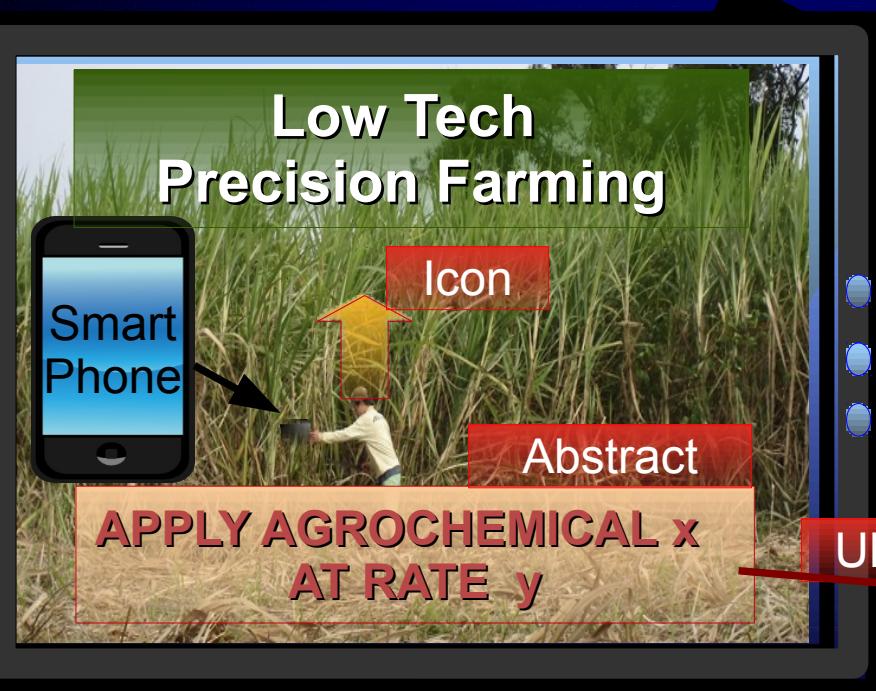
Economic Benefits: Optimized Farming with Low-Tech IT-environment => Developing Countries

Response & Public Health Risks

Mobile Devices as a Decision Support Client



GPS-Location



Attached Information
ICON + ABSTRACT + URL

APPLY AGROCHEMICAL x
AT RATE y

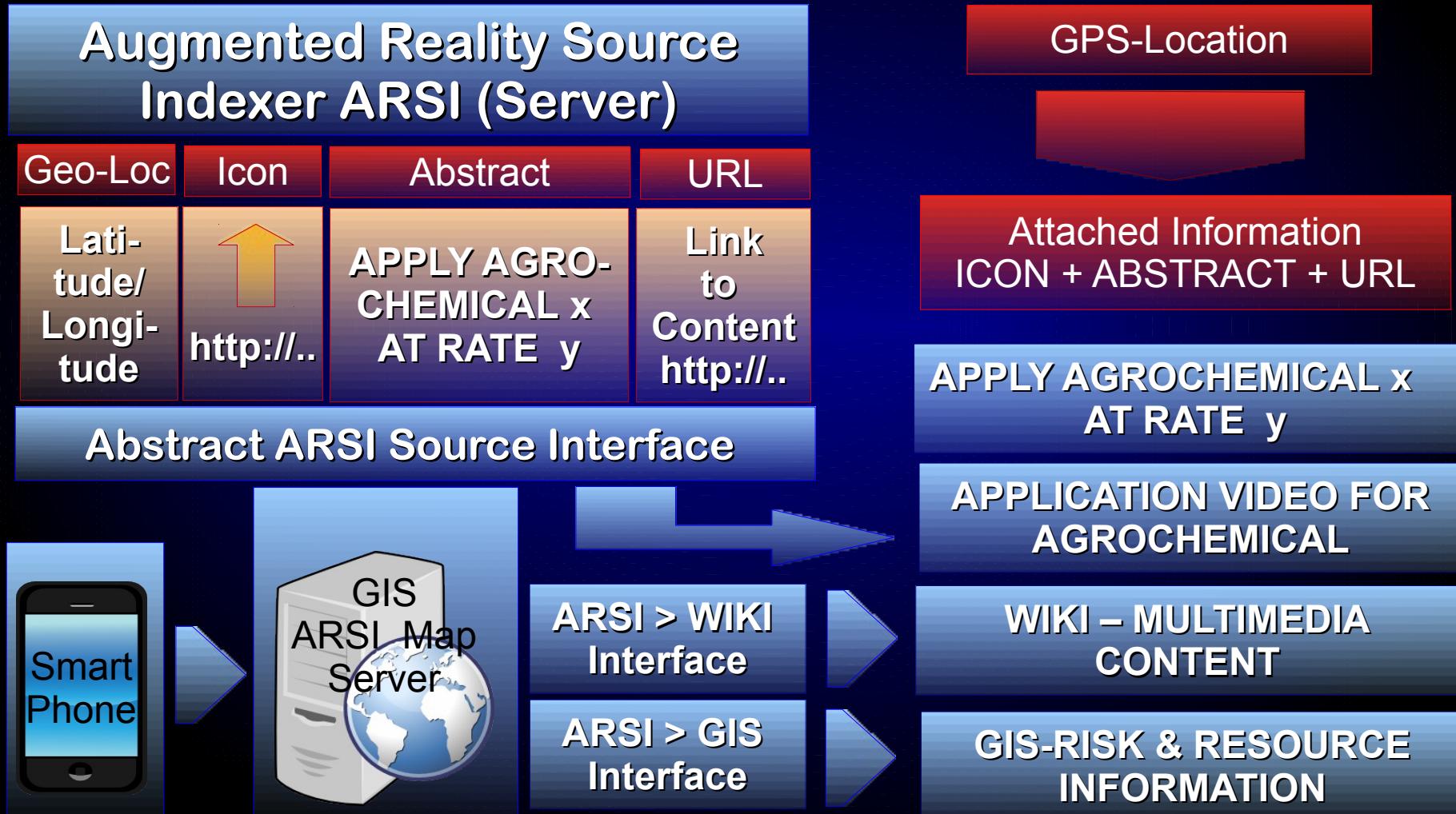
APPLICATION VIDEO FOR
AGROCHEMICAL

WIKI – MULTIMEDIA
CONTENT

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

GIS-RISK & RESOURCE
INFORMATION

Augmented Reality Source Indexer (ARSI)



Augmented Reality Source Indexer (ARSI)

URL [W en.wikipedia.org/wiki/United_Nations_Office_at_Vienna](https://en.wikipedia.org/wiki/United_Nations_Office_at_Vienna)

Create account Log in

Abstract

Read Edit View history Search

United Nations Office at Vienna

From Wikipedia, the free encyclopedia

The United Nations Office in Vienna (UNOV) is one of the four major UN office sites where several different UN agencies have a joint presence. The office complex is located in Vienna, the capital of Austria, and is part of the Vienna International Centre, a cluster of several major international organizations. The UNOV was established on 1 January 1980, and was the third such office established.

Constituent agencies

[edit]

Headquartered at Vienna:

- International Atomic Energy Agency (has a special agreement on its status)
- International Money Laundering Information Network
- International Narcotics Control Board
- Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty
- United Nations Commission on International Trade Law
- United Nations Industrial Development Organization
- United Nations Office for Outer Space Affairs
- United Nations Office on Drugs and Crime

Geo-Loc

Coordinates: 48°14'5"N 16°25'1"E



Icon

The UN headquarters at Vienna, Austria, known as the Vienna International Centre.

Augmented Reality Source Indexer (ARSI)

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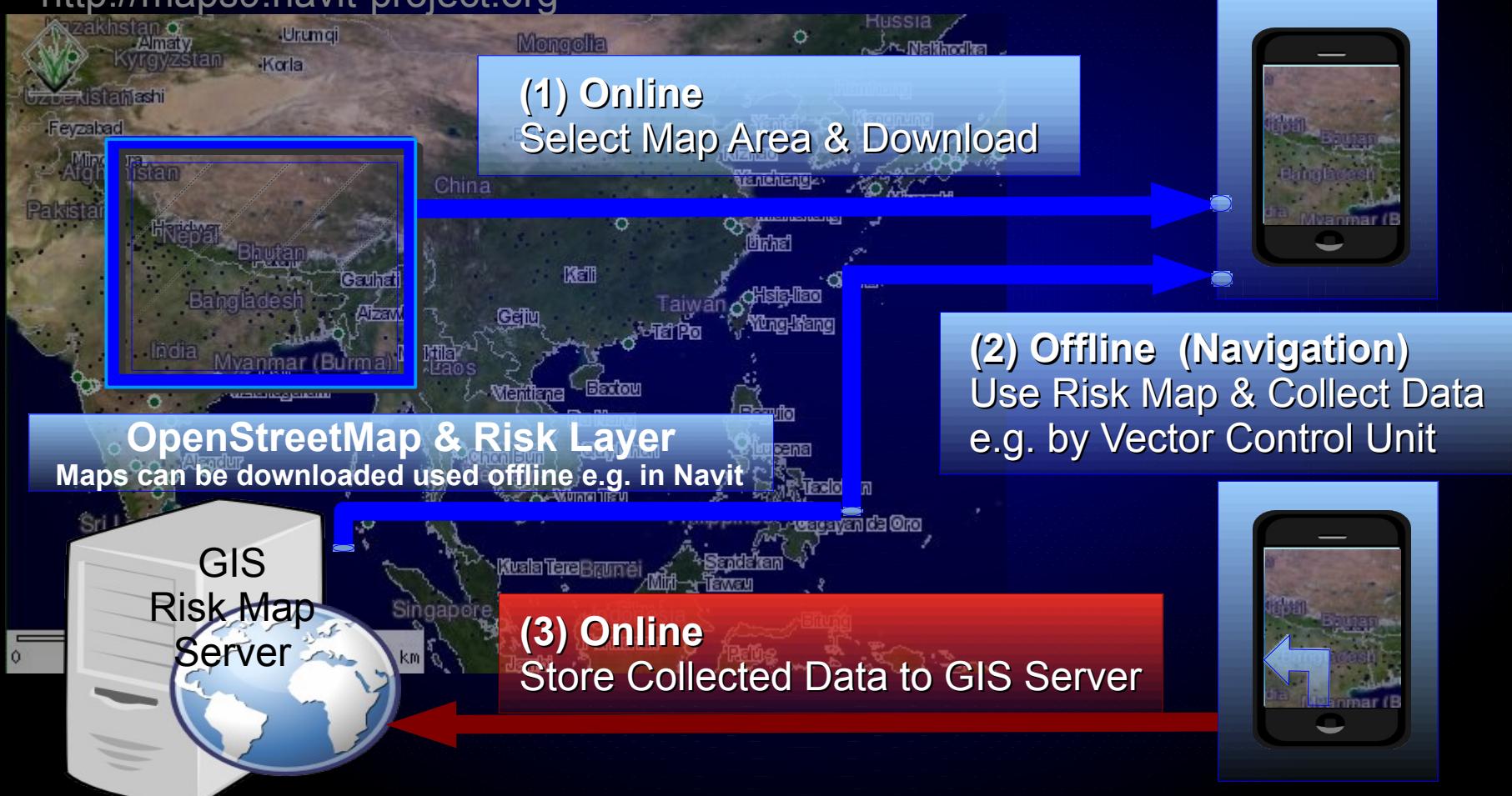


The UN headquarters at Vienna, Austria, known as the Vienna International Centre.

IT-Infrastructure

Offline Usage – OpenSource & OpenContent

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

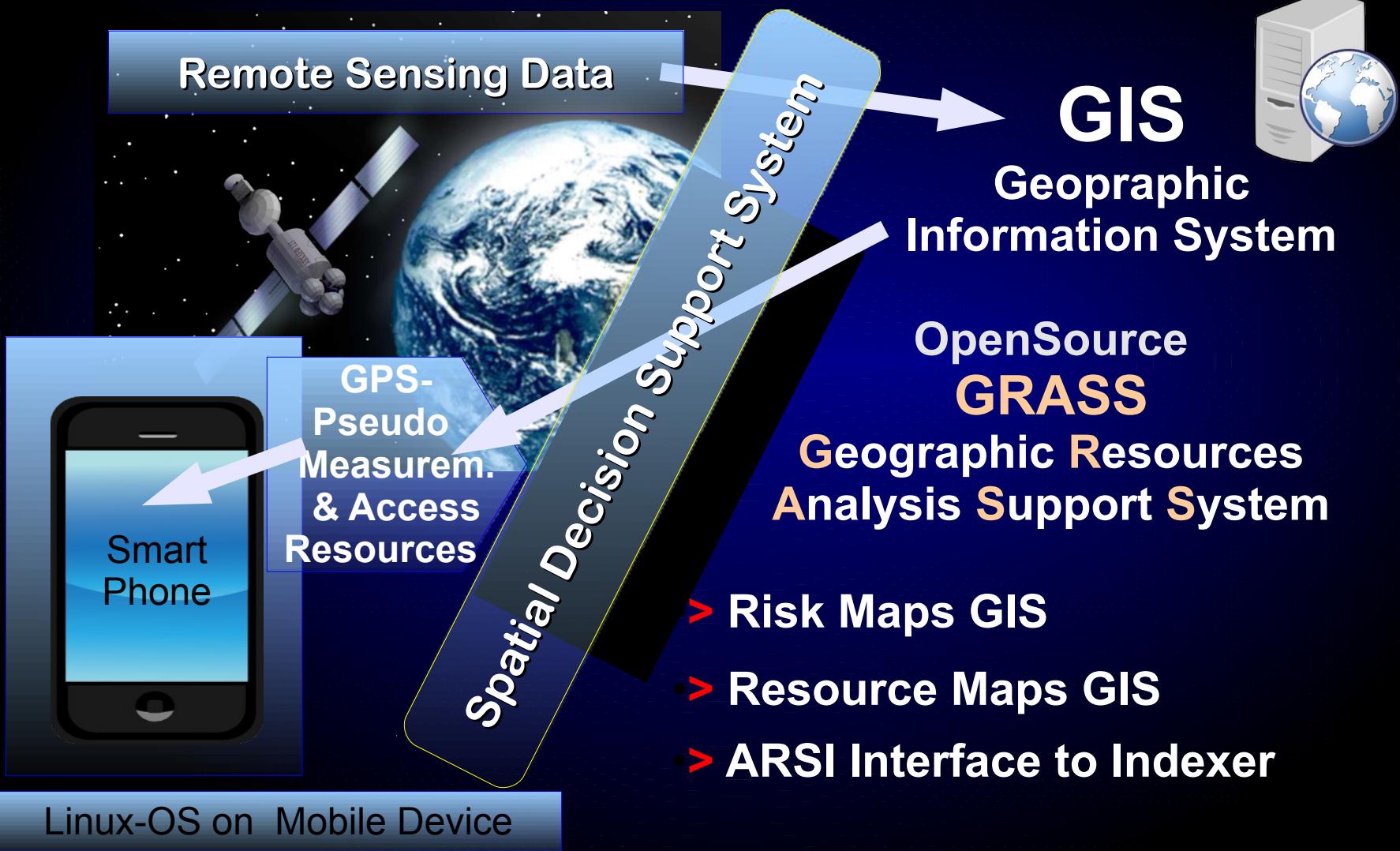


Attaching Digital Information to a GeoLocation

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



ARSI Interface to GIS (Risk & Response)



GPS-Pseudo Measurement

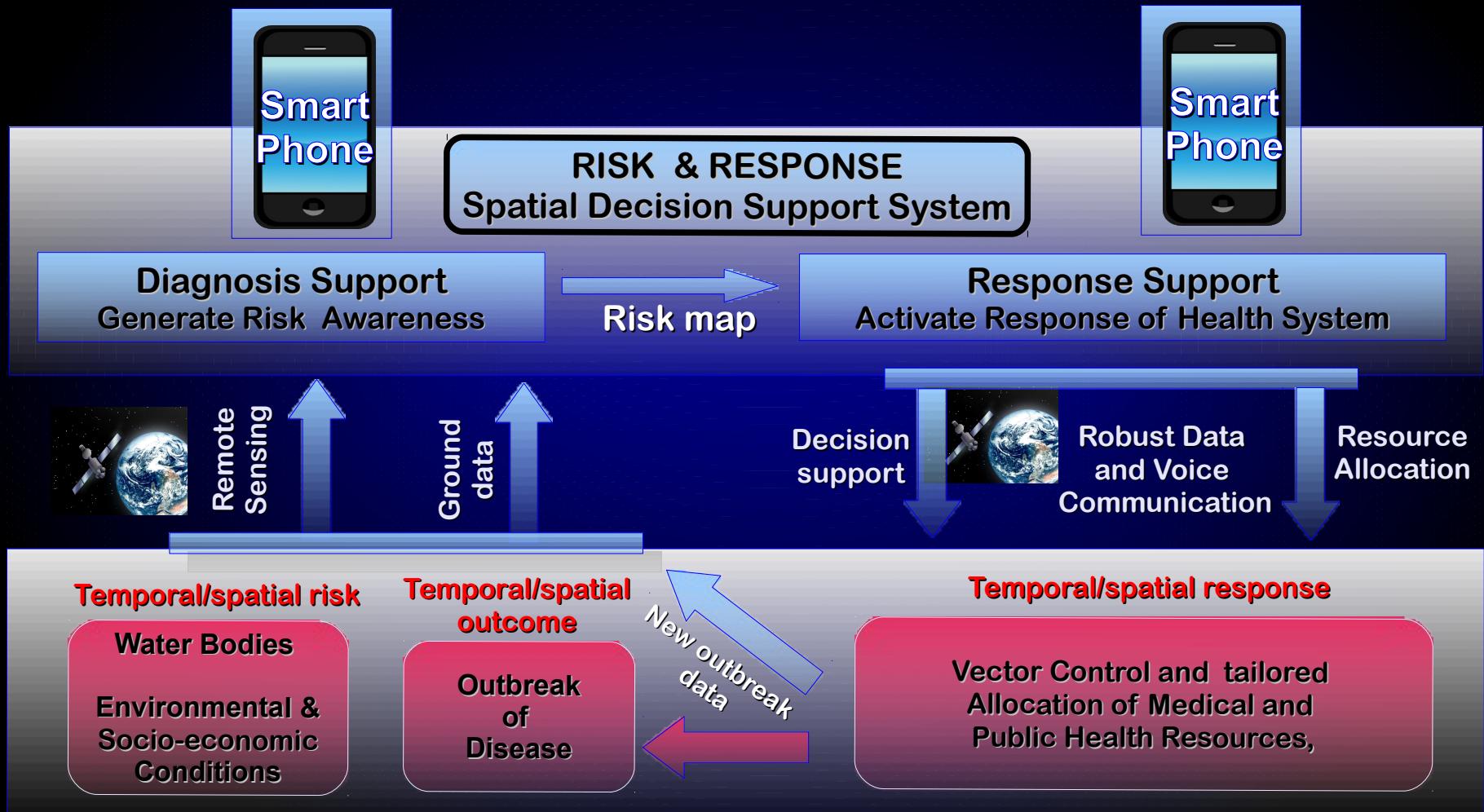


- Contamination of Water, Soil, Air ...
- Contamination of Fruit, Vegetables, Meat, ...
- Radioactive Radiation as Public Health Risk

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.

Smart Phones Usage Risk & Response Cycle



Objectives Paper Generator & Decision Support

Objective: retrieve a usable IT-Products from Authors of Papers for DECISION SUPPORT

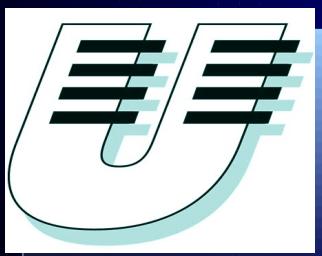
WHY? reduce the TIME SPAN until new scientific Results are integrated in Public Health Spatial Decision Support Systems (Risk Mitigation)

Problem: Authors will not have a benefit from creating usable IT-Products
(Only the published Article counts)

IT-Solution: Paper Generator reduces Workload for Authors and creates an IT-Product of Paper

Evolutionary Paper Generation and Spatial Decision Support

Create IT-Products for Scientific Results



**University of Koblenz-Landau
Natural & Environmental Sciences**

Prof. Dr. Engelbert Niehaus

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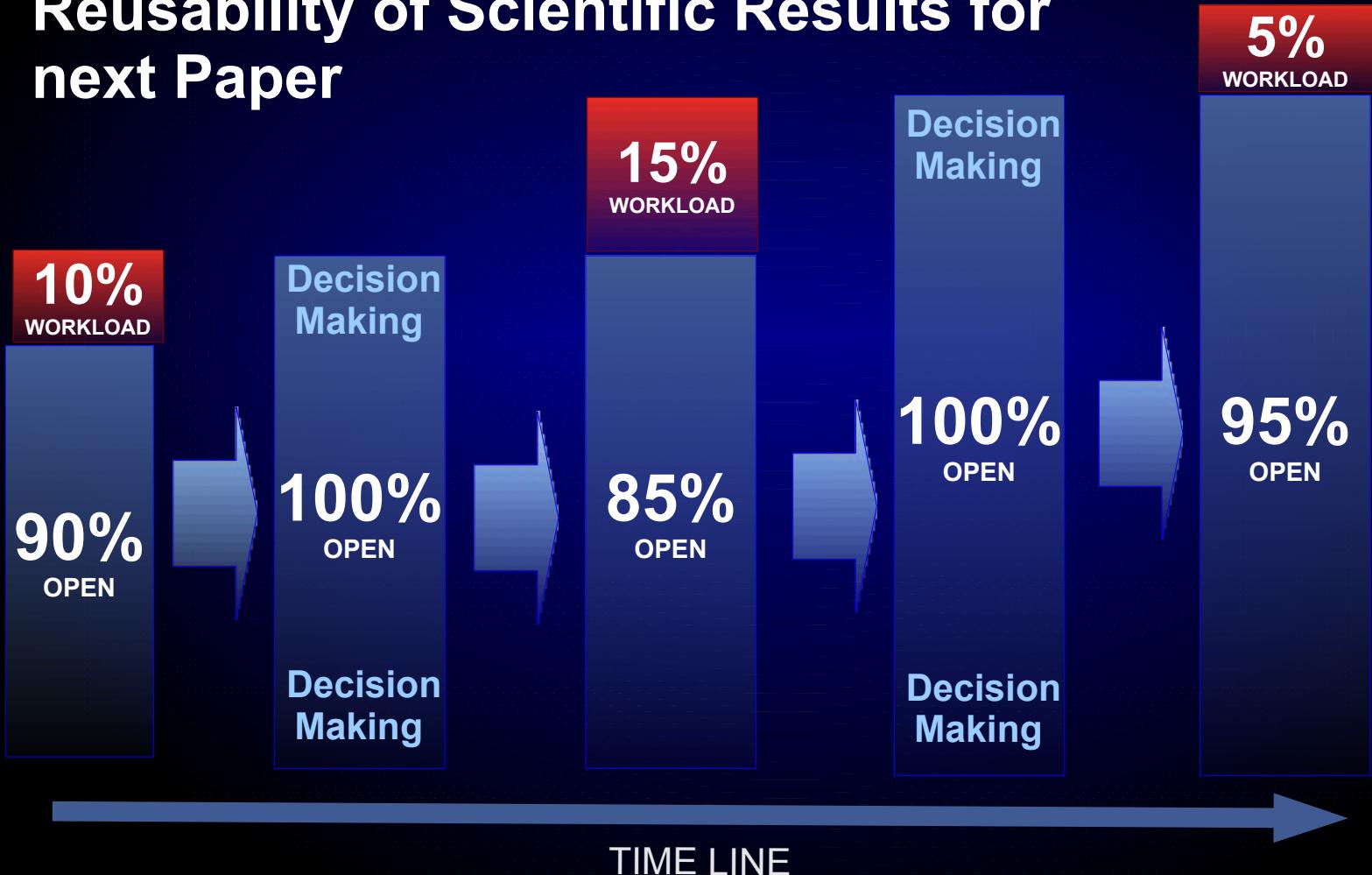


SDSS: Spatial Decisions: Risk & Resources

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

Scientific Results - Papers

Reusability of Scientific Results for next Paper



Paper Generator

- **BibTeX-Database**
- **Data collected by an Experiment**
- **Paper-Seed-Document with Title, Keywords, basic variable definitions, objectives, main steps**

**Paper Processing
by a PERL Script and generate LaTeX-output**

- **Automated Literature Review: Search in BibTeX-database for the Paper Keywords**
- **Create automated statistical analysis of data with "R" (select significant results)** not implemented
- **Create Paper with Diagrams, Figures, ...**

Paper Generator

PAPER GENERATOR

PERL Script with context-free grammar (Journal)
will generate LaTeX-output

paper.in
Seed Document

BiBTeX
Database

Experimental
Design Info

Grammar
for Journal

LaTeX
BibTeX

Paper Generator

Stat Pack
R

Paper in
LaTeX-Format

selected BiBTeX
Records

Figures &
Diagrams

Missing
Definitions

Existing Paper Generator

SCIGEN – Test Scientific Communities
<http://pdos.csail.mit.edu/scigen/>

from context-free
to
context-dependent
Grammar

Javascript Article Generator – Proof of Concept
(no automated statistical analysis)
<http://math.uni-landau.de/javascript/ArticleGenerator>