

# One Health and Space Technology Application of Open Community Approach

Action Team 6 Follow Up Initiative (AT6FUI)

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Mathematics**

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**Summerschool University Koblenz-Landau**

# Holistic One Health Approach

Space



Health



"Bridge" from Space to (One) Health Impact



# 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



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

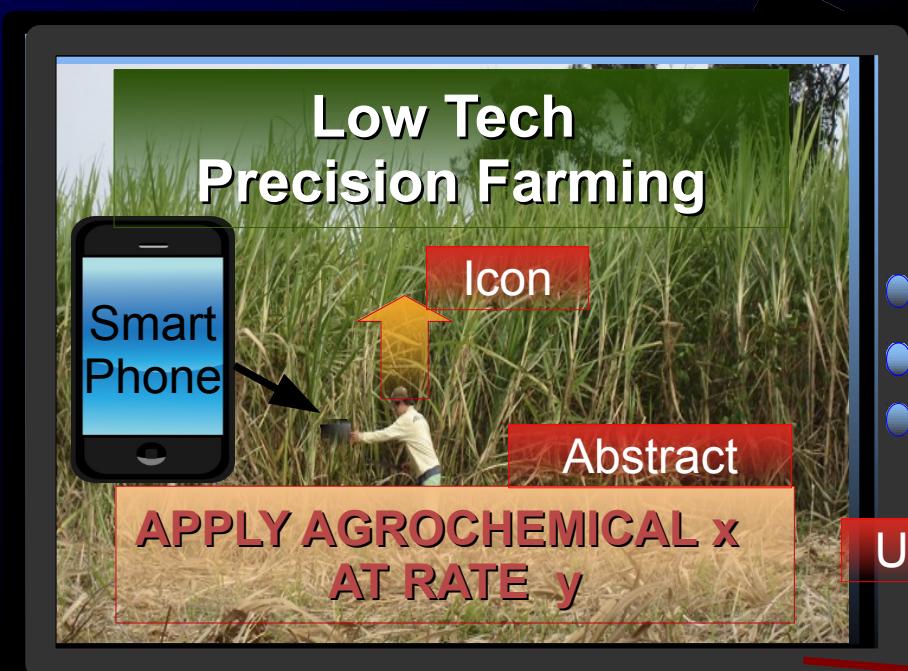
Economic Benefits: Optimized Farming with Low-Tech IT-environment => Developing Countries

# 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

# Response & Public Health Risks

## Augmented Reality Framework

<http://www.mixare.org>

Create Own Geo Database

Open Source App

Attach Digital Info to Geolocation



GPS-Location

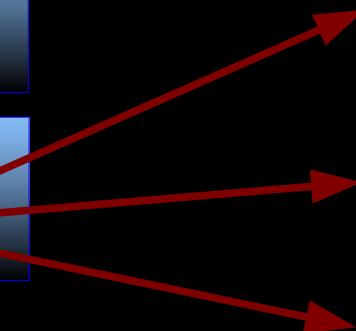
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INFORMATION



# Attaching Digital Information to a GeoLocation

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



**OpenStreetMap & Risk Layer**  
Maps can be downloaded used offline e.g. in Navit



2800 KM

**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



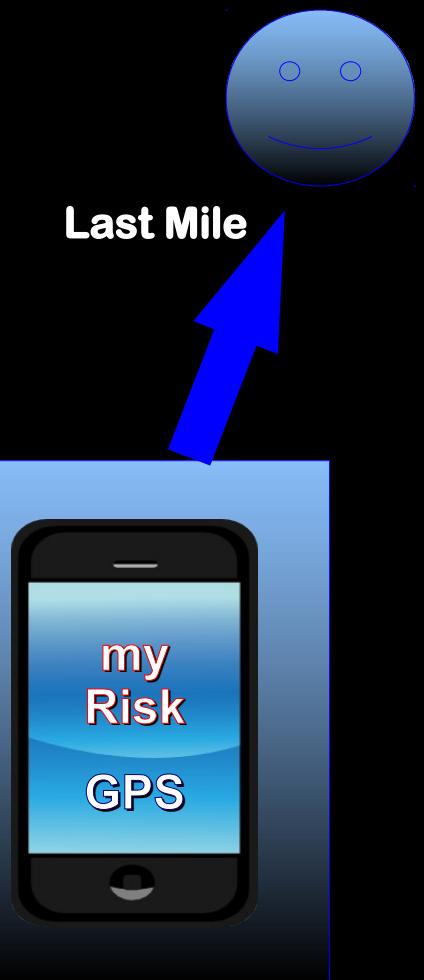
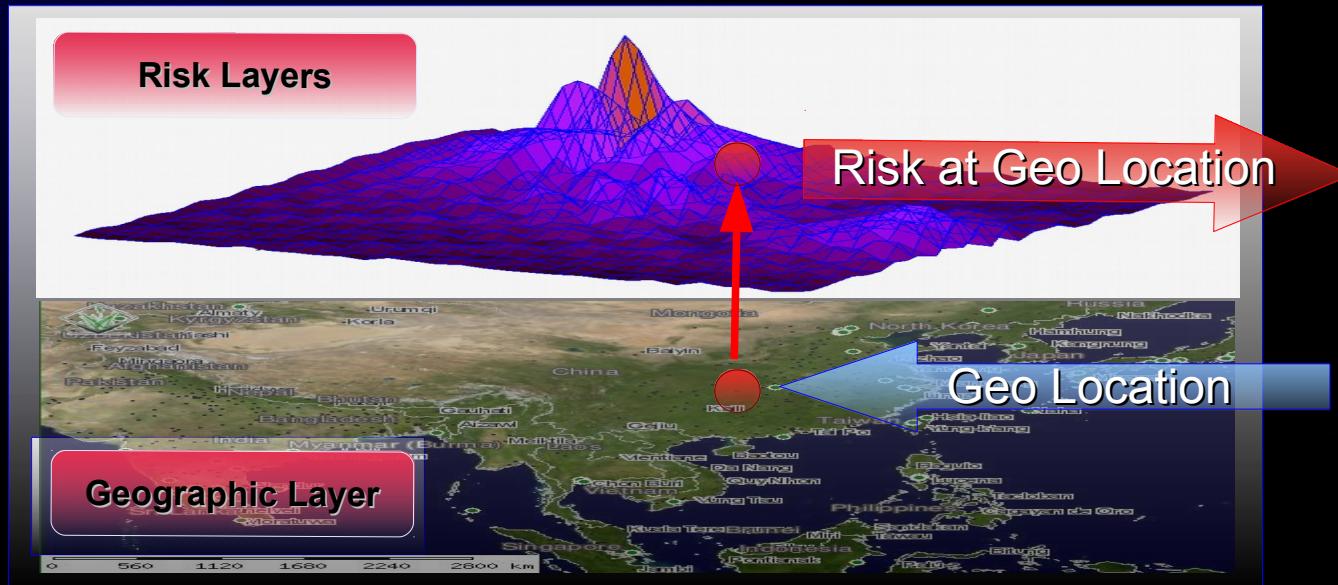
# IT-Infrastructure

## Offline Usage – OpenSource & OpenContent

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



# 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**

# ONE HEALTH

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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

# 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  
Low Cost Precision Agriculture – Decision Making based on temporal-spatial Monitoring

# Open Community Approach (OCA)

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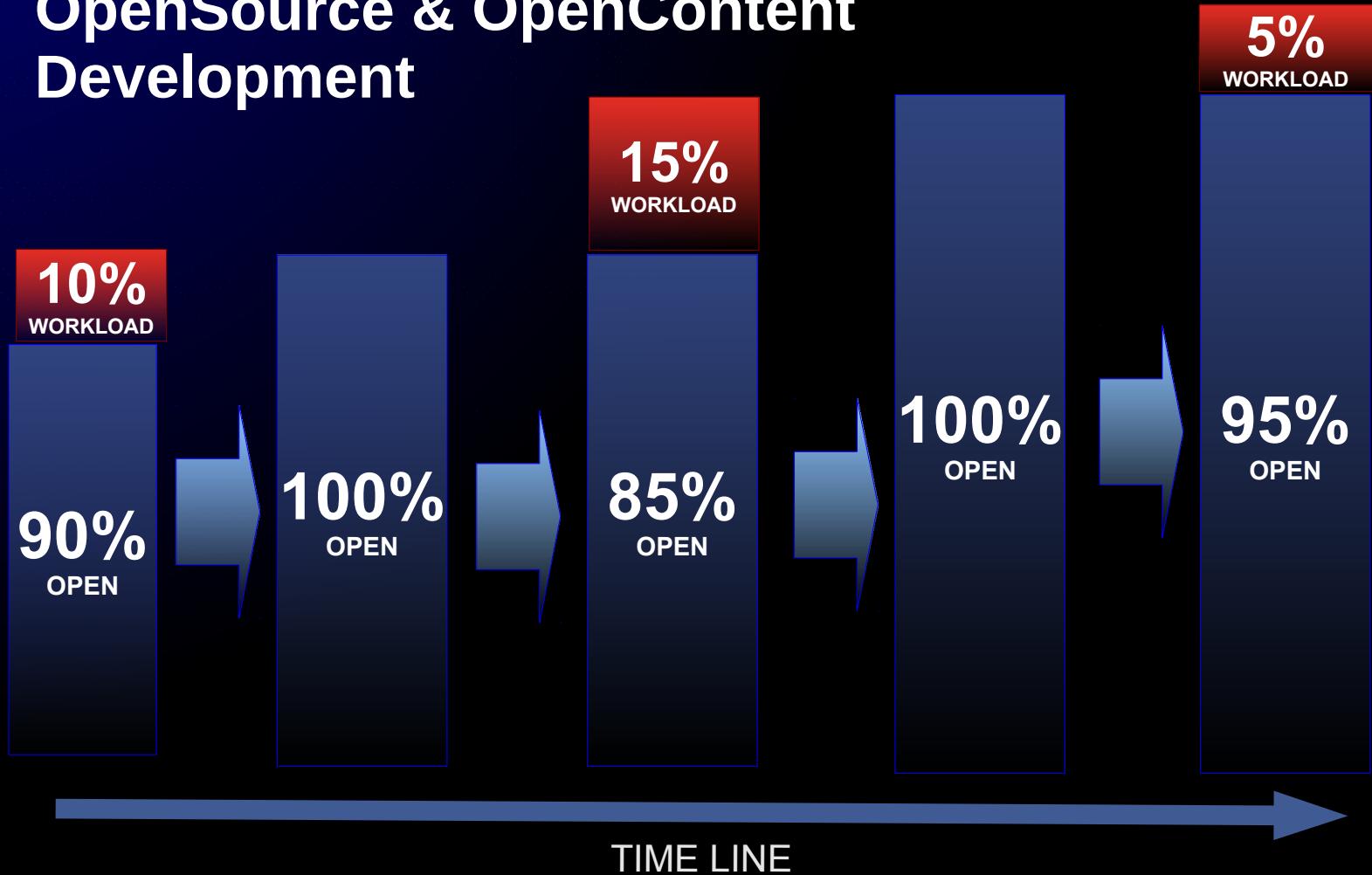
## Definition: Open Community Approach

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

OpenSource & OpenContent  
Development



# 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*)

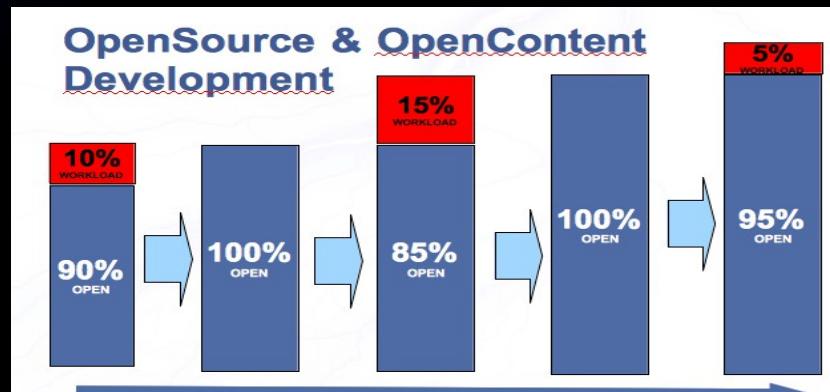
**3.963 Code Commits** (*0.1% Improvement*)

**4.105 Forum Posts** (*0.1% Discussion*)

**443 Bugs Tracked** (*0.01% Error Report*)

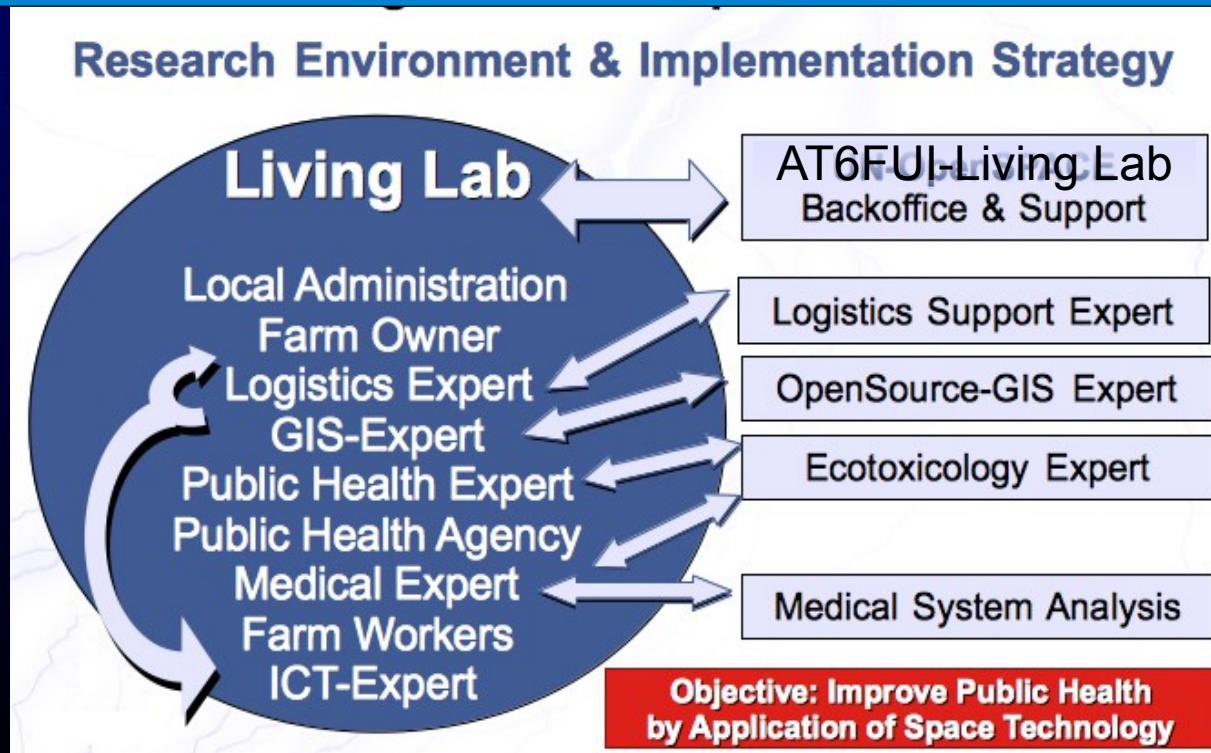
Open  
Usage

Workload



# Living Lab & Application of Space Technology

## User-driven Innovation – Rural Areas



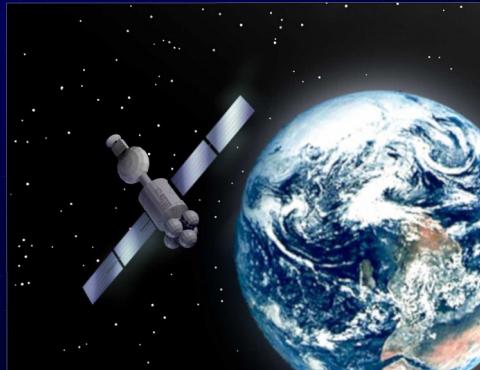
Adaptation  
to CKD

Open  
Resources

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

# Holistic One Health Approach

Space

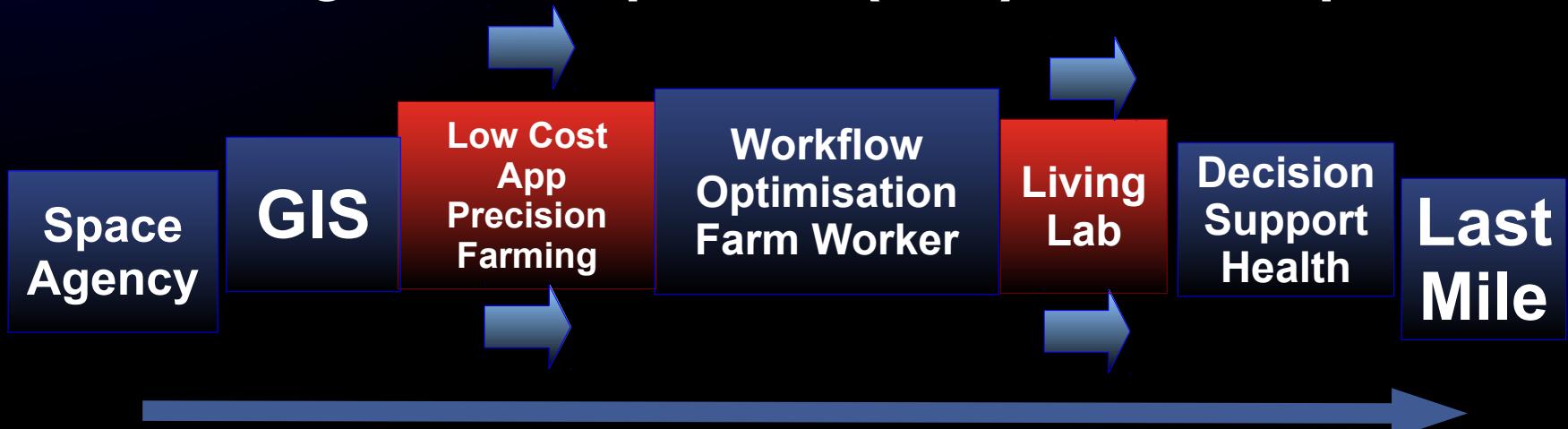


Health



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

"Bridge" from Space to (One) Health Impact



# AT6FUI Support of the Open Community Approach

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

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# Presentation

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**created with LibreOffice - Impress**

<http://www.libreoffice.org>

**Audio Comments recorded with Audacity**

<http://www.audacityteam.org>

**Webpresentation created with PanDocElectron**

<https://niebert.github.io/PanDocElectron>

**Open Source Tools are available for  
Linux, MacOSX and Windows**