

Disaster Medicine, Telemedicine & Integrated Vector Management

Epidemic prevention, warning and response

Medical use of space technology

Bridging the gap between the medical and space communities



Disaster Medicine, Telemedicine & Integrated Vector Management

Epidemic prevention, warning and response

- Information requirements to monitor risk of disease outbreak
- Satellite communication in support of surveillance
- Integration of space technologies with health information systems
- Ways to use EO in health warning and response systems



Disaster Medicine, Telemedicine & Integrated Vector Management

Medical use of space technology

- Potential of space-based communication for medical treatment in a disaster
- Requirements for mapping and navigation systems to support medical response
- Overcoming drawbacks in use of space technology



Disaster Medicine, Telemedicine & Integrated Vector Management

Bridging the gap between the medical and space communities

- Enhancing knowledge sharing and collaboration between space, disaster, and medical communities
- Role of UN-SPIDER
- Increasing capacity of the health community to use space-based technologies



Our "last mile"



Strengthening Health Information Systems

Integrating Space Technology

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Enhancing surveillance of existing and emerging diseases

Preparing for and responding to emergencies and natural disasters

Planning for future impacts on health service infrastructure



Epidemic diseases



SARS



Cholera, Somalia, 2000

Rapidly evolving threats posed by emerging pandemic and epidemic prone diseases

- SARS
- Avian Flu

Epidemic-prone diseases that are known risks

- meningitis
- rabies
- Cholera
- yellow fever

... endemic diseases



Long term interventions

- malaria,
- leprosy,
- guinea worm,
- lymphatic filariasis,
- polio,
- Onchocerciasis
- etc

Diseases that are new or re-emerging

- AIDS
- Tuberculosis
- etc



... industrial accidents, bioterrorism



Accidental or intentional release of

- biological,
- chemical,
- nuclear agents increasing concern ...



... Health Impacts of Natural Disasters and Climate Change

Extreme air temperature and air pollution contribute to deaths from cardiovascular and respiratory disease

Floods, drought and contaminated water compromise hygiene, increase diarrheal disease, increase vector-borne diseases

Decreasing crop yields stress food supply and contribute to malnutrition and under-nutrition increasing severity of infectious diseases

Increased frequency and severity of storms destroys homes, communities and lives

New challenges for control of infectious diseases



Photo: Jacob Dall/Danish Red Cross



... weakened public health infrastructure



Collapse of public health infrastructure

Ineffective vector control programmes (e.g. Chikungunya)

Development of antimicrobial resistance (e.g. XDR-TB)

Increasing burden of chronic diseases due to our changing lifestyles



There is a need for coordinated response for health security



Public health problems cross many sectoral boundaries

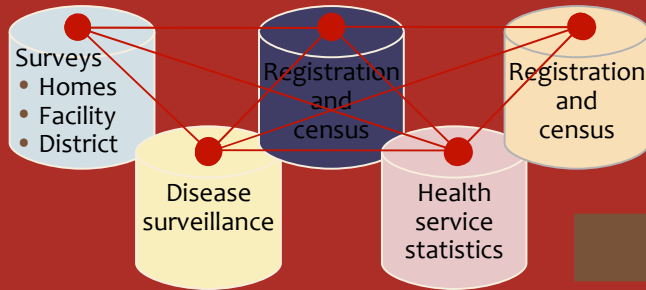
Coordinated action, collaboration and cooperation between governments, private and public sector, media and individuals is required

No single institution or country has all the capacities to respond to public health emergencies



The vision: interoperable /interconnected tools and systems

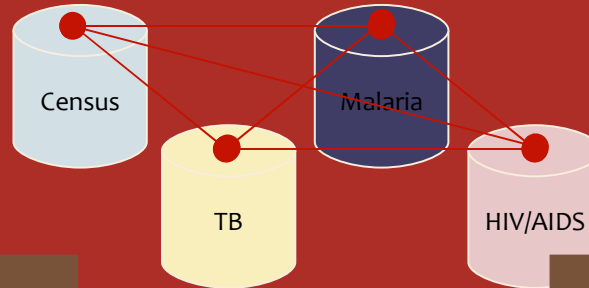
Across district mediated initiatives



Across geographies



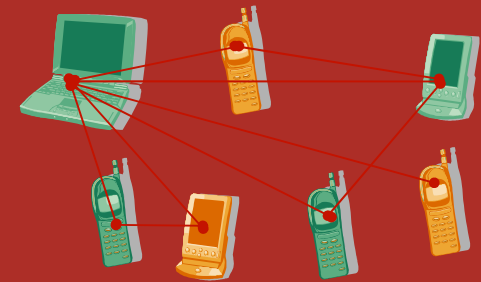
Across programs



Across points of care



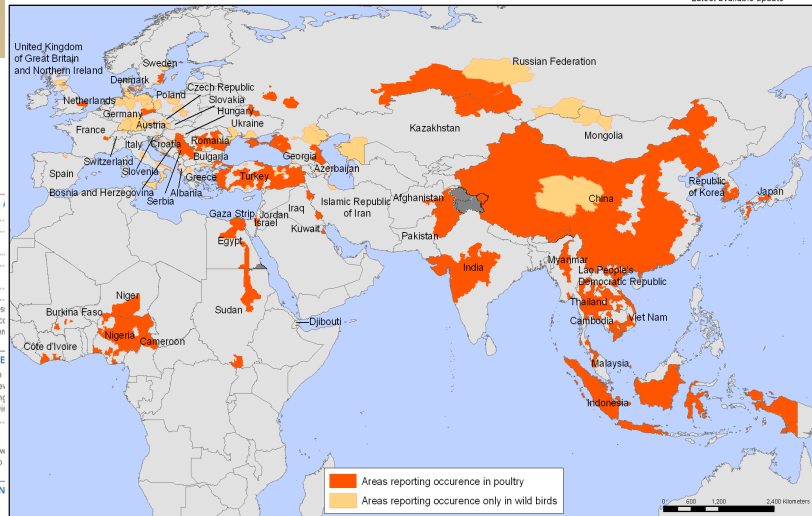
Across technologies



Tools and data for better decision making

Areas reporting confirmed occurrence of H5N1 avian influenza in poultry and wild birds since 2003

Status as of 21 March 2007
Latest available update



Country Profile

MALAWI

I. DEMOGRAPHIC, SOCIAL

Estimated Population
Population Growth Rate
Life expectancy at birth
Women
Human Development Index
Human Poverty Index
Rank
Value
Percentage of people with less than \$1 per day
Per Capita Gross National Income
Per Capita Government Expenditure

II. HIV AND AIDS ESTIMATE

Number of people living with HIV/AIDS
Adults aged 15 and over living with HIV/AIDS
Women aged 15 and over living with HIV/AIDS
Deaths due to AIDS

GENERALIZED EPIDEMICS

Children aged 0 to 14 living with HIV/AIDS
Orphans aged 0 to 17 due to HIV/AIDS

III. COUNTRY PROGRESS IN GENERALIZED EPIDEMICS

Expenditures

Percentage of national funds spent by government on HIV/AIDS
National Programmes

Percentage of pregnant women receiving treatment to reduce mother-to-child transmission
Percentage of HIV-infected women and men receiving antiretroviral therapy
School attendance among orphans
81.0% non-orphans

Knowledge and Behaviour

Percentage of young women and men, aged 15 to 24, who correctly identify ways to prevent HIV
23.5% Women

Percentage of young women and men, aged 15 to 24, who had sex with a casual partner in the past 12 months
13.9% Men

Percentage of young women and men, aged 15 to 24, who had sex before age 15
35.0% Women

Percentage of young women and men, aged 15 to 24, who used a condom last time they had sex with a casual partner
35.0% Women

CONCENTRATED/LOW PREVALENCE EPIDEMICS

Expenditures

Percentage of national funds spent by governments from domestic sources

Policy Development and Implementation Status

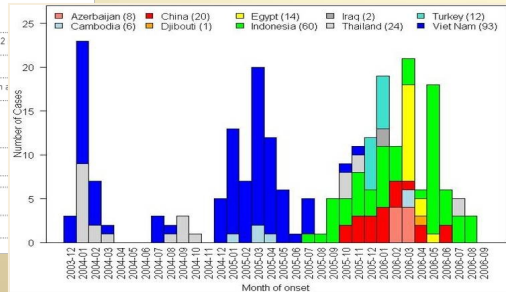
Policy on information, education, communication and prevention for most-at-risk populations
Policy to expand access to essential preventive commodities among most-at-risk populations

National Programmes

Percentage of HIV-infected women and men receiving antiretroviral therapy
Percentage of most-at-risk populations reached by prevention programmes
Injecting drug users
Men who have sex with men

The boundaries and names shown and the designations used on this map do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted lines on maps represent approximate border lines for which there may not yet be full agreement.

Data Source: World Organization for Animal Health (OIE) and national governments
Map Production: Public Health Mapping and GIS
Communicable Diseases (CDS) World Health Organization



Reliable information – essential for public health action

This is particularly true when we need to allocate scarce resources

Especially urgent in the case of an outbreak, epidemic or other public health risk

Decision makers at all levels need access timely, reliable information



Mapping public health resources



Surveillance and response capacity

- Early warning and detection systems (information, communications etc)
- Human resources (rapid investigation teams, surveillance officers,
- Equipment and drugs (PPEs, sampling materials, drugs, stockpiles)

Health services

- Hospitals, clinics, pharmacies, laboratories, blood banks etc

Partners

- Who's doing what and where (NGOs, government, private)

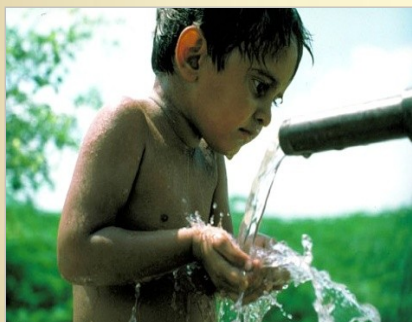


Basic infrastructure and risks



Local transport networks

- Roads, airports, ports, security concerns



Basic utilities

- Water supply, electricity, communications, etc



Social services

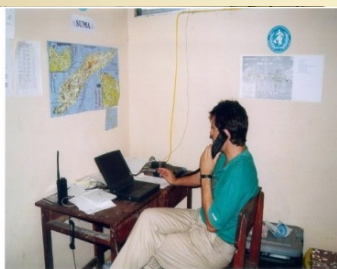
- Schools, feeding centres, etc



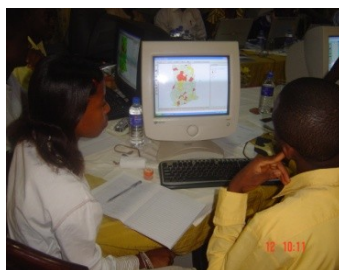
Define, collect and assemble data



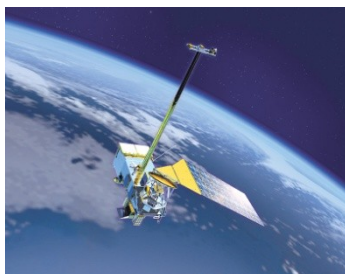
Remote field level



Country level



Regional level



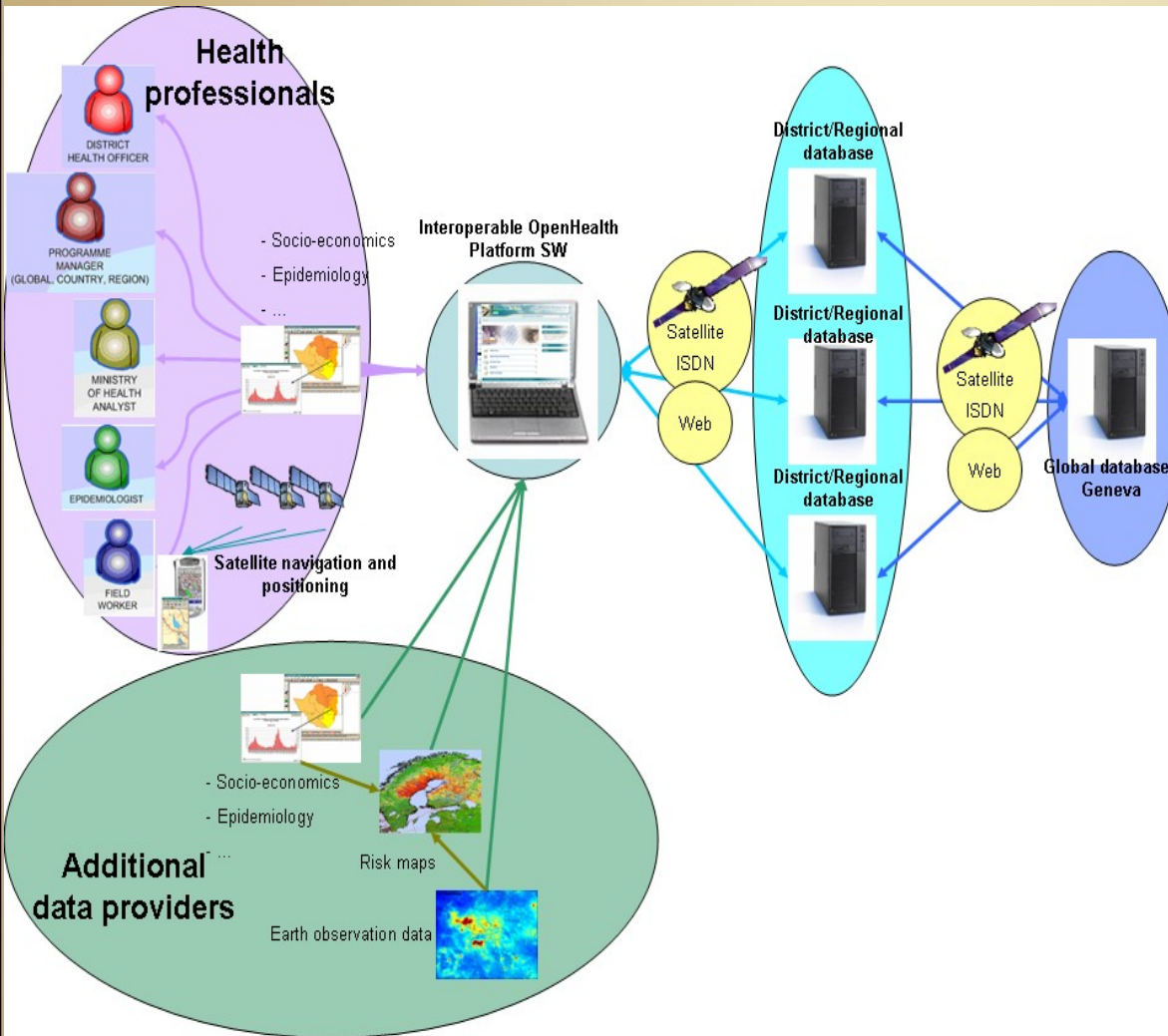
Global level

Multi source: integrate data from different sources using different data collection methodologies

Multi sector: consolidate vital data from different sectors

Multi level: disseminate data across different geographic levels

"OpenHealth" ... putting it all together



A standards-based platform for integrating public health data and applications

Suite of interoperable tools for data collection, management, analysis transfer and decision making

Supporting wide range of applications- disease surveillance, district health management, early warning, monitoring and evaluation

Meningitis Environmental Risk Information Technologies (MERIT): a joint effort of WHO, GEO and partners



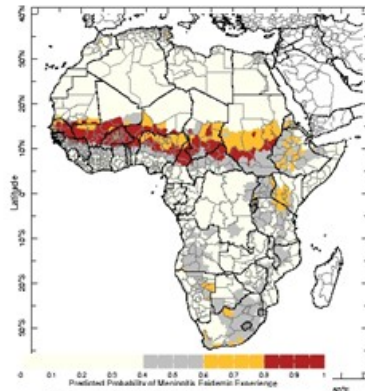
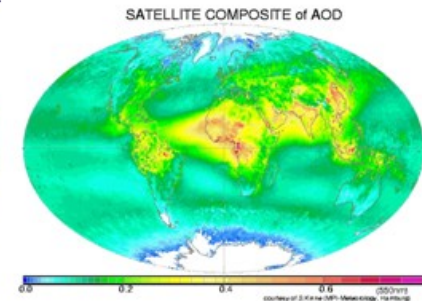
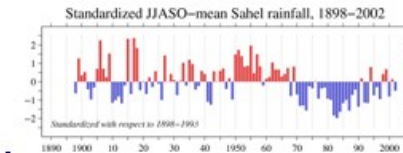
Epidemic Surveillance

Observations and Monitoring

Environmental Risk Factors

prevention and response control strategies

Mid- and Long-Range Forecasts



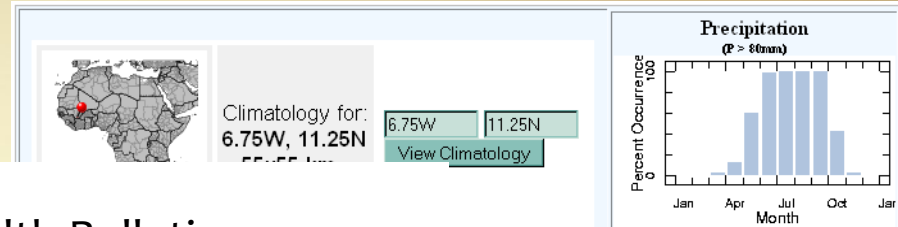
Molesworth et al., 2003



Climate and Seasonality of Endemic Malaria

Climate suitability for endemic malaria

• = 18-32°C + 80mm + RH > 60%



Ethiopia Monthly Health Bulletin

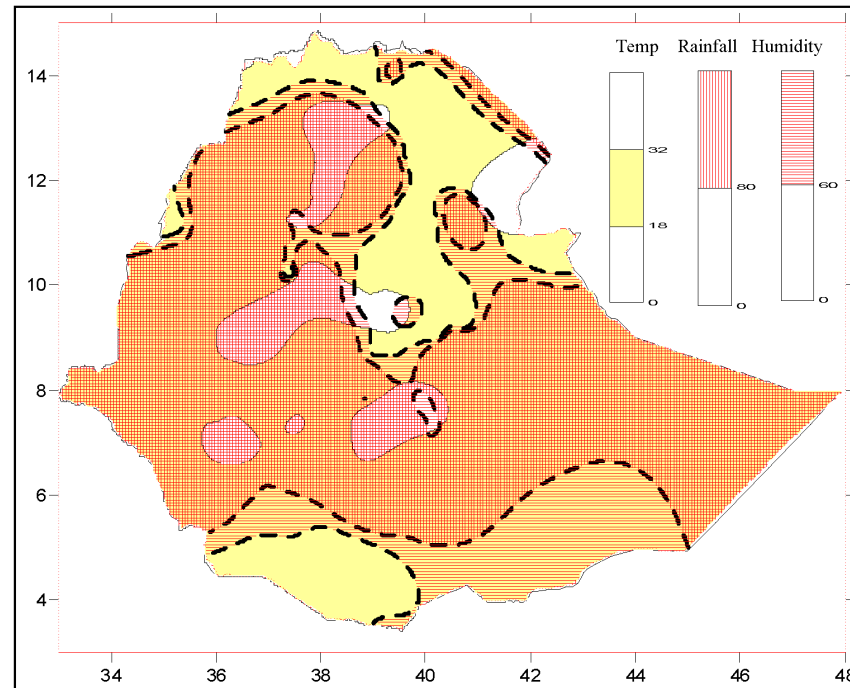
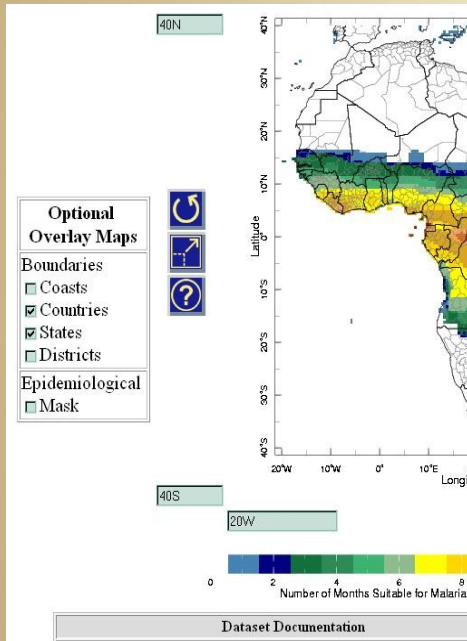
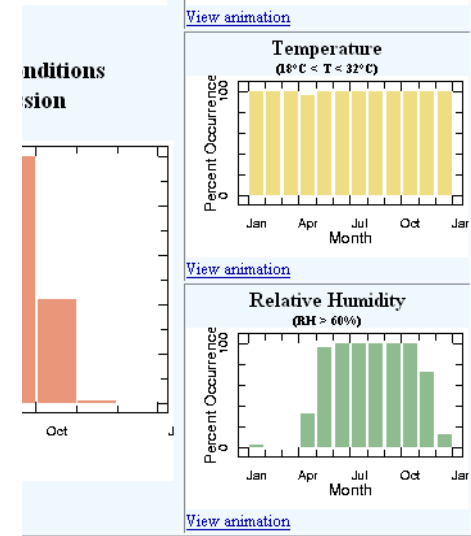
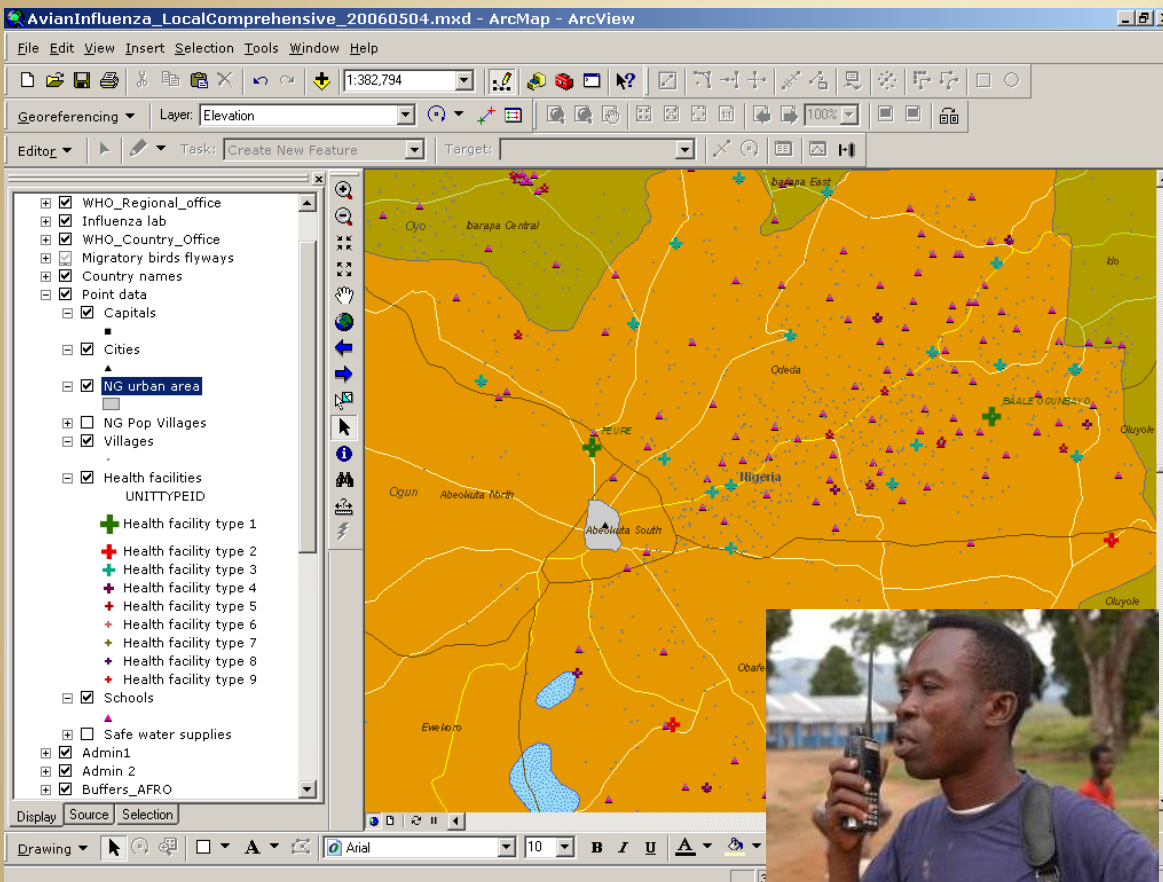


Fig 4. Combined temperature, rainfall and humidity conditions during May 2008. Areas under square patterns with yellowish background are assumed to satisfy favorable climatological conditions for spread of malaria.

<http://iridl.ldeo.columbia.edu/maproom/.Health/.Regional/.Africa/.Malaria/.CSMT/>



Outbreak alert and response



Monitoring spread in relation to population density, risk groups, communication lines, environment and other risk factors

Identifying health services, medical laboratories, schools, workplaces, warehouses, transportation services, to support an outbreak response

Avian influenza H5N1, 2003 - 2007



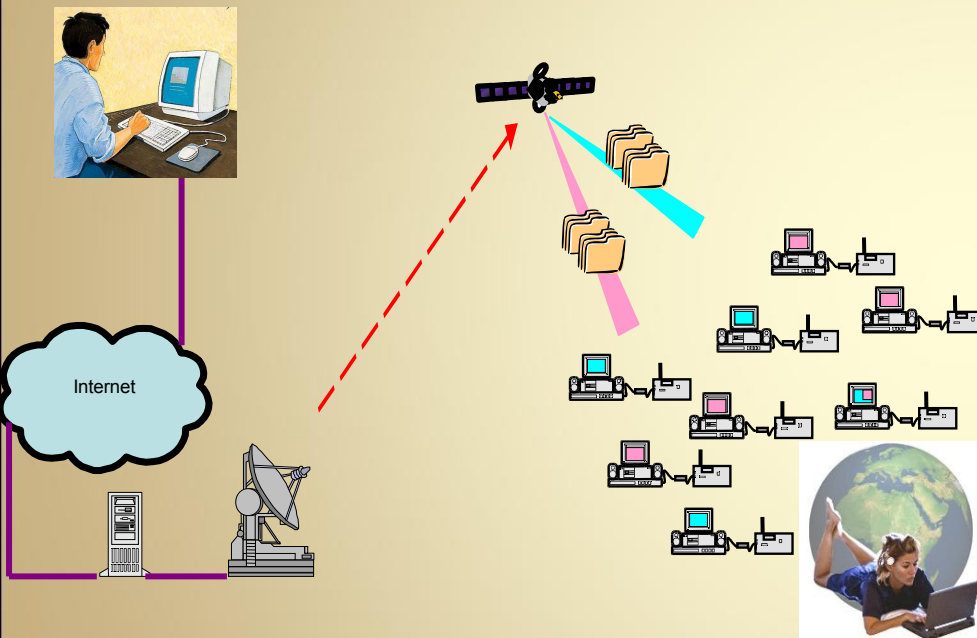
10/15/2008

2nd UN-SPIDER Workshop



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Satellite telecommunications



Integrated telecommunication technologies and solutions that can support:

- Rapid data transfer for outbreak alerts (district, laboratory)
- Data synchronization from district to country and global levels
- Data broadcasting (instructions, alerts)

Needs

Primary remote sensing and satellite derived data for initial risk assessment

- High-resolution maps of urban areas and population settlements
- High-resolution maps for outbreak investigation and risk assessment

Improved operational risk maps for environment dependent diseases (yellow fever, dengue, meningitis, malaria, plague, rift valley fever...)

- NDVI, land cover, land use, water bodies, land and sea surface temperature, moisture, dust, etc.

Satellite telecommunication: for rapid transfer of data

Core capacity strengthening at national level and local levels for interpretation, use and decision making

International cooperation

- on standards and interoperable tools and systems for data collection, analysis, early warning, forecasting etc
- Tools and methodologies for early warning and forecasting



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