EO2HEAVEN

Earth Observation and ENVironmental modelling for the mitigation of HEAlth risks

EO2HEAVEN Overview

OGC Health DWG Adhoc
31st May 2013
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Project Facts and Figures

- FP7 Theme 6 Environment (including Climate Change)
- Grant Agreement 244100, Large-scale Integrating Project
- Duration: 02/2010 – 05/2013
- 13 Partners (3 from Africa)
- Budget ~8.7 M€, EU-funding ~6.3M€
EC FP7 Project EO2HEAVEN studies impact of environmental factors on health.

- Water borne disease cholera: Uganda
- Air Quality and/or Aeroallergens: Durban, Saxony

Diagram:
- Earth Observations
- Health Data
- Web-enabled processing, modelling and fusion
- Risk maps
- Alerting tools
Multi-Disciplinary Approach

- Health
- Epidemiology
- Microbiology
- Geo-informatics, ICT
- Modelling and Statistics
GEO and GEOSS

EO2HEAVEN is in SBA Health,
also relevant: Water Climate

http://www.earthobservations.org
EO2HEAVEN Contributions to GEO Workplan 2012-2015

• IN 05 GEOSS Design and Interoperability: AIP 3, AIP 4, led the AIP 5 SBA Health threads,
• HE 01 Tools and Information for Health Decision Making
  – Coordinator: Rifat Hossain / WHO
  – C1 Air-borne Diseases, Air Quality and Aeroallergens
  – C2 Water-borne Diseases, Water Quality and Risk
• ID-02 Developing Institutional and Individual Capacity: Stakeholder and training workshops
• Participation in Health & Environment Community of Practice
Spatial Information Infrastructure

Service Infrastructure using International Standards
(e.g. Open Geospatial Consortium OGC)
Making the results sustainable

- Capacity building with stakeholders
- Open specifications and best practices
  - Spatial Information Infrastructure for health & environment data
    - Candidate OGC Best Practices to facilitate usage of SOS service (voting in OGC ends 22/06/13)
    - Microbiological sampling
- Software Components as open source
- Collaboration with organizations in GEO Health & Environment CoP
- Targeted: OGC Health DWG
Cholera case study in Uganda

An illustrative example of some issues in health surveillance
Cholera rapid response

Tasks of a response system:
1. Rapid detection of cases
2. Prompt detection of outbreaks
3. Monitoring of epidemic
4. Monitoring program interventions
Uganda National cholera reporting and information system

1. New cases directly reported to DHO
2. Confirmed cases are directly reported to the MoH
3. Weekly cholera reports are sent to the DHO (33b)
4. Monthly modifiable disease reports sent to the ministry
5. Ministry reports to international community
Dira Disease incidence reporting application as mobile app in field

Case registration application

1. Standardized data entry
2. Complementary to mTRAC
3. Transparent data processing
4. Meets various end user requirements
5. Access control
# Diras patient data

## E02Heaven Patient Registration

### Patients 125 to 150 of 150

<table>
<thead>
<tr>
<th>ID</th>
<th>Name</th>
<th>Gender</th>
<th>Age</th>
<th>Status</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>150</td>
<td>Marcoijnberk, 45y ♂</td>
<td></td>
<td></td>
<td>Improved</td>
<td>Nov 29, 2012</td>
</tr>
<tr>
<td>149</td>
<td>Jona markus, 8y ♂</td>
<td></td>
<td></td>
<td>Unknown</td>
<td>Nov 28, 2012</td>
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<tr>
<td>148</td>
<td>Martin drinhuijn, 62y ♂</td>
<td></td>
<td></td>
<td>Unknown</td>
<td>Nov 27, 2012</td>
</tr>
<tr>
<td>147</td>
<td>Daniel vanwinzum, 89y ♂</td>
<td></td>
<td></td>
<td>Improved</td>
<td>Nov 27, 2012</td>
</tr>
<tr>
<td>145</td>
<td>Martin munnickhuussen, 40y ♂</td>
<td></td>
<td></td>
<td>Died</td>
<td>Nov 23, 2012</td>
</tr>
<tr>
<td>146</td>
<td>Sabrina bavelaar, 65y ♂</td>
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<td></td>
<td>New</td>
<td>Nov 23, 2012</td>
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<tr>
<td>144</td>
<td>Johanna swart, 59y ♂</td>
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<td></td>
<td>Improved</td>
<td>Nov 16, 2012</td>
</tr>
<tr>
<td>143</td>
<td>Sandra hahn, 83y ♂</td>
<td></td>
<td></td>
<td>Unknown</td>
<td>Nov 16, 2012</td>
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<tr>
<td>142</td>
<td>Niklas mconnel, 28y ♂</td>
<td></td>
<td></td>
<td>Improved</td>
<td>Nov 15, 2012</td>
</tr>
<tr>
<td>141</td>
<td>Luca zielacht, 3y ♂</td>
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<td></td>
<td>Improved</td>
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<tr>
<td>140</td>
<td>Zoe van der toorn, 4y ♂</td>
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<td></td>
<td>Unknown</td>
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<tr>
<td>139</td>
<td>Melanie tsioopra, 72y ♂</td>
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<td></td>
<td>Improved</td>
<td>Nov 7, 2012</td>
</tr>
<tr>
<td>138</td>
<td>Claudia van sam, 31y ♂</td>
<td></td>
<td></td>
<td>Died</td>
<td>Nov 6, 2012</td>
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<tr>
<td>137</td>
<td>Jan van gorum, 59y ♂</td>
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<td></td>
<td>Died</td>
<td>Nov 2, 2012</td>
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<tr>
<td>136</td>
<td>Alina van der velden, 72y ♂</td>
<td></td>
<td></td>
<td>Unknown</td>
<td>Nov 2, 2012</td>
</tr>
</tbody>
</table>

### Patient Data:

- **Patient**
  - Given Name: Daniel
  - Family Name: van winzum
  - Sex: Female
  - Age: 89 Years
  - Registered: Nov 27, 2012
  - Health Facility: Random
  - Status: Improved

- **Home Town**
  - District: Kasese
  - County: Busongora
  - Subcounty: Bwesumbu
  - Village: Kinyamagana

- **Symptoms**
  - Ill since: Nov 25, 2012
  - Diarrhea: Yes
  - Dehydration: No
  - Vomiting: No
  - Abdominal pain: Yes
  - Cholera diagnosis: Not Cholera

- **Comments**
  - Randomly generated

- **Epidemiological Information**
  - Primary water source: unknown
  - Water treatments:

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### Map

- Location: Kasese

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*Note: The map shows the location of the patient's home town.*
Data reporting options

**TOOL**
- Mobile data Collection
  - Mobile App

**FORMAT**
- Mobile data
  - Mobile App
  - CSV file
  - PDF Report

**Kasese DB**
- Mobile data Collection

**USERS**
- **Health Centers**
  - Data Managers
  - Clinicians

- **District Health Office / Ministry of Health**
  - Health Inspectors
  - Integrated Disease Surveillance Officers

**ENGINE**
- Desktop Client
  - WMS / KML
  - mTRAC
  - Tabular
Time2Maps for data exploration
Web Feature Service for GIS
Ideas for the OGC Health DWG

Topics to be considered
Issues to be considered

- Client applications must work with intermittent internet connectivity
  - Lightweight, robust data transfer protocols
  - Offline-caching of geodata
- Health surveillance applications must be integrated into national systems
- Privacy of health data according to national regulations
- Training and capacity building
Relevant data types

- Health data at various levels of spatiotemporal aggregation
- Environmental data
  - EO, in-situ, ex-situ
- Epidemiological data
- Socioeconomic data, e.g.
  - Population density
  - E.g. on WATSAN (water and sanitation)
OGC Standards & Health: required extensions

- Offering patient and health data in a SWE SOS
  - What are the features?
  - What are the sensors?
  - What are measurements? Quality?
  - Inclusion of epidemiological information
  - How to anonymize / aggregate the data?
  - Statistical Data and Metadata eXchange - Health Domain
  - SDMX: ISO 17369:2013
  - Format used by WHO
  - Universal mapping SDMX-HD to O&M not possible
    - Map health indicators to O&M concepts?
    - No data access interface in SDMX-HD
Further Information

• Public deliverables on www.eo2heaven.org
  – Workshop and Event Presentations
  – EO2HEAVEN Book
  – Case study outcomes,
  – Environmental monitoring for health applications,
  – Spatial Information Infrastructure based on OGC standards
  – Description of software components
Thank you for your attention

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