PREDICT Project

*Prevent and Respond to Epidemics
and Demonstrate Information and Communication Technologies*

IAC Conference

October 5th 2011

esa

DSV

MEDES

AviaGIS

Context

- **About 75 % of the new diseases having affected humans in the past 10 years originate from animals (for example Avian influenza)**

- **Animal diseases also have a huge economic impact in the developing world**

- **Early warning reduces the risk of outbreaks**

- **International bodies promote the use of early warning systems**

  → GLEWS « GLobal Early Warning System » for major animal diseases, including zoonoses, a common initiative of WHO, FAO, OIE
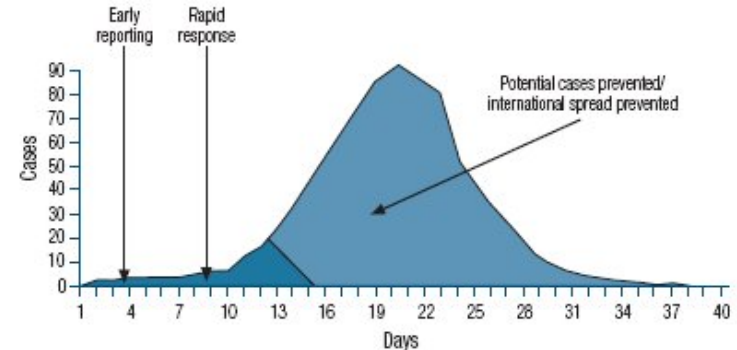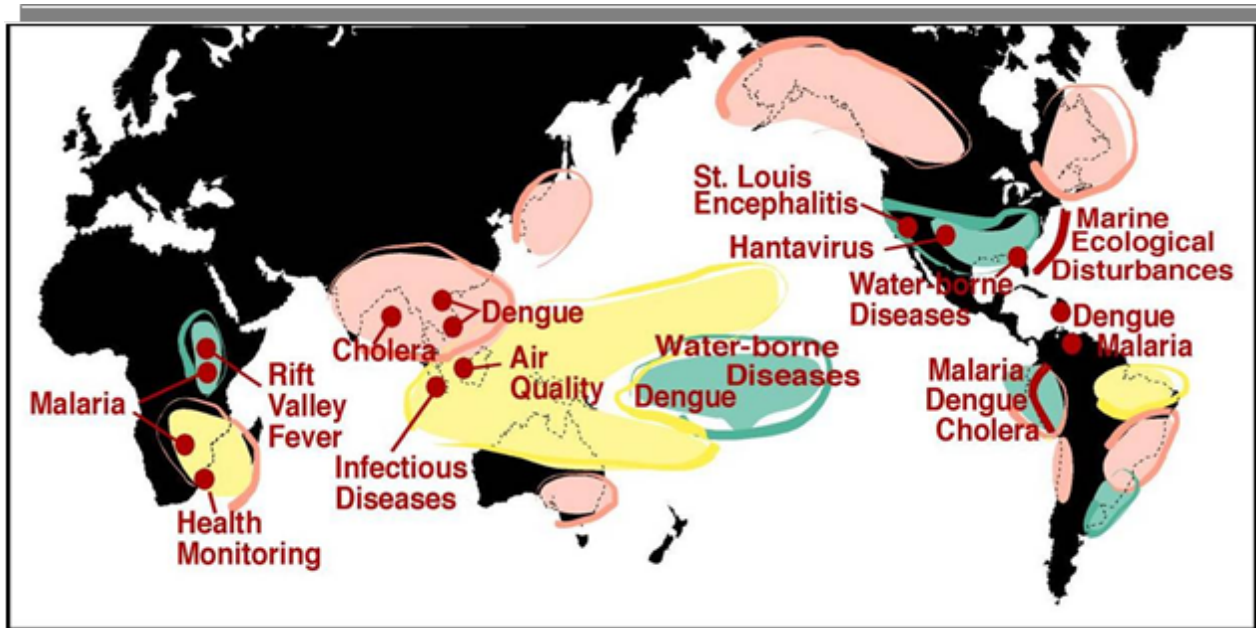

Figure 1: Global outbreaks, the challenge: late reporting
(WHO World Health Report 2007)

*Zoonosis : Naturally transmissible disease between vertebrate animals and humans
*WHO World Health Organisation
*FAO Food and Agriculture Organisation
*OIE World Organisation for Animal Health

Context

Environnemental dependant diseases

- **Increased risks of re-emerging infectious diseases in relation with environmental changes**

    - → Total population at risk : 2 to 3 billions
    - → Annual human deaths : 3.5 to 4.5 millions
    - → Annual animal mortality : 10 to 15 millions

IAP Programme

Integrated Applications Promotion programme

- **Overall goal:**

"The development of operational services for a wide range of users through the combination of different systems"

- **Main objectives of the programme:**

  - **Promotion of space applications to a wider range of users**, especially those who are not aware of the benefits that space technologies can bring to them;

  - **Development of new operational services for these users**, involving a broader participation by actors on both the demand and supply sides;

  - **Utilisation of at least two existing and different space assets** (such as Satellite Communications, Earth Observation, Satellite Navigation, Human Spaceflight technologies and others), leading to a better exploitation of existing space capacity and know-how together with a better understanding of how they should evolve to meet user requirements;

  - **Cross-fertilisation across disciplines** (e.g. impact of Climate on Health, on Energy, on Transport, etc...) together with the development of a consistent approach across Integrated Applications initiatives, to maximise their efficient and cost- effective implementation.

Demonstration foreseen in Senegal
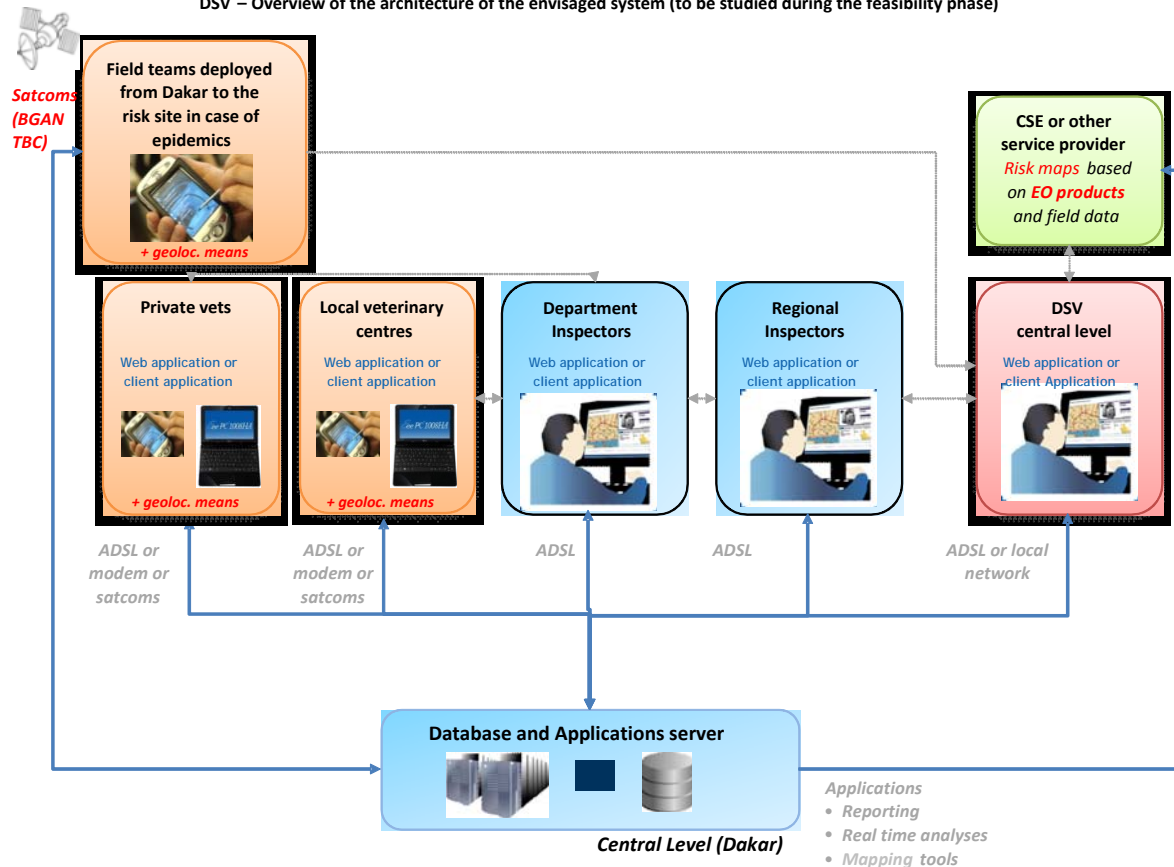
- **Scope and objectives**
  - Electronic surveillance including field agents
  - Resource management and risk mapping
  - Reporting

- **End user**
  - Directorate of Veterinarian Services (DSV) of Senegal

DSV – Overview of the architecture of the envisaged system (to be studied during the feasibility phase)

- **Ongoing feasibility study within the ESA IAP program**

Presentation of DSV in Senegal

- **DSV "Direction des Services vétérinaires" is responsible for animal health protection through the implementation of the National System of Epidemiological Surveillance (SNSE), and for medical and health prophylaxis against animal diseases**

- **Organisation and stakeholders**
  - → Central level in Dakar
  - → 14 regions, each region divided in usually 3 counties
  - → 150 veterinary posts managers reporting outbreaks to SDEL (County Stock Farming Services)..., which in turn report to SREL (Regional Stock Farming Services)
  - → 255 private veterinarians, 50 with a special accreditation for vaccination and insemination
  - → 2 main laboratories, five regional

DSV Background

- **DSV : A long experience in the use of ICT for animal health**

- **Since 2000 - Emercase project**
  - → Electronic surveillance network
  - → Research in risk mapping of the Rift Valley Fever

- **Presently**
  - → SIGEL " Système de Gestion de l'Elevage" (Stock Farming Management System)
    - System administration module
    - Mapping module
    - Cattle identification module
    - Animal production follow up module
    - Sanitary control module
    - Pastoral areas and breeding infrastructures module
    - Animal health module
    - Market follow up module
  - → Research in risk mapping
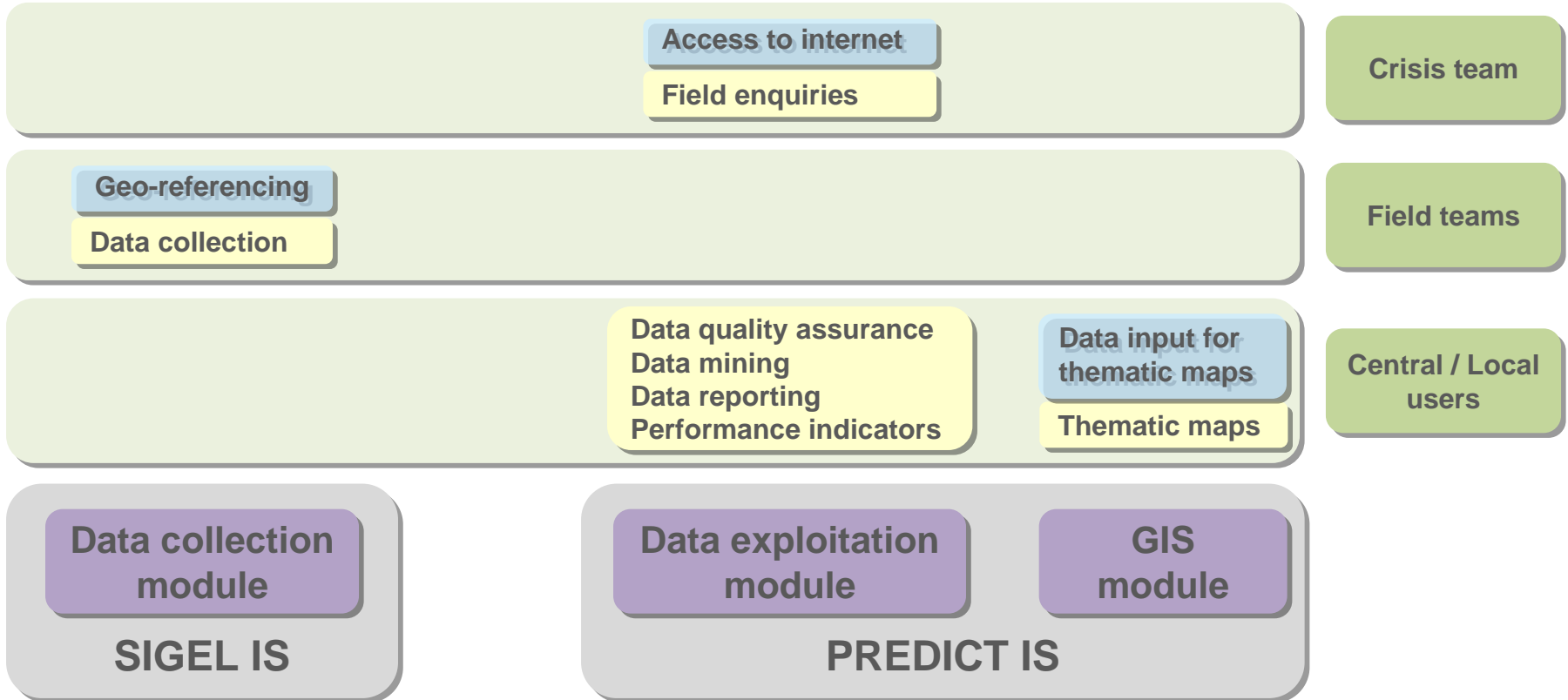
Rationale for PREDICT

- **Actual paper transmission slow and not effective**

- **Move to digital exchanges for collection and reporting**
  - ➜ DSV is implementing the SIGEL "Système de Gestion de l'Elevage"

- **PREDICT will complement the SIGEL**
  - ➜ **Improve quality of information and treatment efficiency**
    - ▪ geo-referencing of outbreaks and localisation of herds
    - ▪ validation and monitoring of data
    - ▪ follow up of user activity
  - ➜ **Automated report production with configurable queries**
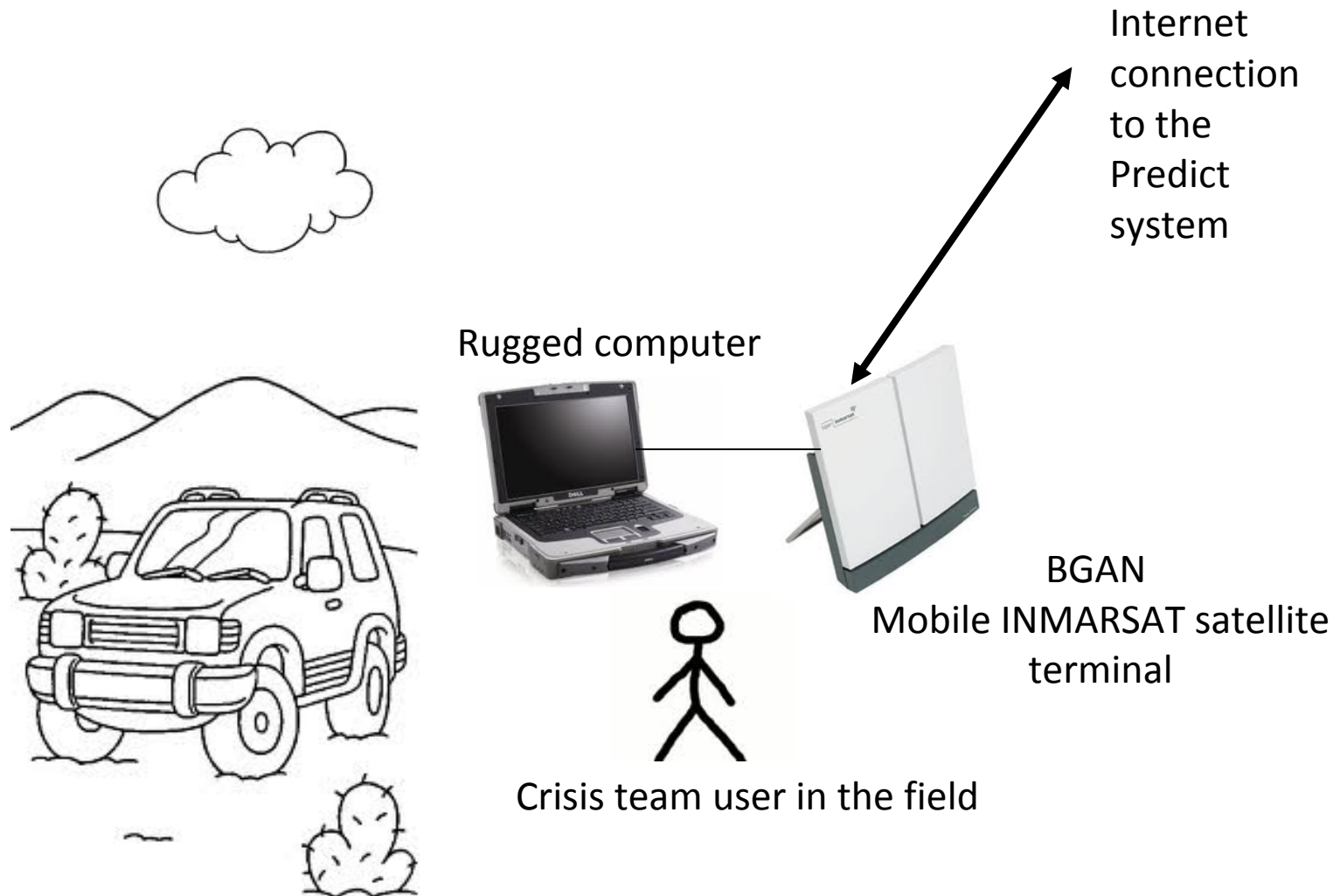 - ➜ **Implement Performance Indicators**

Fulfilment of DSV needs

Need	System that will fulfil the need
Data collection	**SIGEL** **Data collection**
Data entry verification	
Search for aberrations	
Manual validation of data	
Follow up of suspected outbreaks	
Follow up of user activity	**PREDICT** **Data Exploitation module**
Configurable queries	
Help to query definition	
Report production	
Performance indicators	
Data base and space time analysis	**PREDICT** **GIS module**
Delimitation of burnt areas	
Localisation of herds	
Field enquiries	**PREDICT** **Mobile crisis team unit**

System of systems

Positionning

Communication

Earth Observation

Access to internet

Field enquiries

Crisis team

Geo-referencing

Data collection

Field teams

Data quality assurance
Data mining
Data reporting
Performance indicators

Data input for thematic maps

Thematic maps

Central / Local users

Data collection module

Data exploitation module

GIS module

SIGEL IS

PREDICT IS

Use of satellite communications

Access to the full range of PREDICT services for a mobile crisis team

Internet connection to the Predict system

Rugged computer

BGAN
Mobile INMARSAT satellite terminal

Crisis team user in the field

Use of localisation - Data geo-referencing

Data geo-referencing, by administrative levels or using GPS

New document

Enter on
form coordinate
read on GPS receiver

Coordinate

Select administrative
level in drop down list

Administrative
level

GPS
receiver

Administrative levels database
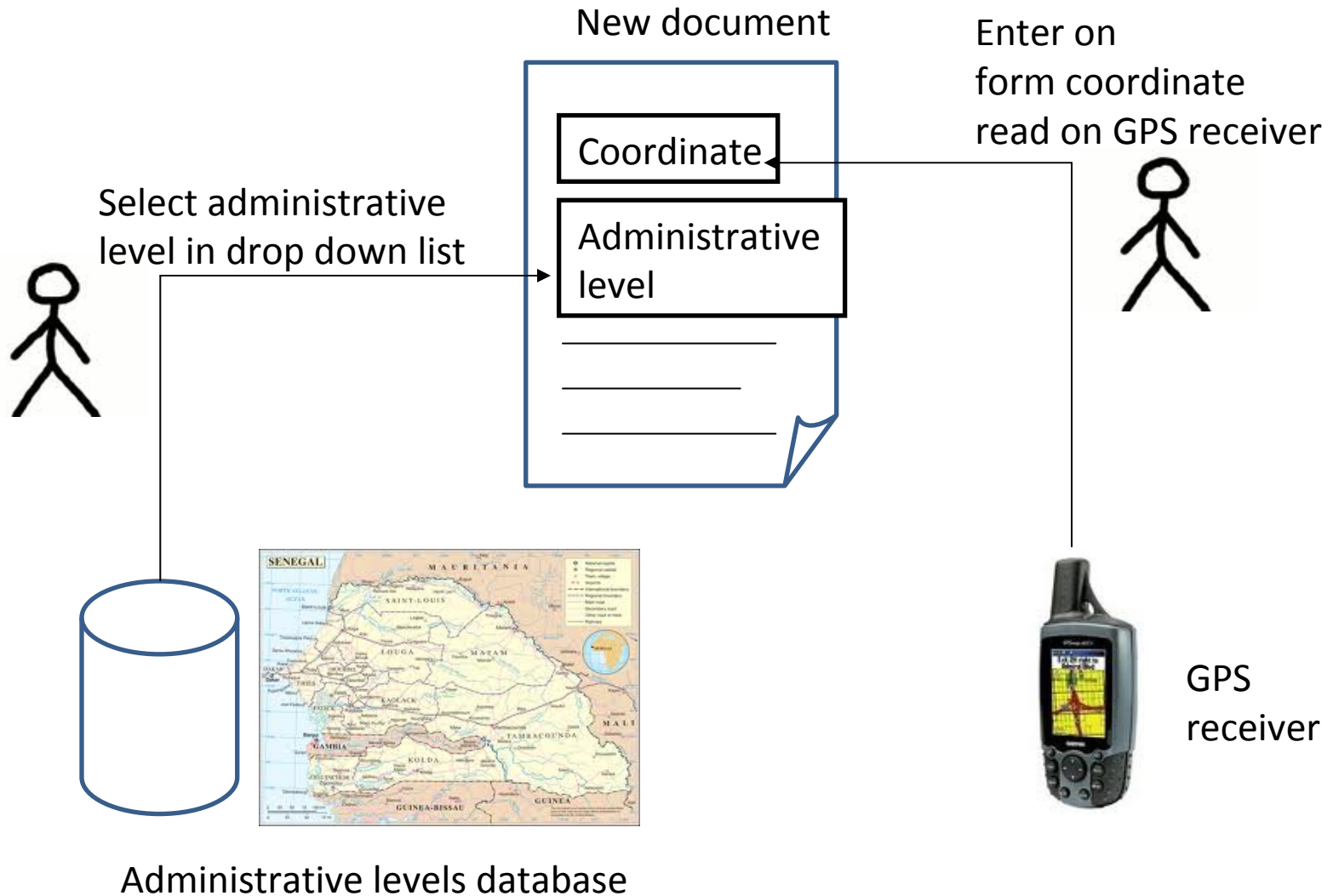
Use of Earth Observation

Modelling livestock distribution using spatial data and Earth Observation

- **GIS Module**
  - ➜ MODIS, NOAA, Meteosat (MSG), SPOT images
  - ➜ Vector data layers for
    - ➜ Road network
    - ➜ Hydrological network
    - ➜ Administrative units
    - ➜ Land cover
    - ➜ Land use
    - ➜ Protected areas
    - ➜ Altitude

  - ➜ Localization of herds
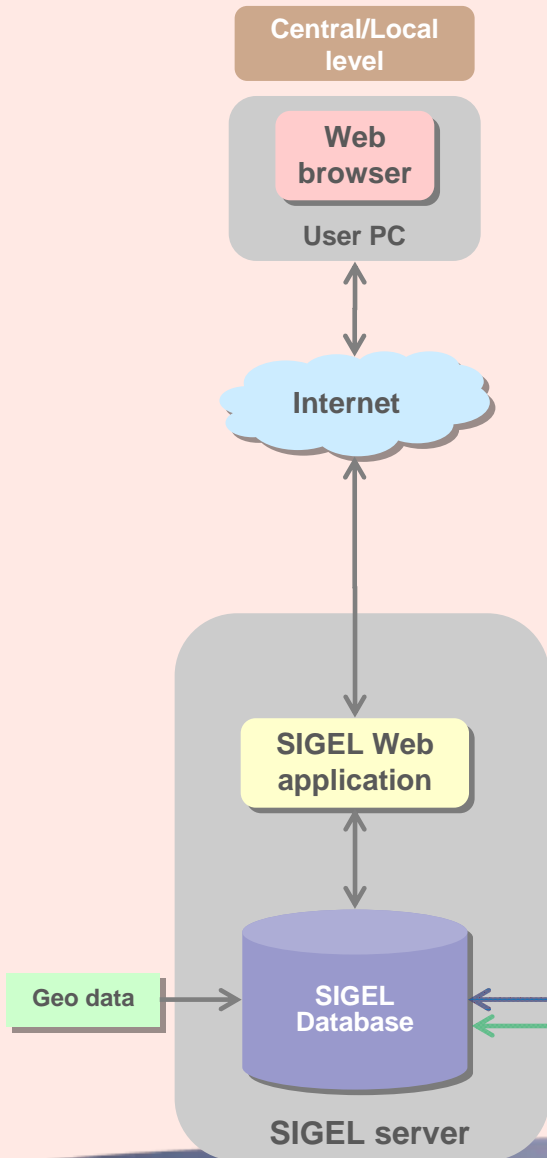 - ➜ Livestock distriution mapping
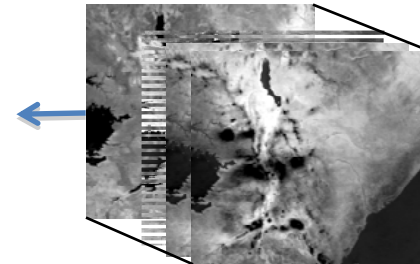
Partnership of DSV for the demonstration

- **CSE (Centre de Suivi Ecologique) – Ecological Survey Center of Dakar**
  - ➔ Involved in environmental and health applications using earth observation
  - ➔ Long collaboration between DSV and CSE
  - ➔ Within PREDICT, CSE will bring:
    - Multiple spatial data layers
    - Satellite data
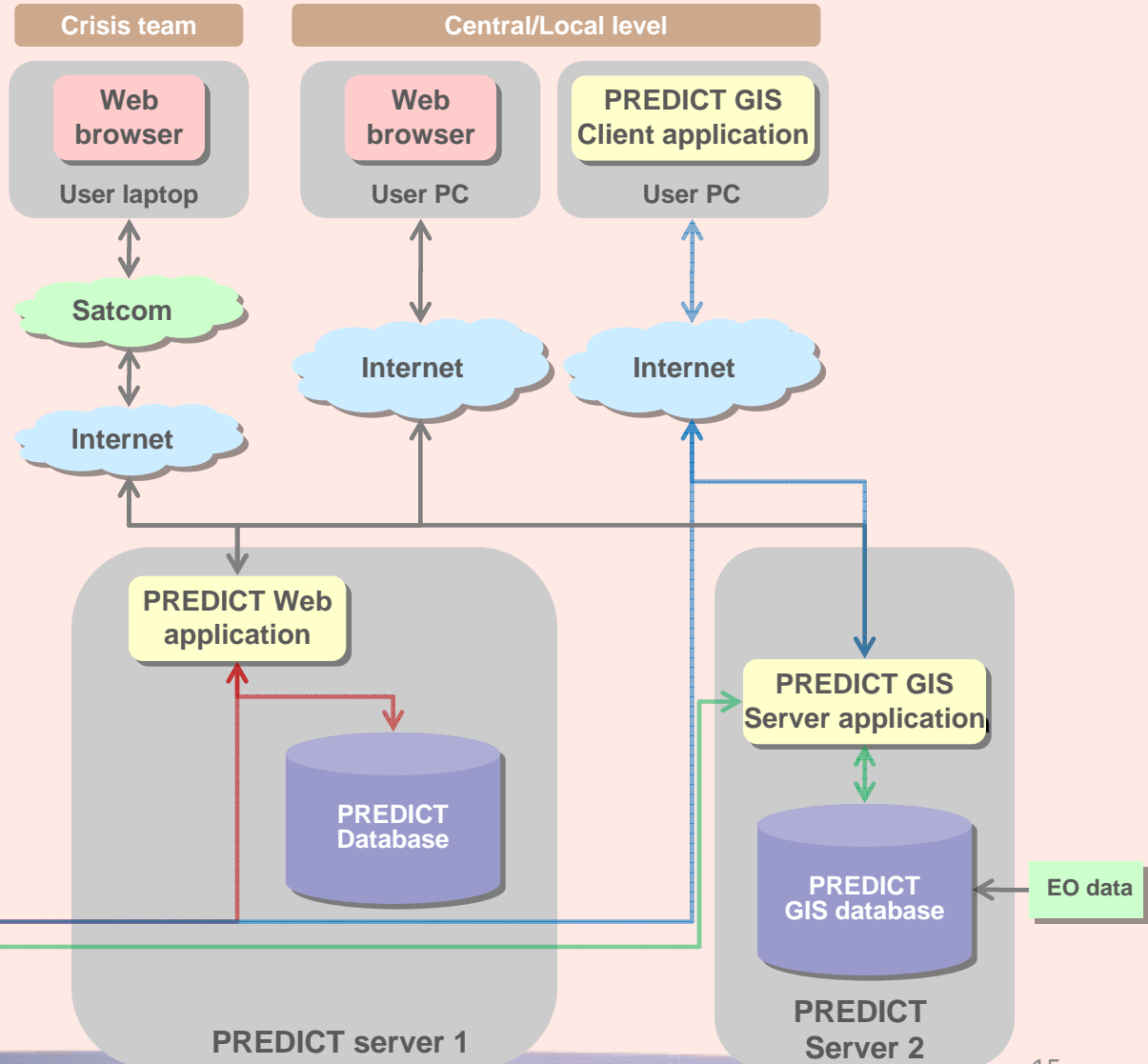 - ➔ Memorandum of understanding needed between CSE and DSV for PREDICT demonstration activities

- **ADIE (Agence pour le Développement Informatique de l'Etat) – Agency for Information Development of the State**
  - ➔ Promotes the use of ICT for governmental needs
  - ➔ Is implementing a network at the national level
  - ➔ Will host SIGEL and PREDICT servers, and provide technical support and health applications using earth observation
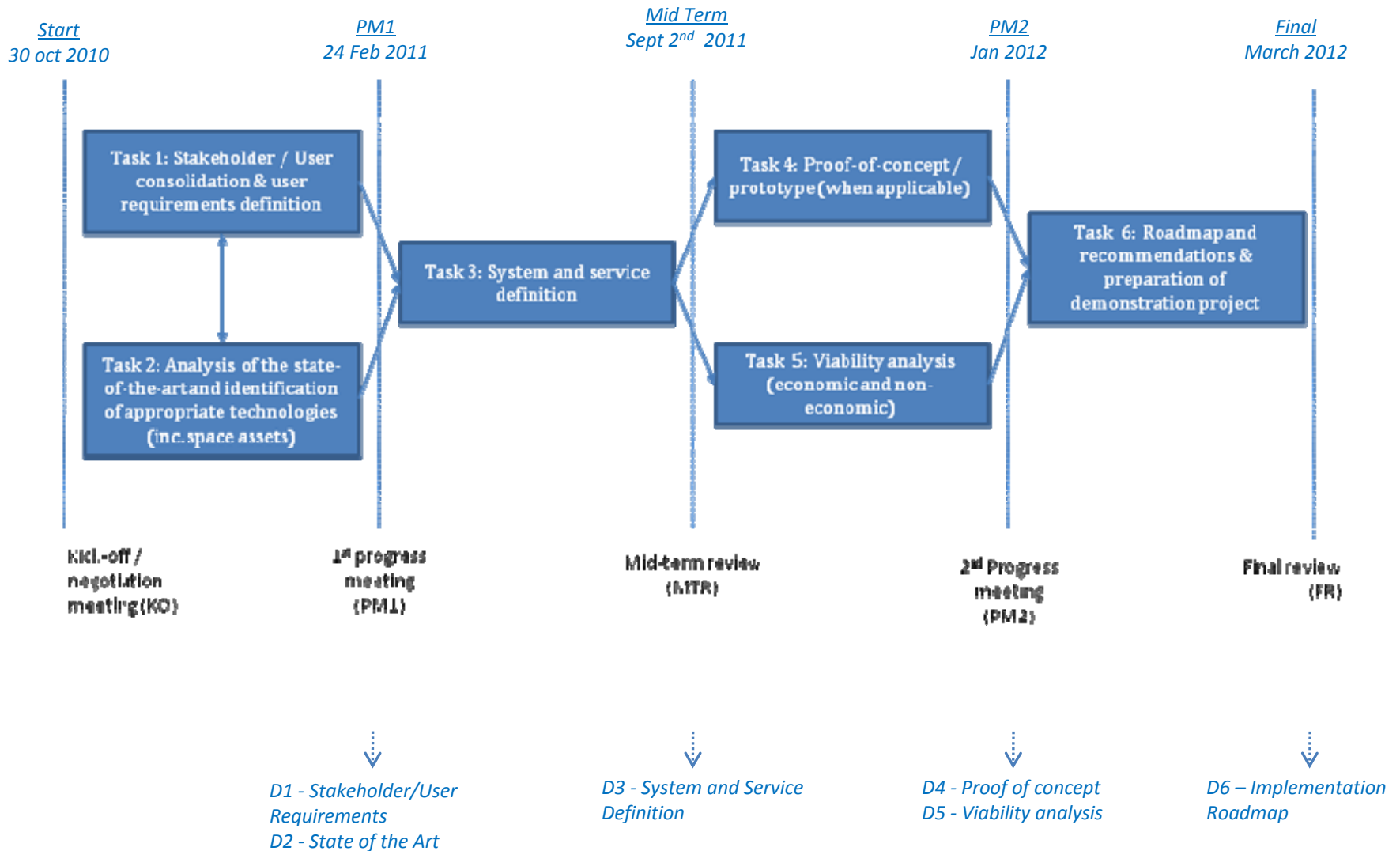
Information System architecture

SIGEL information system

Central/Local level

Web browser

User PC

Internet

SIGEL Web application

Geo data

SIGEL Database

SIGEL server

PREDICT information system

Crisis team

Web browser

User laptop

Central/Local level

Web browser

User PC

PREDICT GIS Client application

User PC

Satcom

Internet

Internet

Internet

PREDICT Web application

PREDICT Database

PREDICT server 1

PREDICT GIS Server application

PREDICT GIS database

EO data

PREDICT Server 2

Activities of the feasibility study

Preliminary sustainability assessment

- **Real needs expressed by DSV**

- **PREDICT complements the ongoing SIGEL initiative of DSV**

- **Strong partnership between DSV, CSE and ADIE**
    - ➔ **Free-of-charge services or preferential rates**

- **Low running costs expected for PREDICT, to be evaluated during the ongoing viability analysis**

- **Experience of DSV on Information systems from previous projects**

Conclusions

- **Senegal demonstration relevant**
  - ➔ PREDICT fulfills DSV needs and complement DSV initiatives
  - ➔ DSV can rely on a good local partnership
  - ➔ Need for three satellite services
  - ➔ Strong indication for sustainability

- **Demonstration could start in 2012**

- **PREDICT will develop a generic solution relevant in many countries for which Senegal could be the show case**
  - ➔ Definition of a "generic PREDICT " solution
  - ➔ Availability of an open source solution for core data collection and analysis
  - ➔ Commercial availability of the full system including mapping services by Avia-GIS

  - **Further PREDICT evolution could include the integration with the international inititatives of WHO, FAO, OIE**

PREDICT Project

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Thank You !

Questions ?

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