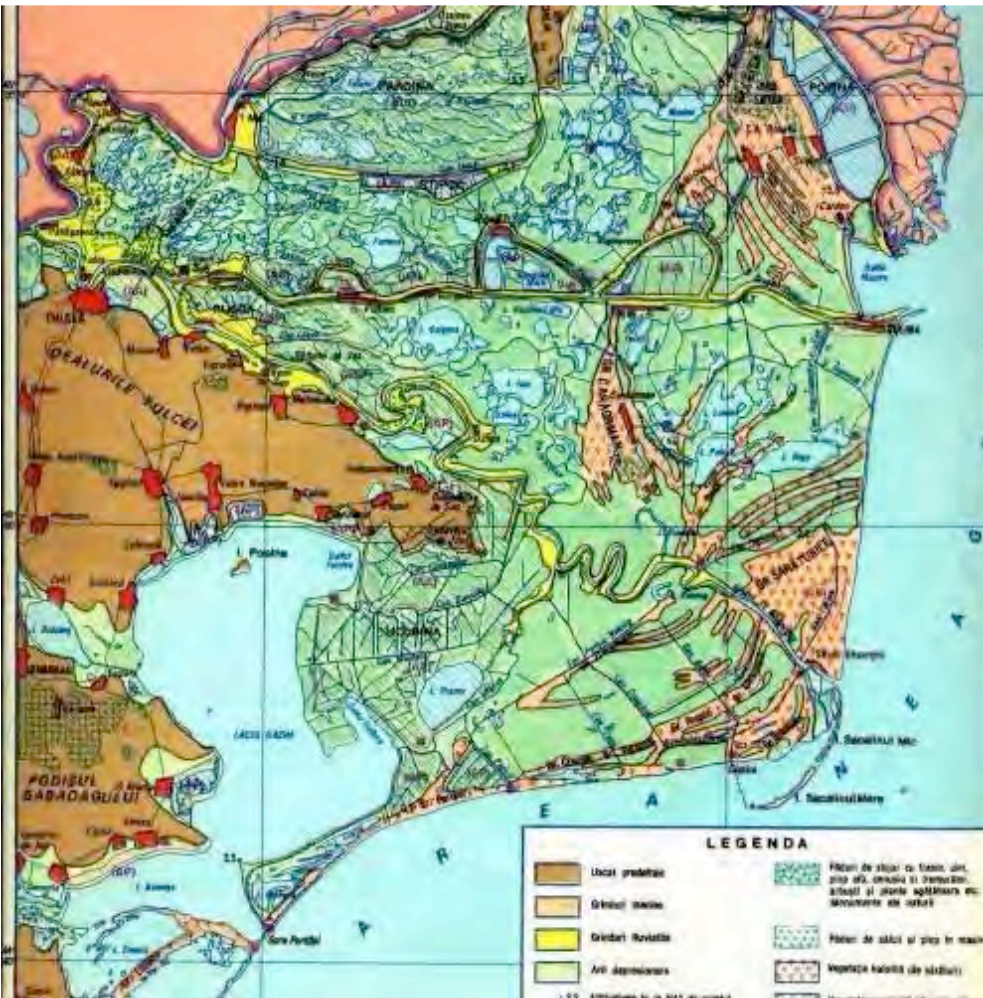


Science and Technology in service of biodiversity: the Danube “Δ”



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Danube Delta – a rich biodiversity area

30 different eco-systems:

- **Water rivers:** Danube arms and channels, with active circulation of water channels in natural areas, under pool water circulation channels, within polders with controlled exchange of water or without water exchange, etc
- **Wetlands:** lakes with a large area and / or active exchange of water, lakes with low exchange and lakes within the polders with controlled exchange of water
- **aquatic vegetation:** reed, floating islands, willow formations on the sides, frequently flooded pastures on the banks in association with clumps of willow etc)
- **temperate forests** (forests and oak), shrubs and herbaceous and open areas with poor or no vegetation (dunes, dunes or partially shifting quicksand, partially covered with vegetation, coastal belts poorly consolidated and beaches).
- **Agricultural** area landscaping forest poplar plantations on the banks of the river, fishing facilities, various other facilities etc)
- **Cities and villages** (urban and rural)

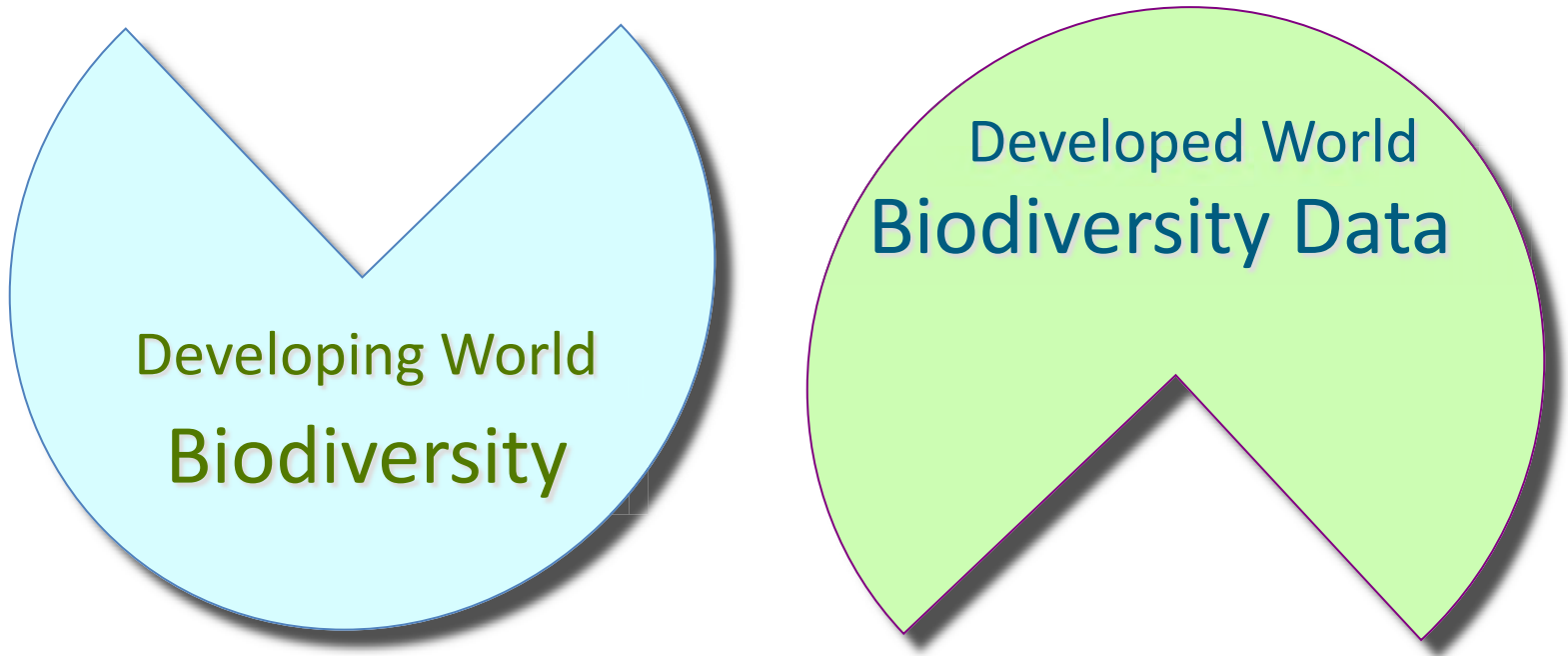
Functions and values of biodiversity

- First of all → a national cultural treasury
- Multiple source of services for the humanity, notably for the agriculture, food industry and medical sectors
- Support of production for food related goods, thanks to the soil fertility and sediments.
- Leisure: nature discovery, animals and birds observation etc – a source for eco-tourism

Threats on the Danube Delta biodiversity

- Danube delta in a continuous transformation and evolution: unpredictable Danube, Black sea and climate changes
- Human activity at the origin of deep changes: agricultural practices and technologies
- Habitat degradation and fragmentation: pollution, over-exploitation for certain species, climate change etc
- All these favor more certain species and less others
- Certain species are isolated and others can travel and adapt easier – links with other eco-systems

The need for monitoring and information gathering



Source: NLBIF

Where is the Danube Delta situated ?

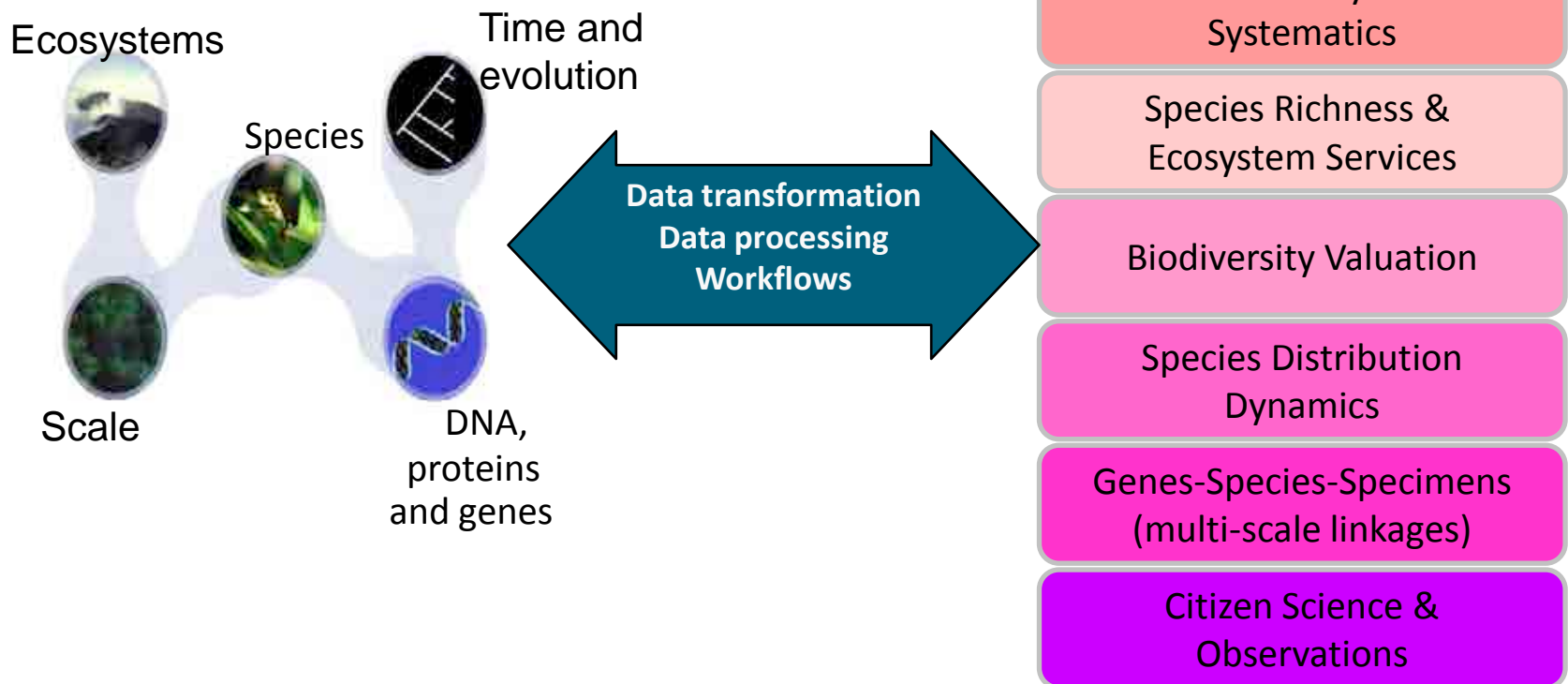
Much information is missing about the Danube Delta biodiversity

Very limited knowledge about biodiversity of
Danube Delta in the “Knowledge based society”:

- Birds
- Fish species
- Vascular plants species
- Invertebrates
- Bacteria
- Genes

An ICT Infrastructure → towards a “Digital Δ” concept

- a mean of processing and scaling-up biodiversity data



ICT tools in support of biodiversity

→ Goal: “Biosystem observation”

→ A wide range of ICT technologies needs to be deployed:

- Communication networks - Internet communication
- Sensors and surveillance systems
- Information processing capabilities
- Knowledge bases
- All connected to cloud computing

Objectives:

- **Sharing** of biodiversity data, information and the nationally available know-how
- Providing **access** to biodiversity data, information and know-how in other countries
- Develop ICT tools for **data management**, analysis, exchange, and electronic dissemination worldwide
- **Connect** databases to European and world wide similar systems

A distributed ICT system

Metadatabase

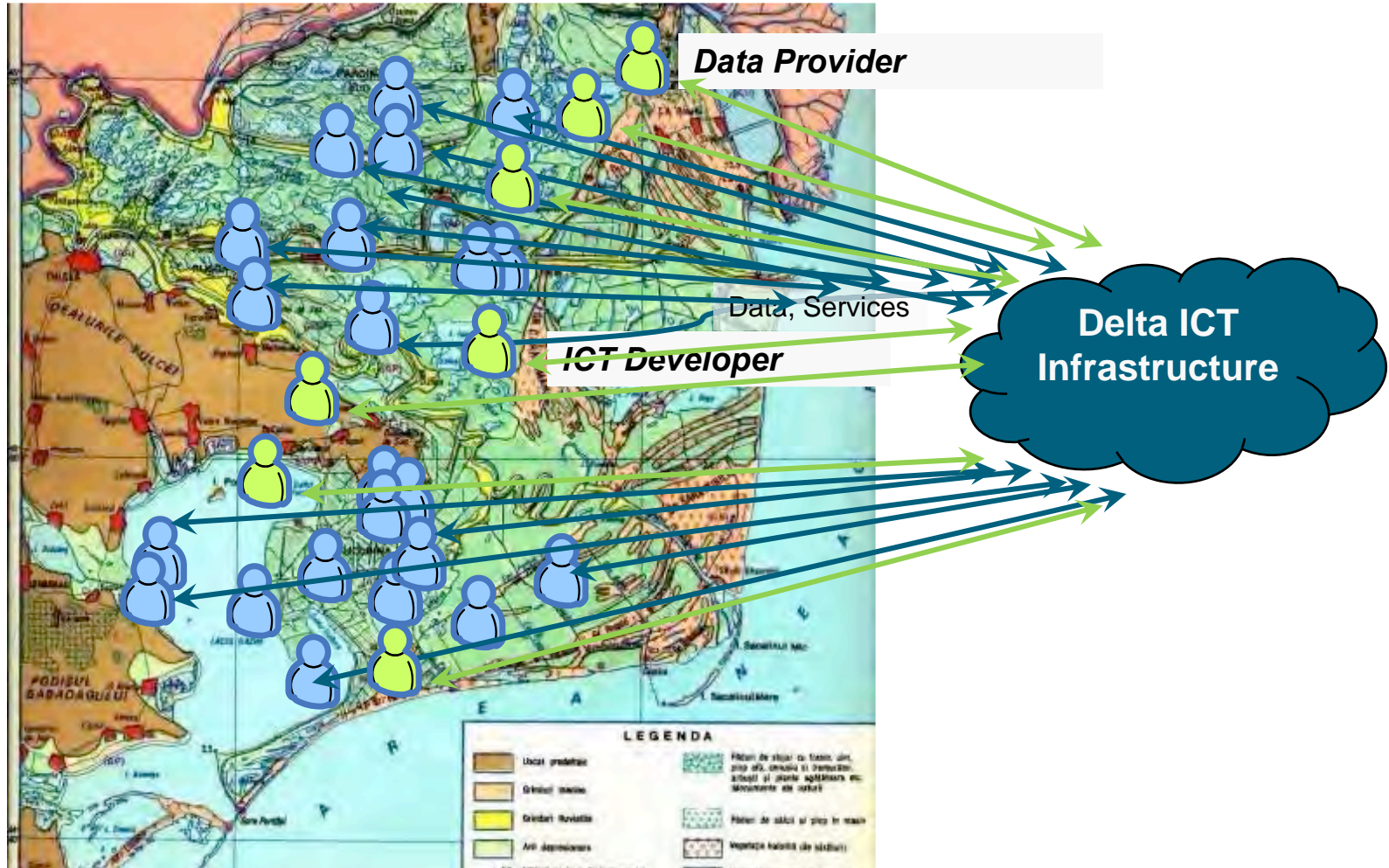
- Inventory of institutes and organisations holding Delta biodiversity information
- Biodiversity data in the Danube Delta:
- Who is who? → names, addresses, websites
- Who has what? → collections, observations, expertise
- Invest in local sensing capabilities
- An integrated, online ICT system

What is needed

A framework of Programs and Fund raising to

- bring biodiversity information on-line
- digitise natural history collections
- develop on-line Species Banks
- supply electronic catalogues of names
- connect and integrate biodiversity databases

A LifeWATCH Reference Model ...



ICT benefits for biodiversity

ICT and the Internet

- ICTs offer the potential for transport and travel substitution. With telework or e-work
- ICTs can also contribute to the resource and energy efficiency
- Environmental observation:
 - terrestrial (earth, land, soil, water), climate and atmospheric monitoring
 - data recording technologies and systems (remote sensing, data collection and storage tools, telemetric systems, meteorological and climate related recording and monitoring system)
 - geographic information systems (GIS).
- Environmental analysis and planning
- Environmental management and protection

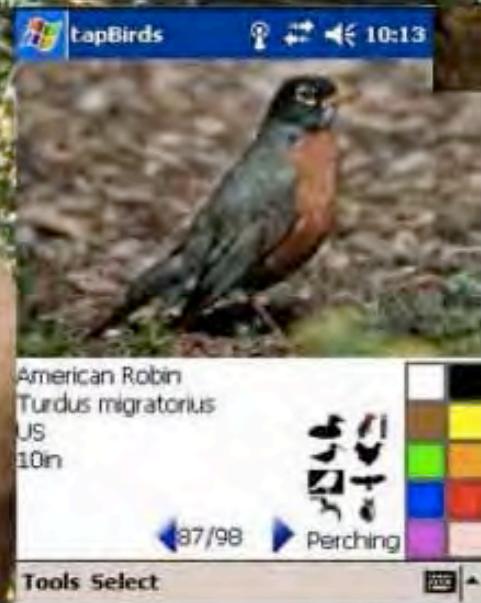
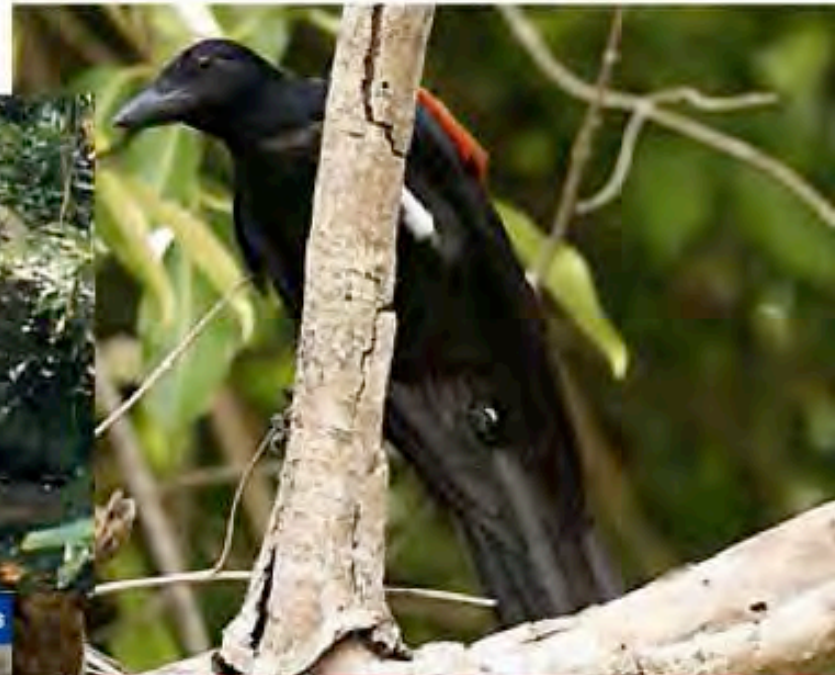
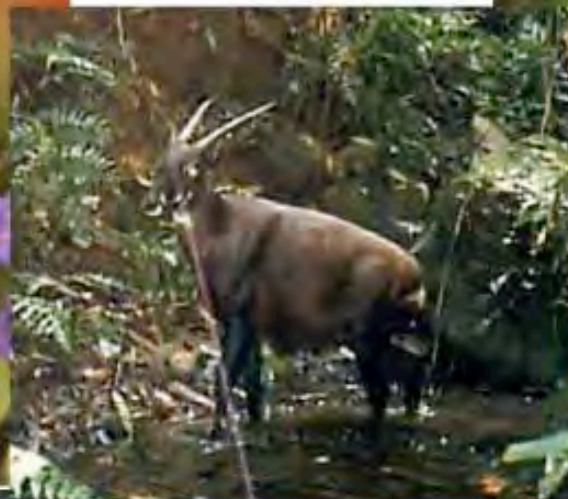
ICT categories for biodiversity

Electronics, microsystems	Information systems, software	Media and content	Communication technology, networks, distributed systems
<ul style="list-style-type: none">- automation, robotics- control systems, sensors- monitoring systems	<ul style="list-style-type: none">- databases, database management, data mining- data processing / data interchange- simulation- knowledge management, process management- semantic technologies- artificial intelligence, usability- advanced systems architecture	<ul style="list-style-type: none">- publishing, digital content- information filtering, semantics, statistics- visualisation, virtual reality- geographic information systems (GIS), location-based content	<ul style="list-style-type: none">- audiovisual equipment and communication technology- broadband technologies- internet services, web services, service architectures- mobile communications- network technology, network security- grid computing- satellite technology / systems / positioning / communication- ubiquitous computing, pervasive computing- computer-supported cooperation, portal technologies

Stages to enable the “Digital Δ ”

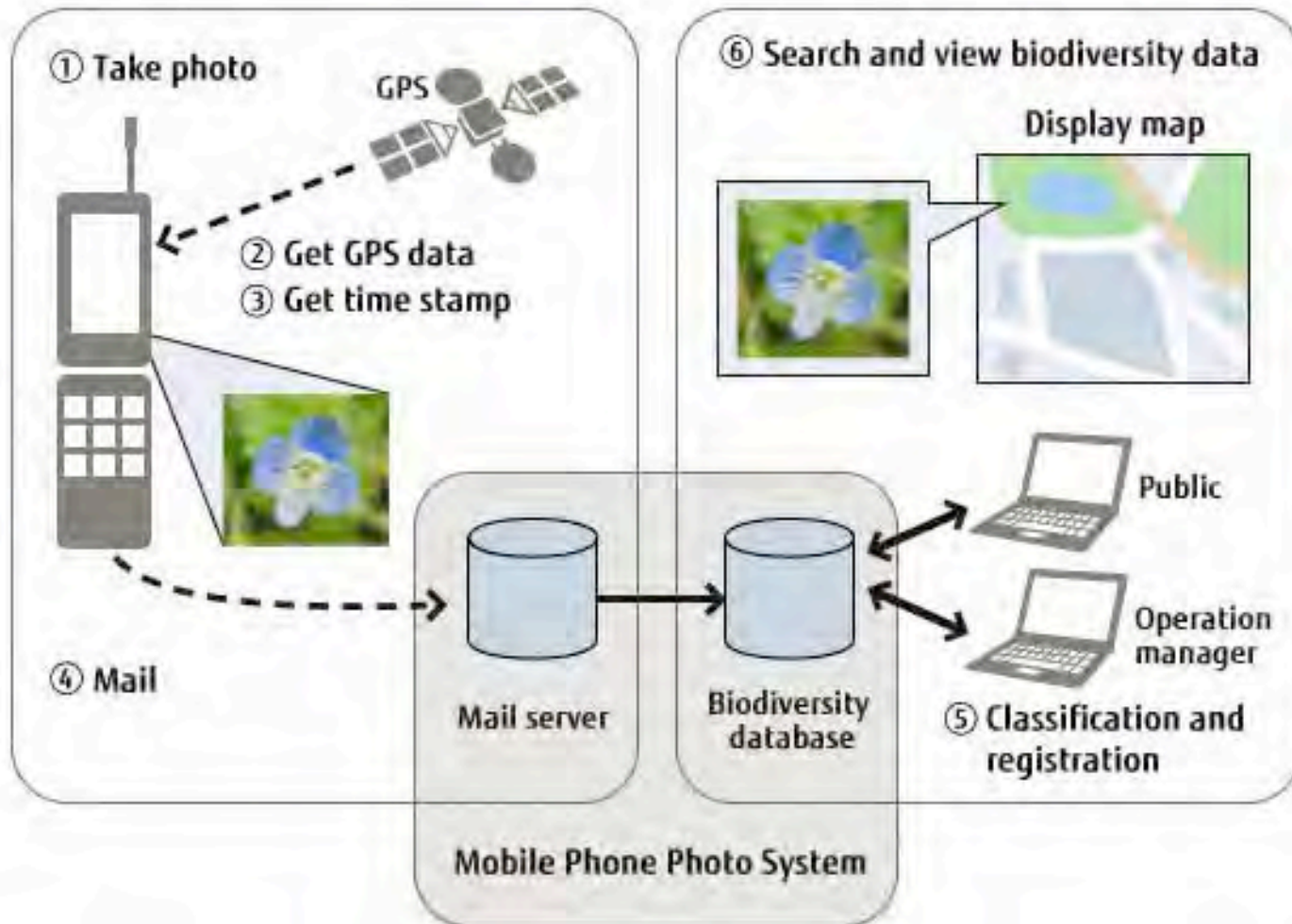
- First priority: Network communication infrastructure
 - Cellular approach
 - broadband connectivity
- Establishment of Delta biodiversity information nodes:
 - Environmental parameters
 - Species observation and monitoring
 - OPEN access databases and dissemination websites
- Sensor and system deployment
- Knowledge bases - in the clouds

The best available ICT needs to be applied to biodiversity conservation

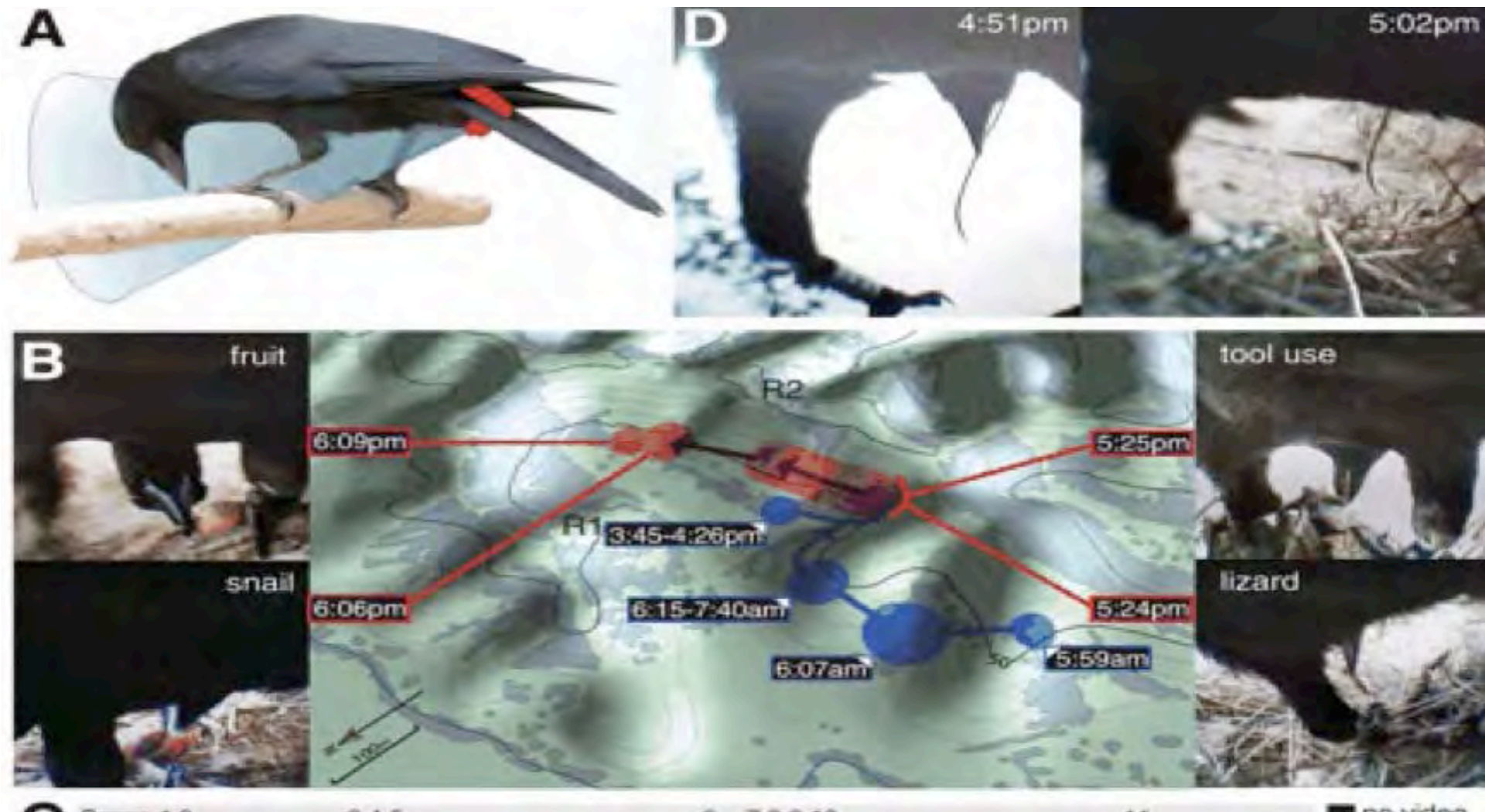


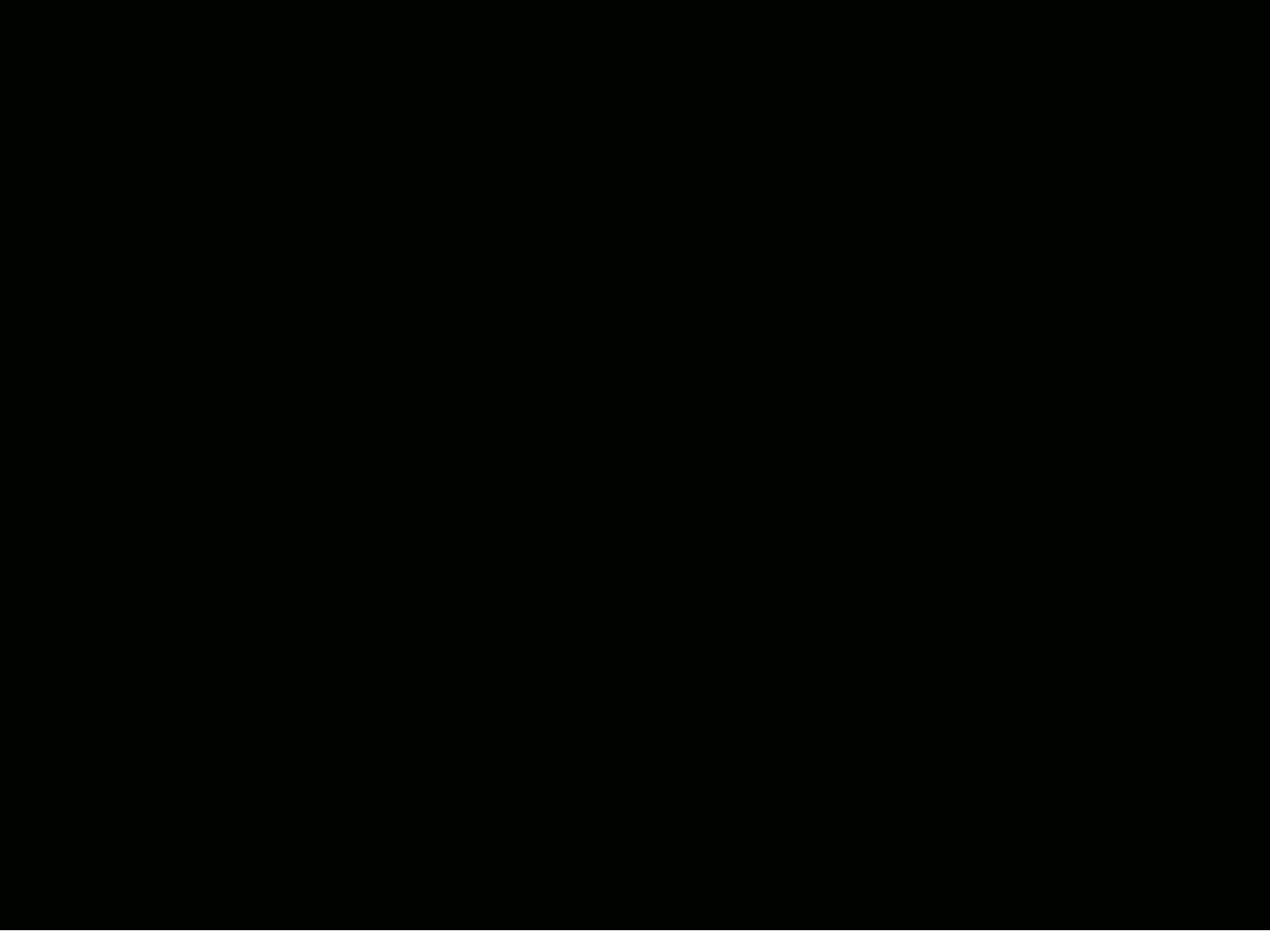
Examples: Vegetation Survey Using Mobile Phone Photo System

Mobile Photo System



Livecams for Species remote observation





Thank you !