How GIS is used in veterinary medicine

Essential use - Emerging use

GIS references

Geographic information systems: their application in animal disease control

There are a number of possible applications in the veterinary field. One of the most attractive uses is for the recording and reporting of disease information on a geographical basis. This allows for the spatial distribution of disease to be monitored over time. The major issue to be decided is the resolution at which data will be stored; systems that allow for the capture, storage, manipulation, analysis, display and

Another important veterinary application relates to the epidemiological study of specific diseases. The first step is usually to look for clustering of disease cases, as this can be a clue to the presence of risk factors; statistical techniques can be used to test for clustering. The next step is to analyse the relationships between the presence

Another example would be the development of control policies for rabies in foxes. Using computer simulation modelling, Tinline (26) identified six different

A number of possible veterinary applications are suggested, and three examples of the use of GIS in New Zealand are discussed.

GIS references

WHO C[O]
ON DEVE[L]
APPLICATION[...]
METHODS IN [...]
OF Z[...]

WUSTERH[...]
30 MAY[...]

- Information dissemination. The objective is to inform the public, policy and decision makers and other professionals through the use of geographically represented data. The purpose is to increase awareness and commitment to action: "A map is worth a thousand words!"

- Integrating information from different sectors to promote collaboration or intersectoral collaboration

- Epidemiological studies
- Epidemiological surveillance
- Impact assessment
- Decision support systems
- Disease simulations
- Disease control planning
- Disease control management

GIS references

GISVET 2001 - 2004 - 2007

OIEGIS 2006

GeoVet 2010 - 2013

GIS references

The Geomed project
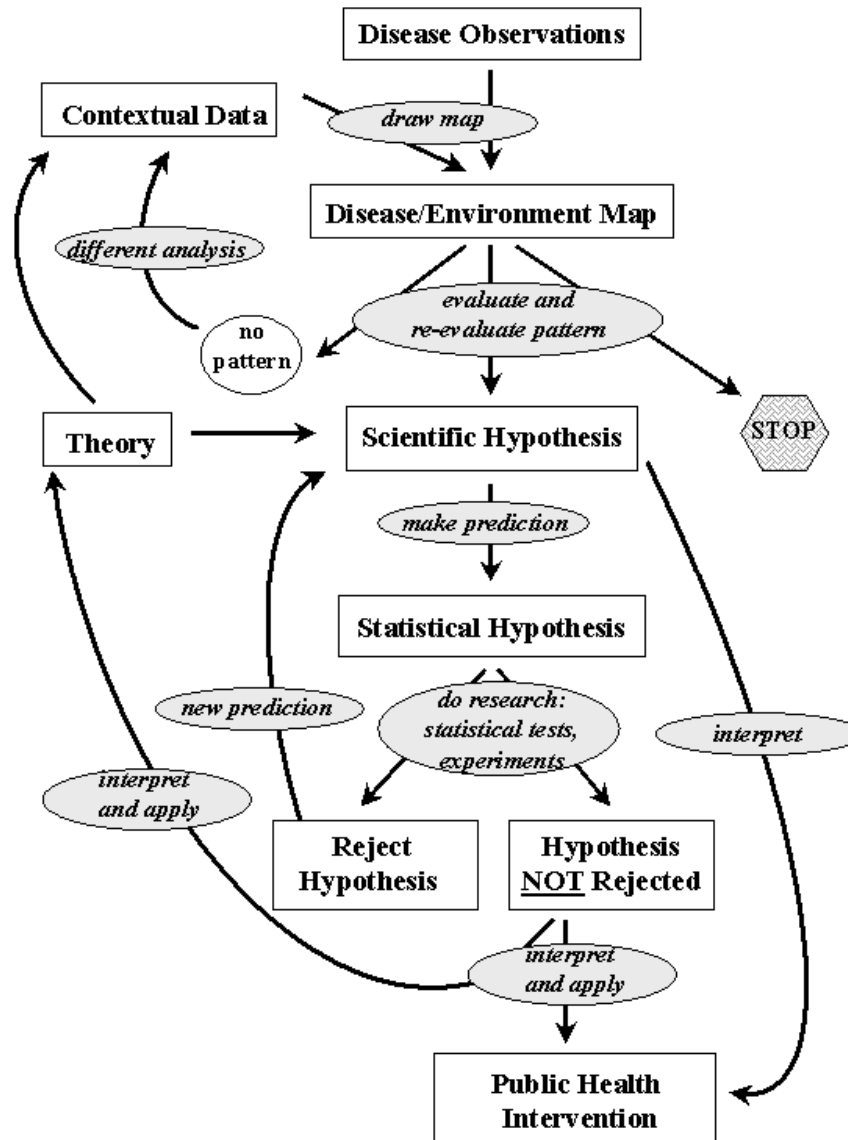
GIS references

Methods to investigate spatial and temporal clustering in veterinary epidemiology

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Abstract

Due to their contagious or point-source nature, ill-health and diseases often cluster in time and/or space. Overlooking this characteristic can lead to a delay in the control or eradication of the health problem. In addition to potentially expediting control efforts, cluster identification techniques enable the researcher or health-care official to identify and adjust for confounding factors and to generate new hypotheses regarding disease transmission. This paper examines a variety of temporal and spatial clustering techniques and focuses on those which have been reported recently in the veterinary literature. © 2001 Elsevier Science B.V. All rights reserved.

Keywords: Diseases; Clustering; Epidemiology

GIS reference

GIS references

CHANGING PARADIGMS OF GEOGRAPHY

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Abstract

Nowadays for an appropriate, way to deal with geographic space there is an axiomatic need to accept an integrated approach both in terms of the way we regard geographic space and how we investigate it. This leads to a two-prong position: First, that geographic space constitutes a dialectic entity and second that the spatial methodological approaches presently in use are now absolute. That is, Geography has recently undergone a paradigm shift from Geoinformatics, which in their own way have replaced traditional concepts, towards an integrating approach, bringing Geography into a new paradigm, called in this paper Choroinformatics.
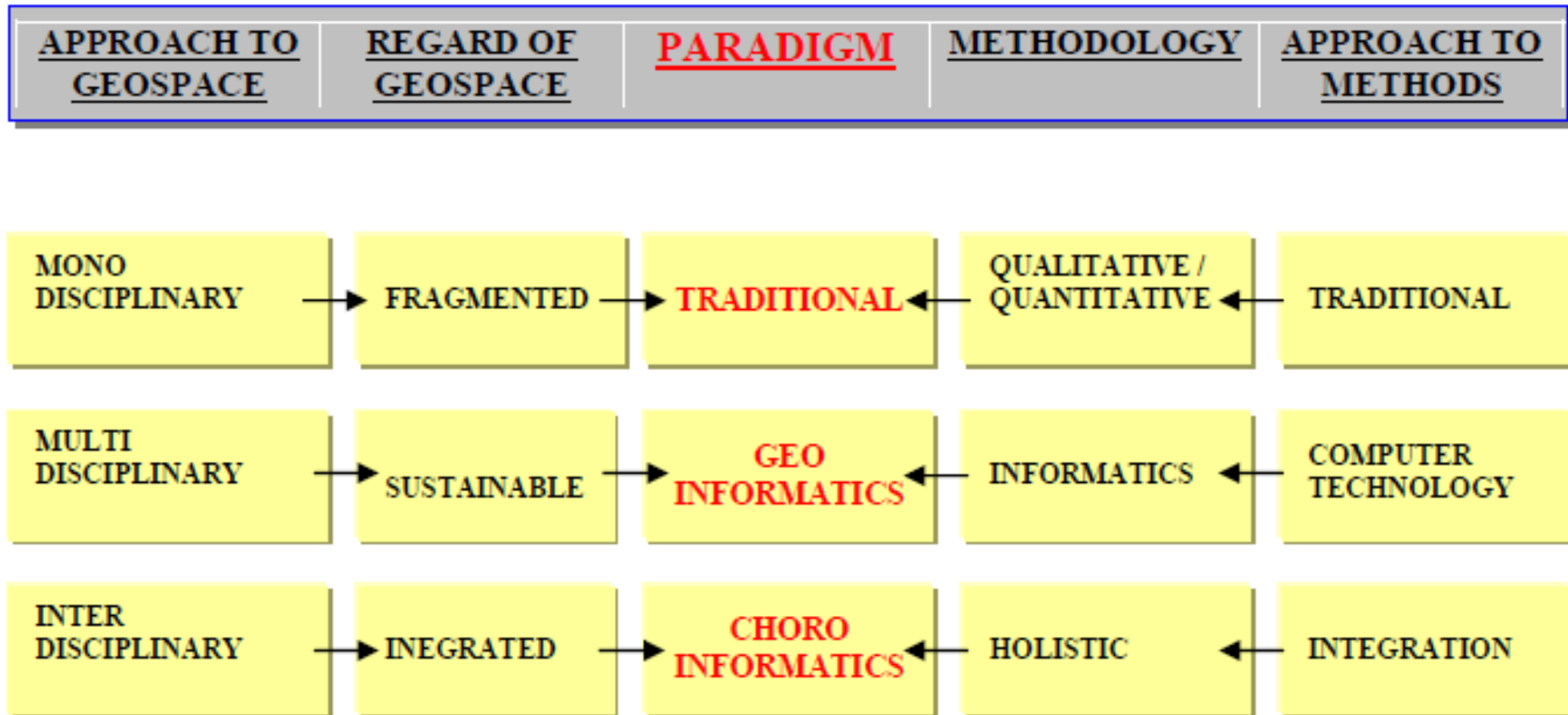
GIS references

Traditional model

Source: Koutsopoulos, 2011

GIS references

New paradigms in geography

APPROACH TO GEOSPACE	REGARD OF GEOSPACE	PARADIGM	METHODOLOGY	APPROACH TO METHODS
MONO DISCIPLINARY	FRAGMENTED	TRADITIONAL	QUALITATIVE / QUANTITATIVE	TRADITIONAL
MULTI DISCIPLINARY	SUSTAINABLE	GEO INFORMATICS	INFORMATICS	COMPUTER TECHNOLOGY
INTER DISCIPLINARY	INEGRATED	CHORO INFORMATICS	HOLISTIC	INTEGRATION

Source: Koutsopoulos, 2011

Digital Earth

"Imagine, for example, a young child going to a Digital Earth exhibit at a local ... she sees Earth as i ... ns in, using high ... nd an area of th ... he equivalen ... on of the terrain." ...

..today rapid advancements in graphics coprocessors, and techniques for data storage and progressive visualization, have made most of that vision available to us all..

GIS references

Digital Earth 2020: towards the vision for the next decade[1]

Max Craglia[a]*, Kees de Bie[b], Davina Jackson[c], Martino Pesaresi[a],

Digital Earth: multi-resolution, three-dimensional representation of the planet that would make it possible to find, visualise and make sense of vast amounts of geo-referenced information on physical and social environments.
Such a system would allow users to navigate through space and time, accessing historical data as well as future predictions, and would support its use by scientists, policy-makers and children alike.

that the vision of Digital Earth (DE) put forward by Vice-President Al Gore 13 years ago needs to be re-evaluated in the light of the many developments in the fields of information technology, data infrastructures and earth observation that have taken place since. The paper identifies the main policy, scientific and societal drivers for the development of DE and illustrates the multi-faceted nature of a new vision of DE grounding it with a few examples of potential applications. Because no single organisation can on its own develop all the aspects of DE, it is essential to develop a series of collaborations at the global level to turn the vision outlined in this paper into reality.

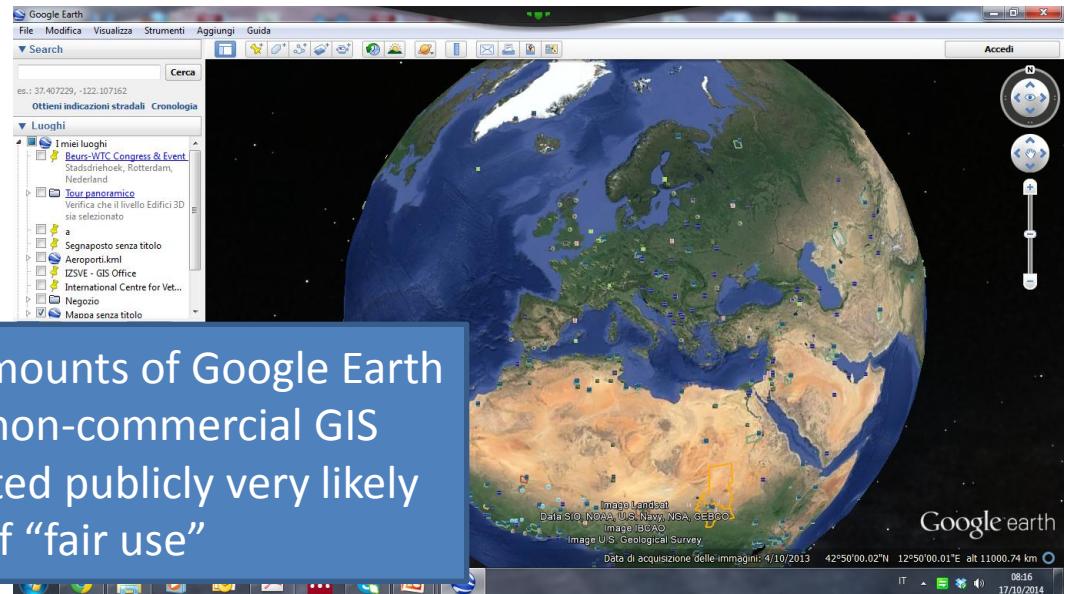# Digital Earth

Key features
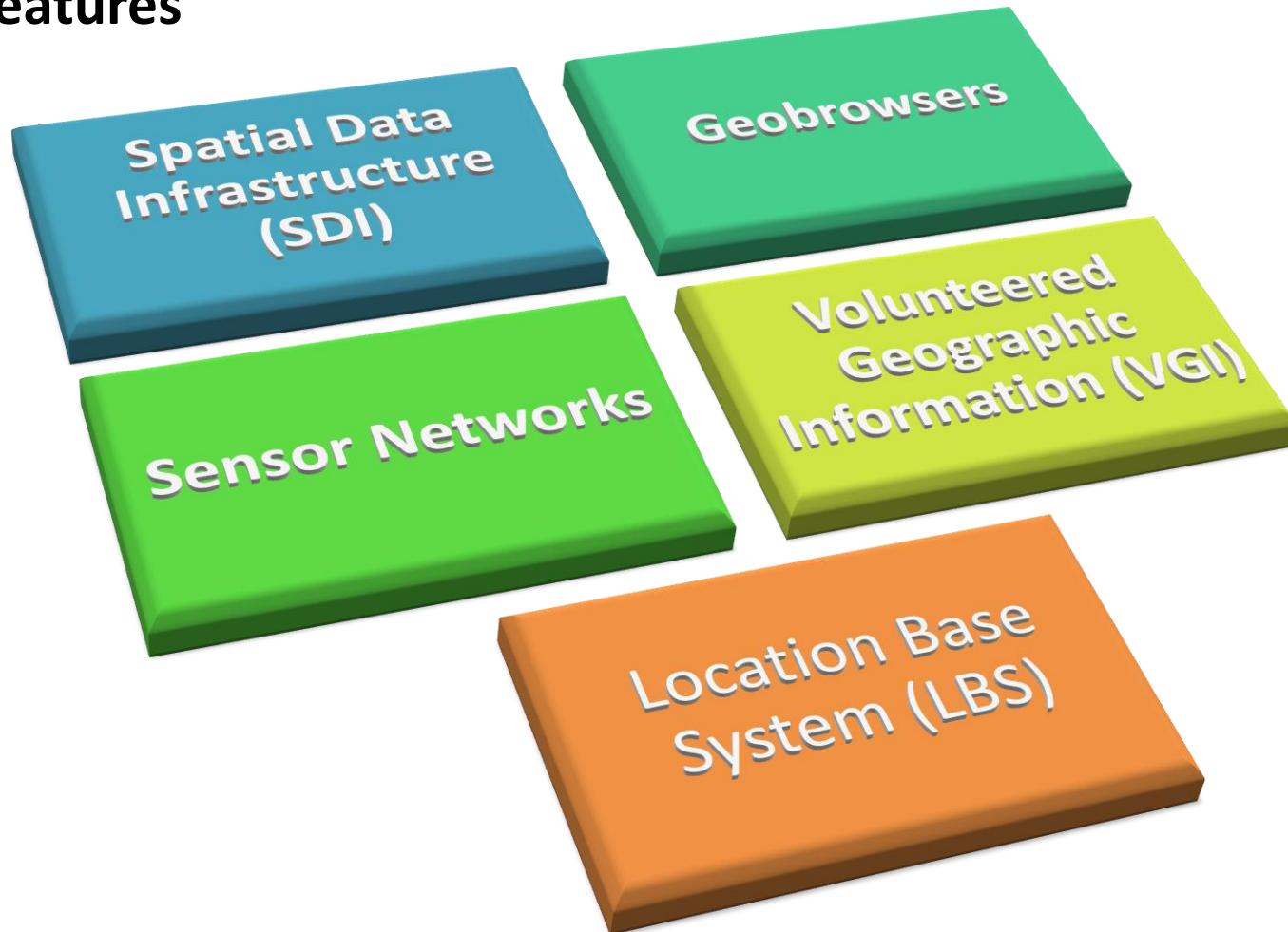
Digital Earth

Geobrowser

it is a platform where it is possible to seek and access information via a method that allows the users to browse contents on a map, and then navigate down to the textual/non-textual information.

..your use of Content may be acceptable under principles of "fair use".

.

The usage of a limited amounts of Google Earth imagery for personal or non-commercial GIS usage when not distributed publicly very likely falls within the bounds of "fair use"

Digital Earth

VGI

is the harnessing of tools to create, assemble, and disseminate geographic data provided voluntarily by individuals (Goodchild, 2007)
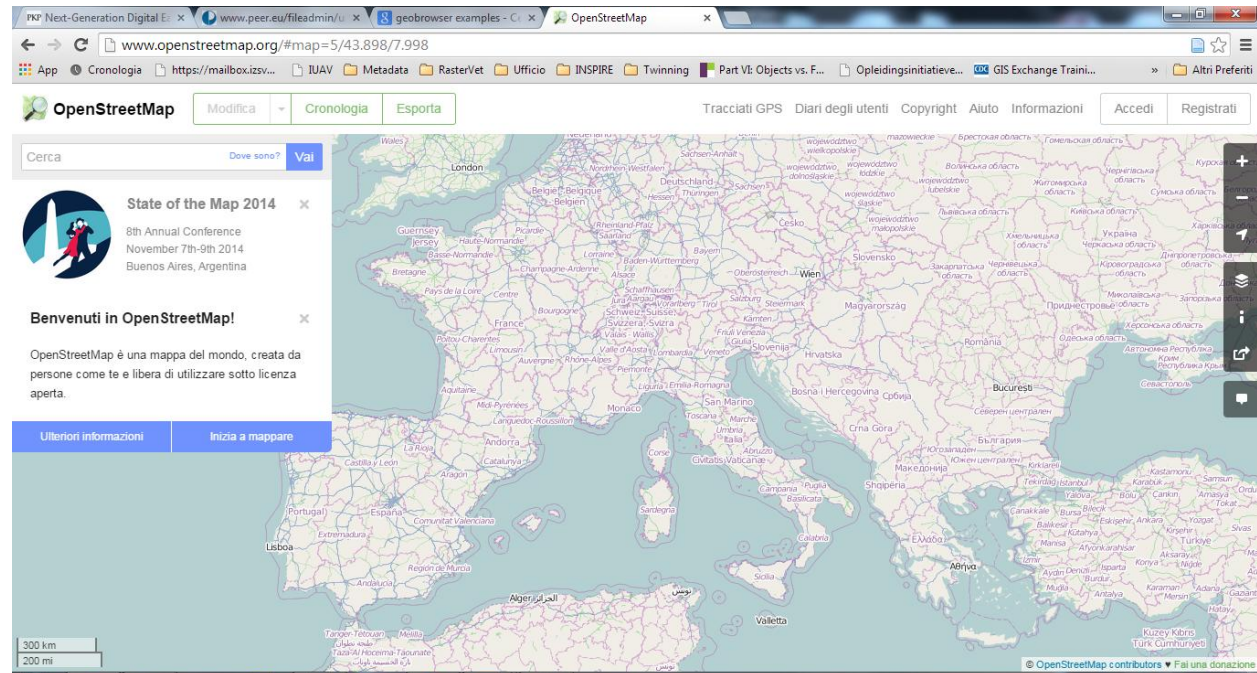
Digital Earth

LBS

is a software application for a mobile device that requires knowledge about where the mobile device is located.
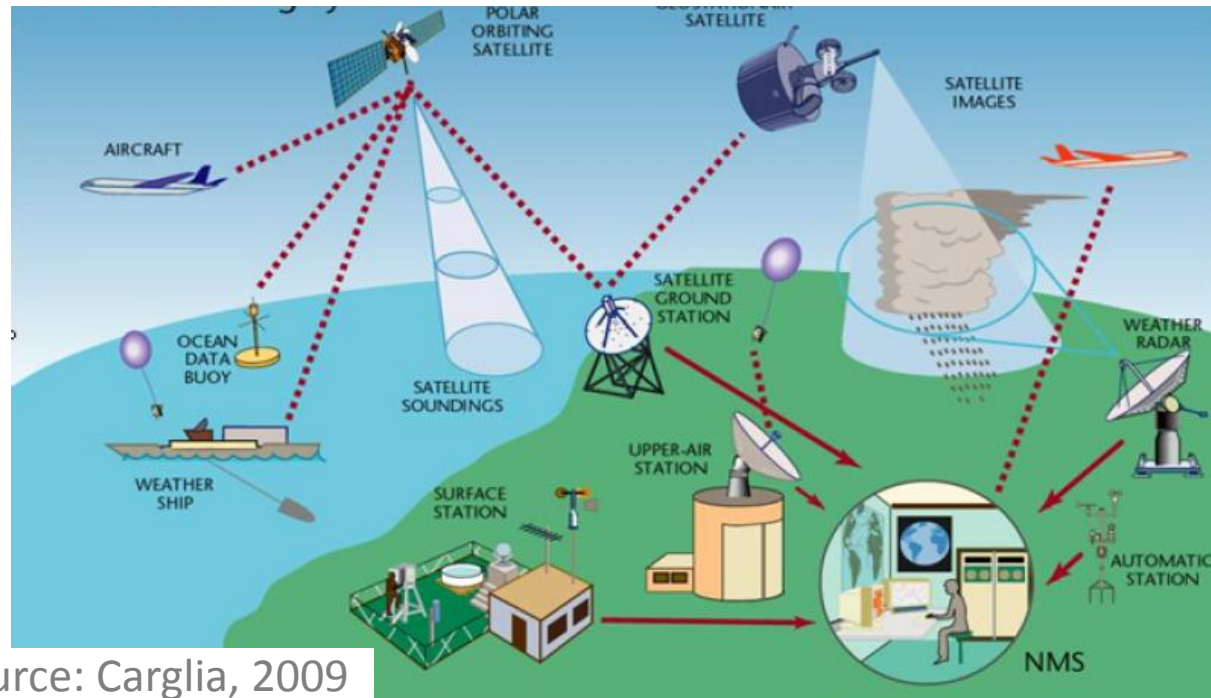

Mobile GIS

Distribution of location information

Digital Earth

Geosensors

is any device receiving and measuring environmental stimuli that can be geographically referenced. As such they include satellite-based sensors, and sensors near, on, or under the Earth's surface.

Source: Carglia, 2009
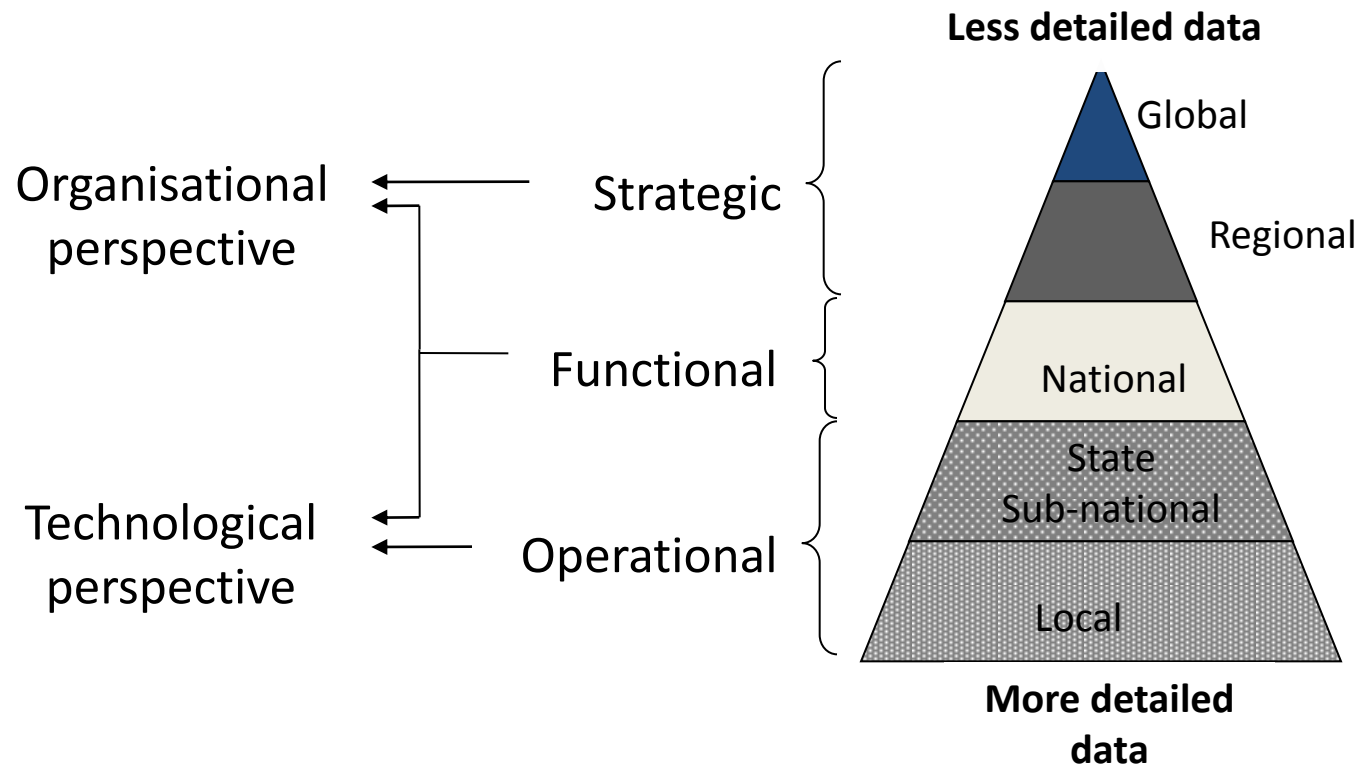
Digital Earth

SDI

a framework of data, technology, policies, standards, and human resources, necessary to facilitate the sharing and using of geographic information.

The term infrastructure is used to emphasise not just hardware and data (equivalent in the rail system to carriages, power lines, rail tracks, stations) but also the need for **coordinating structures and international standards and agreements** *(on gauges, timetables, safety rules, signalling, etc.) without which the system cannot operate consistently and safely.*
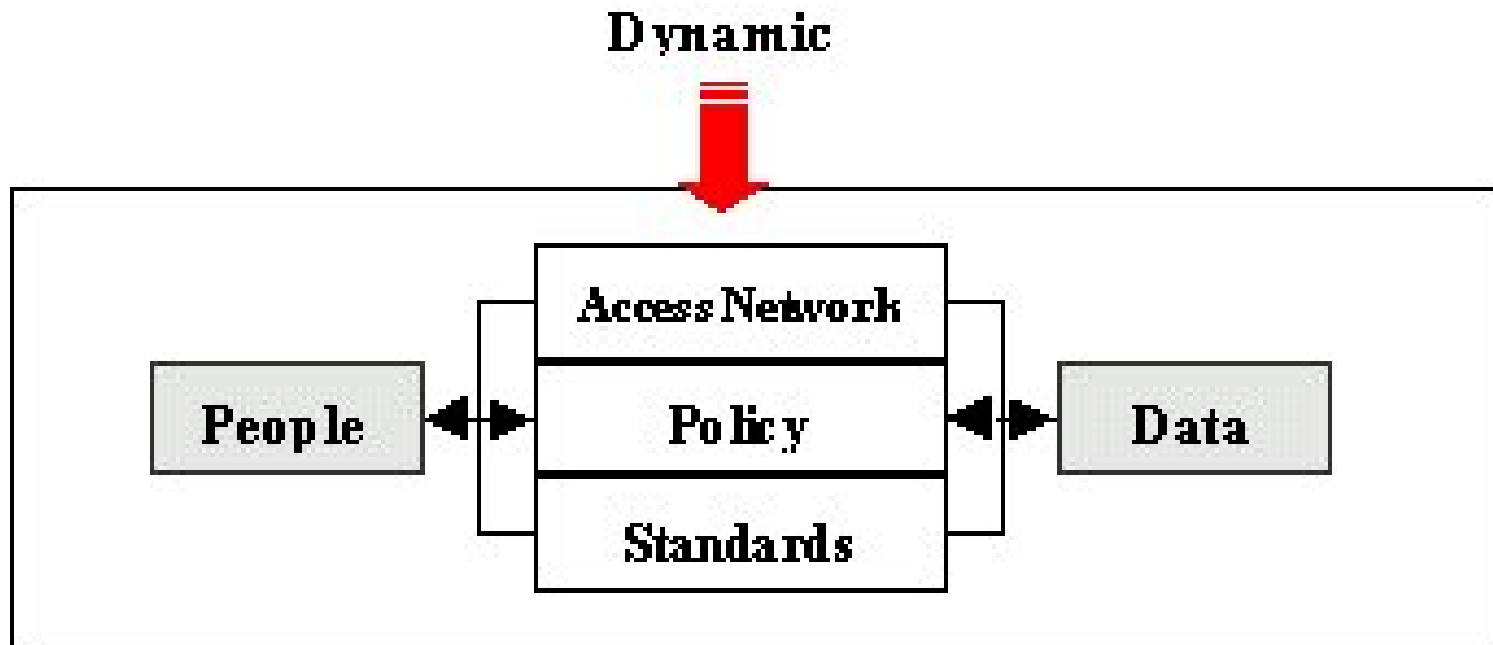
Digital Earth

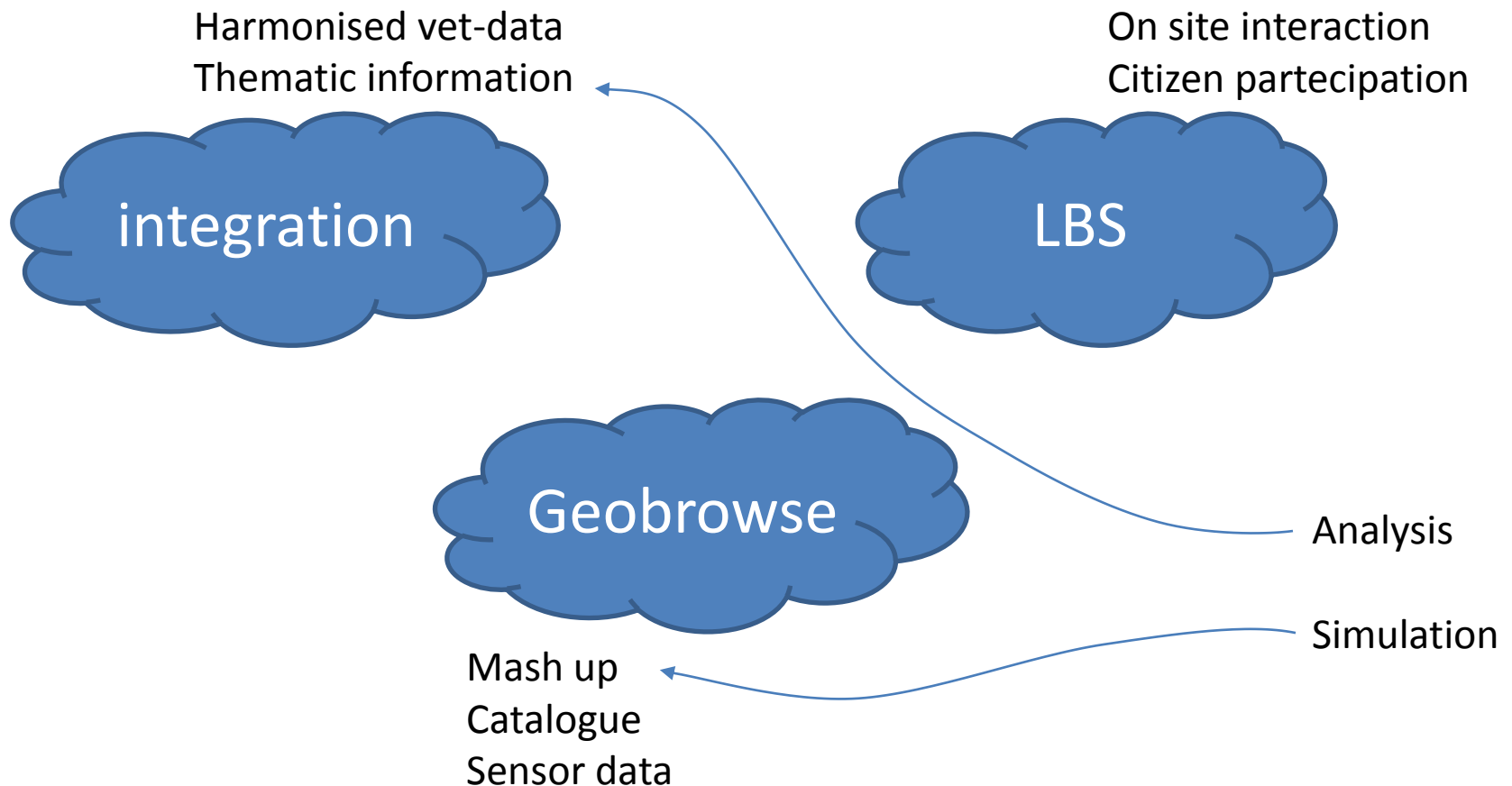# Digital Earth

SDI

next-generation GIS applications in veterinary medicine..

Harmonised vet-data
Thematic information

integration

On site interaction
Citizen partecipation

LBS

Geobrowse

Analysis

Simulation

Mash up
Catalogue
Sensor data

next-generation GIS applications in veterinary medicine..

Digital Earth: What the hack?

An AGILE workshop on advancing co-creation in smart cities
3 JUNE 2014, Castellón, Spain

Any examples of successful GIS applications in veterinary medicine?

Any examples of successful GIS applications in veterinary medicine?

- Technical validity
  - The system to be implemented works
    - Apparently no bug, data seems clean

- Organizational validity
  - Congruence between the organization and the system to be implemented
    - The system is accepted and used by the organizational members

- Organizational effectiveness
  - Improvement in efficiency and effectiveness
    - Improved decision making
  - Even perceived as a process of organizational change
    - Some GIS changes the way the organization does their business

Source: Obermeyer, Nancy J. and Jeffrey K. Pinto. 2008. Managing GIS (1994).

Any examples of successful GIS applications in veterinary medicine?

..after attending many GIS conferences, I'm convinced that the large majority of GIS implementations are less than successful..

..organisations implements a GIS because is a "can't miss" technology..

.. many companies and organisations struggle to realise the benefits that GIS can deliver because they have not developed an integrated GIS strategy.

Any examples of successful GIS applications in veterinary medicine?

1) GIS MASTER PLAN
Careful planning ensures broad organizational commitment and adequate funding, and minimizes common road blocks. It serves as a guide for staffing, data standards, training, and hardware and software purchases.

2) COORDINATION
This is the most critical characteristic of successful GIS programs. Most organizations will need to evaluate and implement the optimum governance model for managing and maintaining their GIS.

7) QUANTIFY BENEFITS VS. COST
Proving savings in time, life, and money guarantees continued support and momentum. Make sure you invest resources on solutions that solve specific problems.

3) QUICK SUCCESS
The earliest phases of GIS are typically the most expensive and the most important, but the least glamorous. High impact projects that can be implemented in the first year help maintain enthusiasm and build credibility for GIS.

6) ENTERPRISE-WIDE IMPLEMENTATION
Spread the responsibilities for GIS throughout the organization and offer all departments the opportunity to use the technology. GIS should be as widely used as a word processor, on every desktop in the organization. This approach helps turn data into valuable information.

5) EASE OF USE
Gone are the days when GIS was limited to a few highly trained power users. Make sure you implement intuitive, easy solutions so everyone can benefit. Some of the most widely accepted GIS applications are delivered to the public via the Internet.

4) EDUCATION
Make sure users throughout the organization understand what GIS can do for them. Give users at all levels a preview of how they will soon be able to do their jobs more efficiently with GIS.

Source: Holdstock, 2007

Any examples of successful GIS applications in veterinary medicine?

Source: Hinton and Holdstock, 2010

Return on Investment
the key to GIS implementation

The benefit of GIS (also know as "pay-back", "Return On Investment (ROI)" or "value position") are maximized through careful planning, design and implementation.

Source: Holdstock, 2007

"Can we live without this?"

Source: Gareth, 2013

GIS references

VET... 2012 V...

Use of Geoinformatics ... Disease Management

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==“can’t miss” technology==

system (GIS) in the field of surveillance and ...been
monitoring of animal diseases. Prime areas in i... ...ntrol
which GIS could be incorporated are recording of infectious diseases in animals (Sanson 1994).
and reporting information, epidemic emergency, Geographical information system GIS is a
cluster analysis, disease spread modeling, and computer-based system for analyzing and
planning control strategies. Different sources of displaying digital geo-referenced data sets (Fig.1).
data; geographical data, farm locations and The data can be stored in two formats; vector
disease information are used in the development based and grid-based. The maps of the vector-
of the GIS. based format display models of the real world
using points, lines and polygons. Vector digitizing

Any examples of successful GIS applications in veterinary medicine?

Source: Hinton and Holdstock, 2010