

Archiving and Management of Geospatial Intelligence Data Powered by ArcGIS

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ESRI
p a r t n e r The ESRI partner logo features the word 'ESRI' in a large, bold, blue, sans-serif font. Below it, the word 'partner' is written in a smaller, blue, sans-serif font, with each letter separated by a small space. To the right of 'partner', there are two small orange plus signs.

To handle petabytes of aerial and satellite images, raster maps, vector data, DEM's, and other geospatial intelligence data an automated archive system and an efficient metadata information system are necessary.

We have developed a high-performance solution for the archiving, management, retrieval, display, and dissemination of all kinds of imagery and geospatial information. The metadata and vector data are stored in an Oracle database, whereas the imagery and other mass data are stored file-based within a SAN (storage area network). During data ingest the original data are automatically geo-referenced and converted into standard formats like GeoTIFF. All data can be queried, displayed in the form of footprints located in a reference map, ordered and downloaded in a LAN, an Internet or Intranet environment. The archiving and management software has been integrated as application within ArcGIS. It is in operation in several German civil, military and intelligence agencies.

- ▶ Motivation
- ▶ Solution for geospatial data management
- ▶ Applications
- ▶ Conclusions
- ▶ Practical demonstration

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Motivation

Military Applications



MAW TAURUS (© WTD 61)

→ Modern reconnaissance and weapon systems require worldwide high precision 3D terrain information

Motivation

Civil Applications



Earthquakes



Forest fires



Floodings

Crisis and disaster situations require a rapid, accurate and task-oriented

- ▶ acquisition
- ▶ management
- ▶ processing
- ▶ provision

of geospatial data and derived products

- ▶ Motivation

- ▶ Solution for geospatial data management

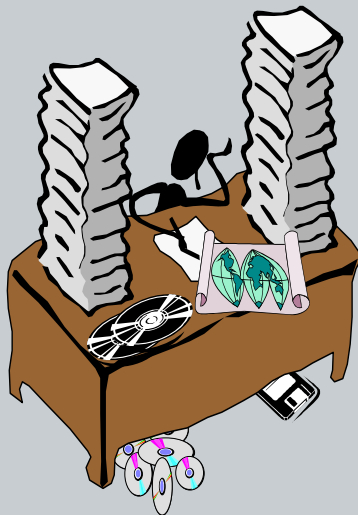
- ▶ Applications

- ▶ Conclusions

- ▶ Practical demonstration

Initial Situation

- ▶ Increasing data volume due to digital photogrammetry, remote sensing and cartography
- ▶ Data chaos
- ▶ No digital catalogue / archive
- ▶ No online access to required geodata



Requirements

- ▶ Archiving of source and product data TByte...PByte
- ▶ Metadata information system (catalogue system) for efficient data retrieval
- ▶ Web-based data provision via Internet / Intranet
- ▶ Automation of production workflows



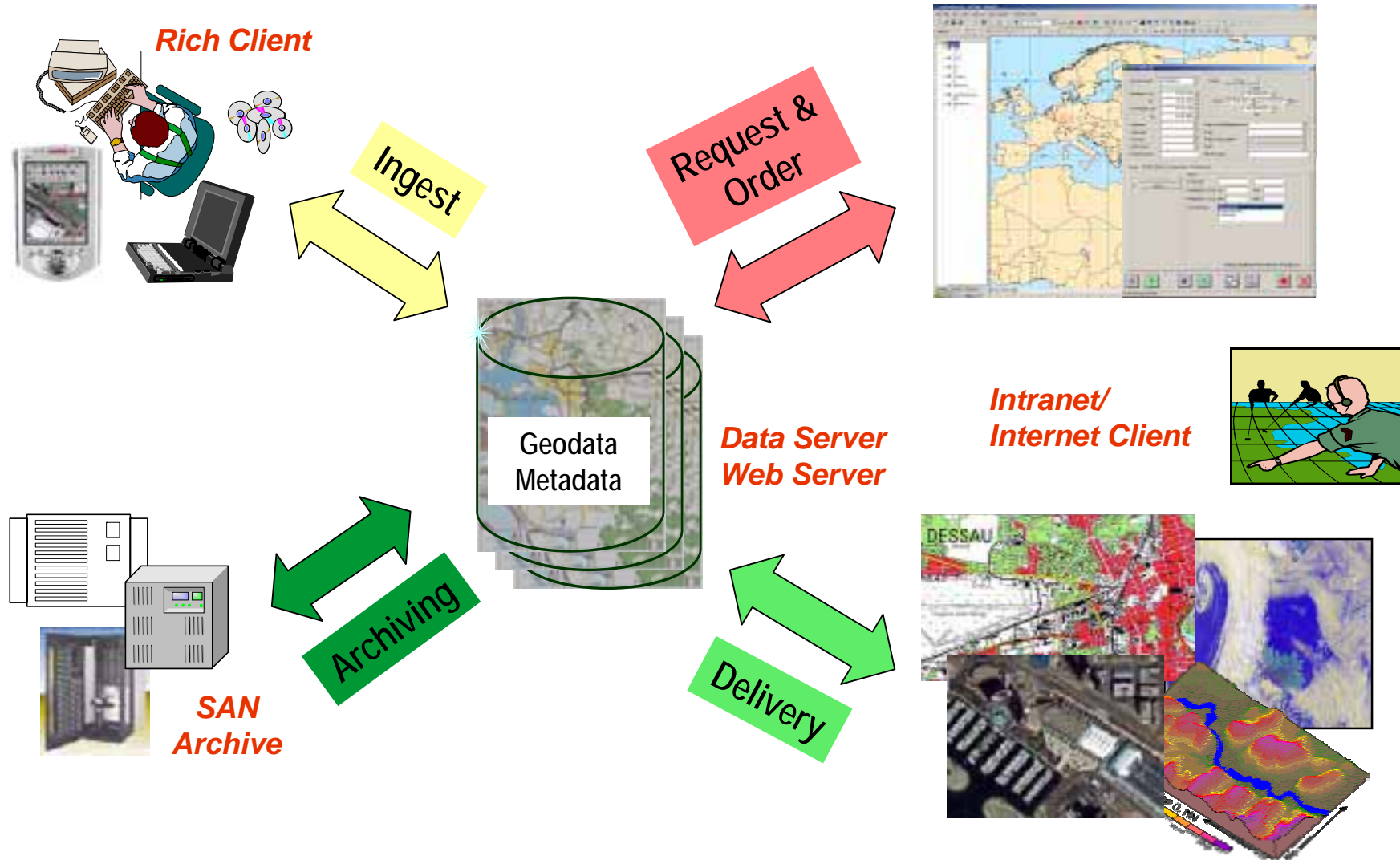


GeoBroker® Geospatial Data Management System

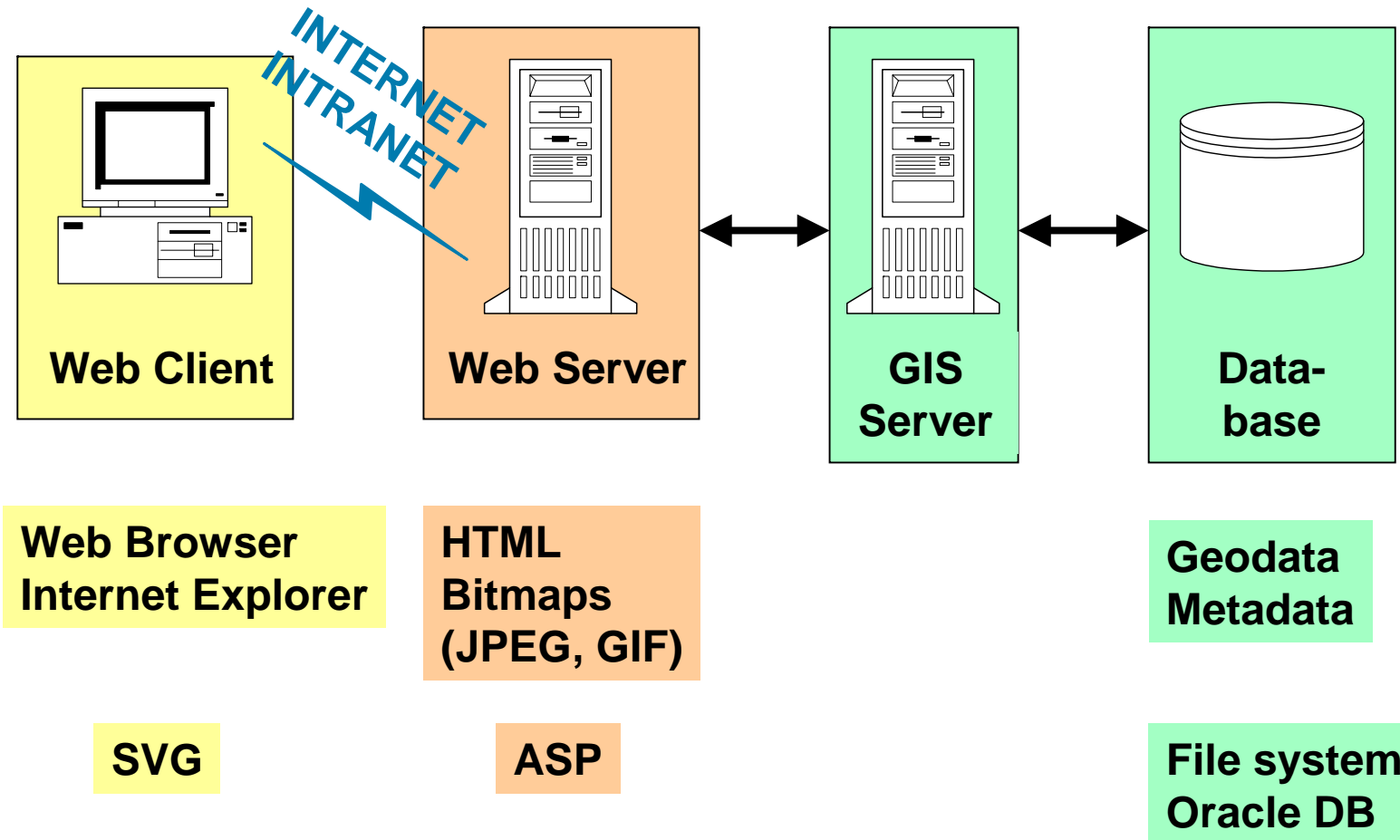
- ▶ A high-performance solution for the archiving, management, retrieval, display, and dissemination of all kinds of geospatial data
- ▶ Delivery of geospatial information on time
- ▶ Graphical, web-enabled information system allows specific searches for distributed geospatial data available worldwide
- ▶ Can be customised and tailored to user requirements and available hardware and software equipment
- ▶ Used by civil and military authorities and intelligence agencies
- ▶ Oriented to user requirements

GeoBroker® is the central archiving and information system (“ZARA”) for geospatial data at the Bundeswehr Geoinformation Office

Data Management Principle



System architecture



Open, scalable, component-based system architecture

Rich Client

Data Ingest, Request and Delivery



The screenshot shows the ArcGIS interface with a map of Europe. A dialog box titled 'ZARA Abfrage' is open, displaying various query parameters. Callouts are placed over the interface:

- Footprints**: Points to a red rectangular area on the map of Europe.
- Basemap**: Points to the background map layer.
- Integrated into ArcGIS**: Points to the top toolbar of the application.
- Query definition**: Points to the 'Spezialmodus' section of the dialog box, which includes a list with 'Mehrfachteil', 'Parzelleninhalt', and 'Unbau.gml'.

Viewer

Data Request and Delivery



The screenshot displays a GIS viewer interface. The main window shows a map of Europe with a grid overlay. A table of data is visible in the lower-left corner, and a legend is in the lower-right corner.

ID	TIME	UTM_ZONE	UTM_ZONE	UTM_ZONE	UTM_ZONE	UTM_ZONE	UTM_ZONE	UTM_ZONE
01	0:00	0:00	0:00	0:00	0:00	0:00	0:00	0:00
02	0:00	0:00	0:00	0:00	0:00	0:00	0:00	0:00
03	0:00	0:00	0:00	0:00	0:00	0:00	0:00	0:00
04	0:00	0:00	0:00	0:00	0:00	0:00	0:00	0:00
05	0:00	0:00	0:00	0:00	0:00	0:00	0:00	0:00
06	0:00	0:00	0:00	0:00	0:00	0:00	0:00	0:00
07	0:00	0:00	0:00	0:00	0:00	0:00	0:00	0:00
08	0:00	0:00	0:00	0:00	0:00	0:00	0:00	0:00
09	0:00	0:00	0:00	0:00	0:00	0:00	0:00	0:00
10	0:00	0:00	0:00	0:00	0:00	0:00	0:00	0:00
11	0:00	0:00	0:00	0:00	0:00	0:00	0:00	0:00
12	0:00	0:00	0:00	0:00	0:00	0:00	0:00	0:00
13	0:00	0:00	0:00	0:00	0:00	0:00	0:00	0:00
14	0:00	0:00	0:00	0:00	0:00	0:00	0:00	0:00

Use of MapObjects

Basemap with footprints

Query result list

Web Client

Data Request



WEB-ZARA - Management system for geospatial information

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[Technical demands](#)
[Help](#)
[GeoRouter Map \(RVO\)](#)
[Visitors on this website](#)

WEB-ZARA - Management system for geospatial information

Retrieval of geospatial information.
Display of request hits in terms of lists and footprints in a map.
Quicklooks of geospatial information.
Download of geospatial information.
Ordering of geospatial information.

Guest-account: User name = gast, Password = WEB-ZARA

WEB-ZARA - Microsoft Internet Explorer

WEB-ZARA Request [Map Window](#) [Contact](#) [Modify password](#) [Help](#) [Close](#)

Geoinformationsdienst der Bundeswehr

Area of Interest

Latitude North:
Longitude West:
Longitude East:
Latitude South:

Source date from:
unit:
Confidential level:
Archive status:

Region cross national:
State:
Region intrastate:
City:

DHM DOM DTED GTopo SRTM X-Band

[Select all datatypes](#)
[Reset all datatypes](#)

[Maps](#) [MGeo-PCMAP](#) [Remote sensing](#) [Raster data](#) [Vector data](#) [Elevation data](#) [Points](#) [Others](#) [Weather](#)

[Start request](#) [Reset settings](#)

Lokales Intranet

Web Client

Data Retrieval



The screenshot displays the WEB-ZARA Map web client interface. The main map shows a topographic view of a region with a red grid overlay. A yellow callout bubble labeled "Footprints of query results" points to this grid. Another yellow callout bubble labeled "SVG graphics" points to the map area. A third yellow callout bubble labeled "Thumbnail" points to a smaller map view in the bottom right corner. On the right side, a window titled "Download more data of request list" is open, showing a table of data and a "Download" button. A yellow callout bubble labeled "Data download" points to this button. The interface includes a top navigation bar with buttons for "List of request hits", "Request window", "Info", and "Close window". A legend on the left lists "Hatched", "Flux", "Staircase", "Kardane", and "Sea". The status bar at the bottom indicates "Basemap of scalegroup 2 is loaded from server" and "Projection: Plate carree with globe radius 6,378,127 m".

Data type	Series	Editor	Horiz. datum	Vert. datum	Source date	Archive format	Archive status	ID
DTED	DTED1	36	World Geodetic System 1984	36	01/02/2000	DTED1	online	604193

WMS Client



WEB-ZARA Map List of request hits Request window info Close window

Map display Options

- Show Legend
- Lodge Relief
- Grid
- Footprints visible

OGC Web Map Services:

- height data - SRTM
- Aerial view - CIB
- Flight map - TPC 1 : 500000
- Flight map - ONC 1 : 1000000

Status: Mouse down and drag rectangle for new map extent. Click in main map to end function.

Legende

- Hauptstadt
- Stadt
- Straße
- Bahnstrecke
- Fluss
- Staatsgrenze
- Küstengrenze
- See

1,826,018 m (am Äquator)

Info: Basemap of scalegroup 5 is loaded from server1 Projection: Plate carree with globe radius 6,378,127 m

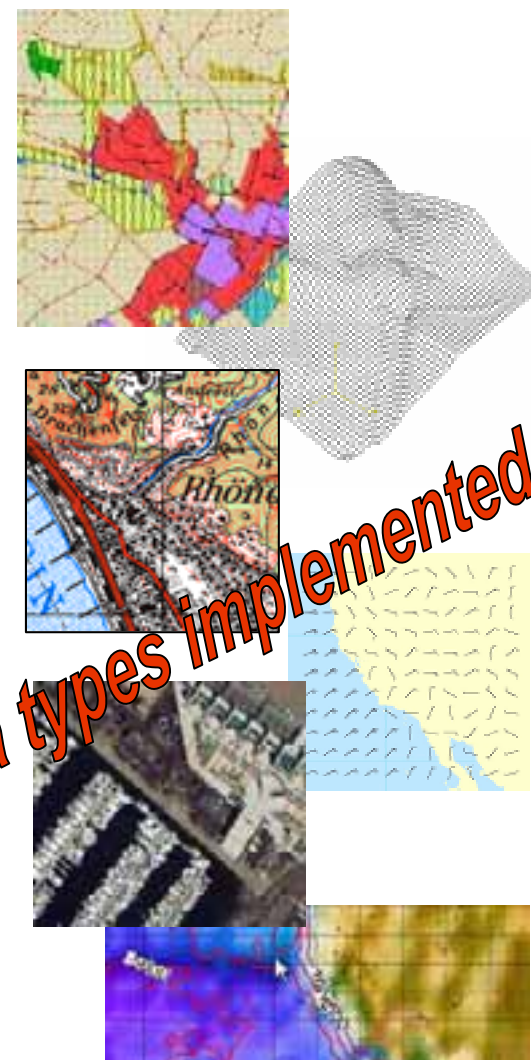
Layer display

Layer selection

Data formats



- ▶ Aerial imagery: TIFF, GeoTIFF
- ▶ Satellite imagery: Ikonos, QuickBird, EROS, SPOT, IRS, Landsat, Radarsat, ERS, JERS
- ▶ Raster data: ADRG, CADRG, ASRP, CRP, CIB, USRP, RLE, MRG, KMRG, GeoTIFF
- ▶ Vector data: VPF (VMap, FFD, DNC), S57, DFAD, DLM, DGN, SHP
- ▶ Elevation data: DTED, GTopo, DHM, DSM, SRTM
- ▶ Simulation data: OpenFlight, SIF, SEDRIS
- ▶ Point data: GEOnet Names Server, TP, NavP, GCP, MP, RP
- ▶ Weather data: METGM
- ▶ Oceanographic data: GeoTIFF
- ▶ Other data: slide, video (MPEG, AVI), dossier, evaluation reports, special maps



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Reference projects (sample)



- ▶ Central archiving and information system of BW Geoinformation Office (“ZARA”)



- ▶ Database generation system airforce



- ▶ Central mission planning for missile TAURUS



- ▶ Database generation system army

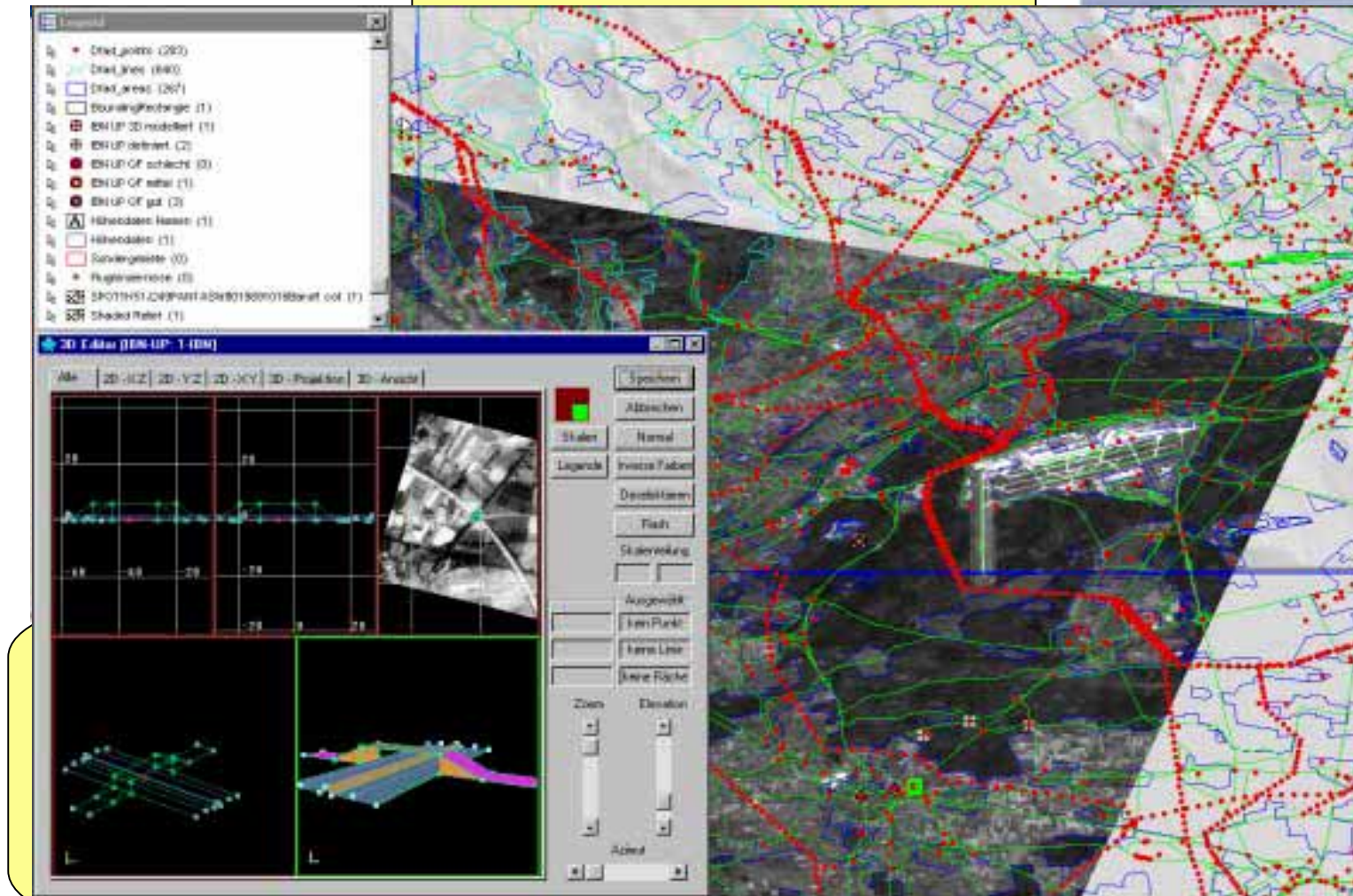


- ▶ Geoinformation Service

Central Mission Planning TAURUS



Autonomous missile



Demonstrator Geoinformation Service

Project Goals



Goals Geoinformation Service

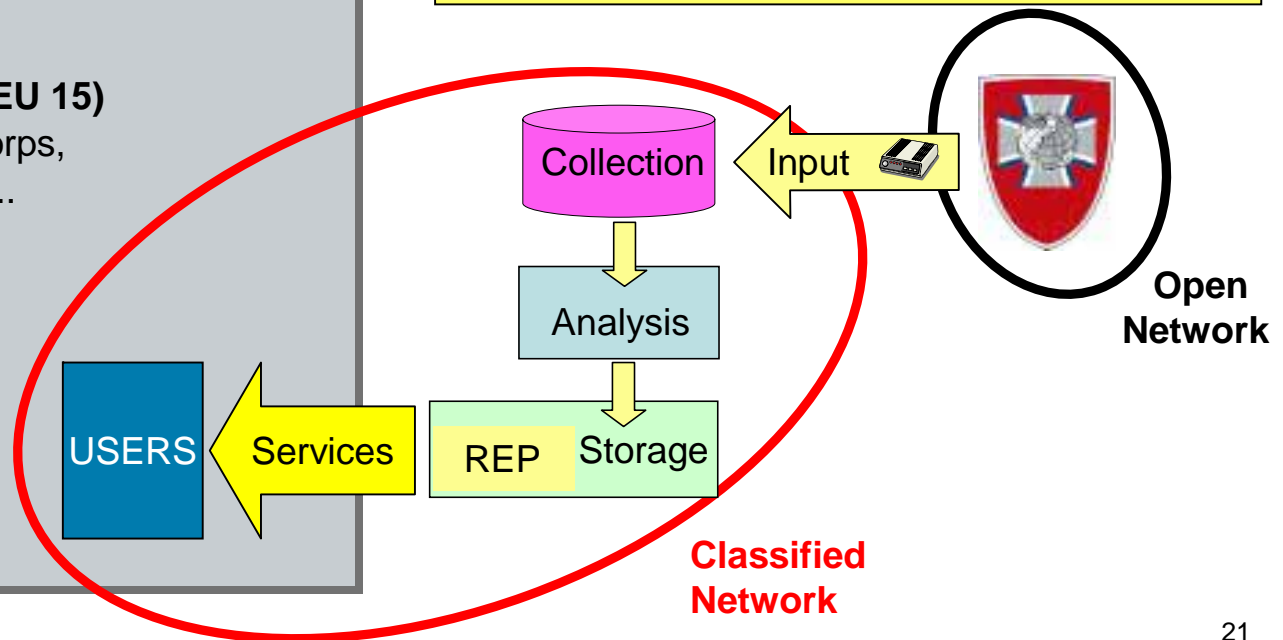
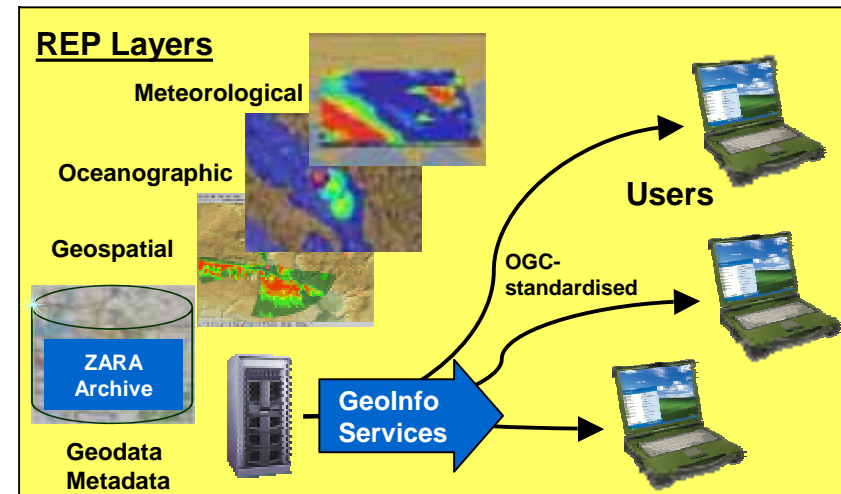
Geoinformation Service of BGIO

- ▶ Online download of geospatial data and METOC data
- ▶ REP generation und publication
- ▶ Interoperable interface to C4I systems using standardised web services (OGC WMS/WFS)

CWID 2006 Participation (DEU 15)

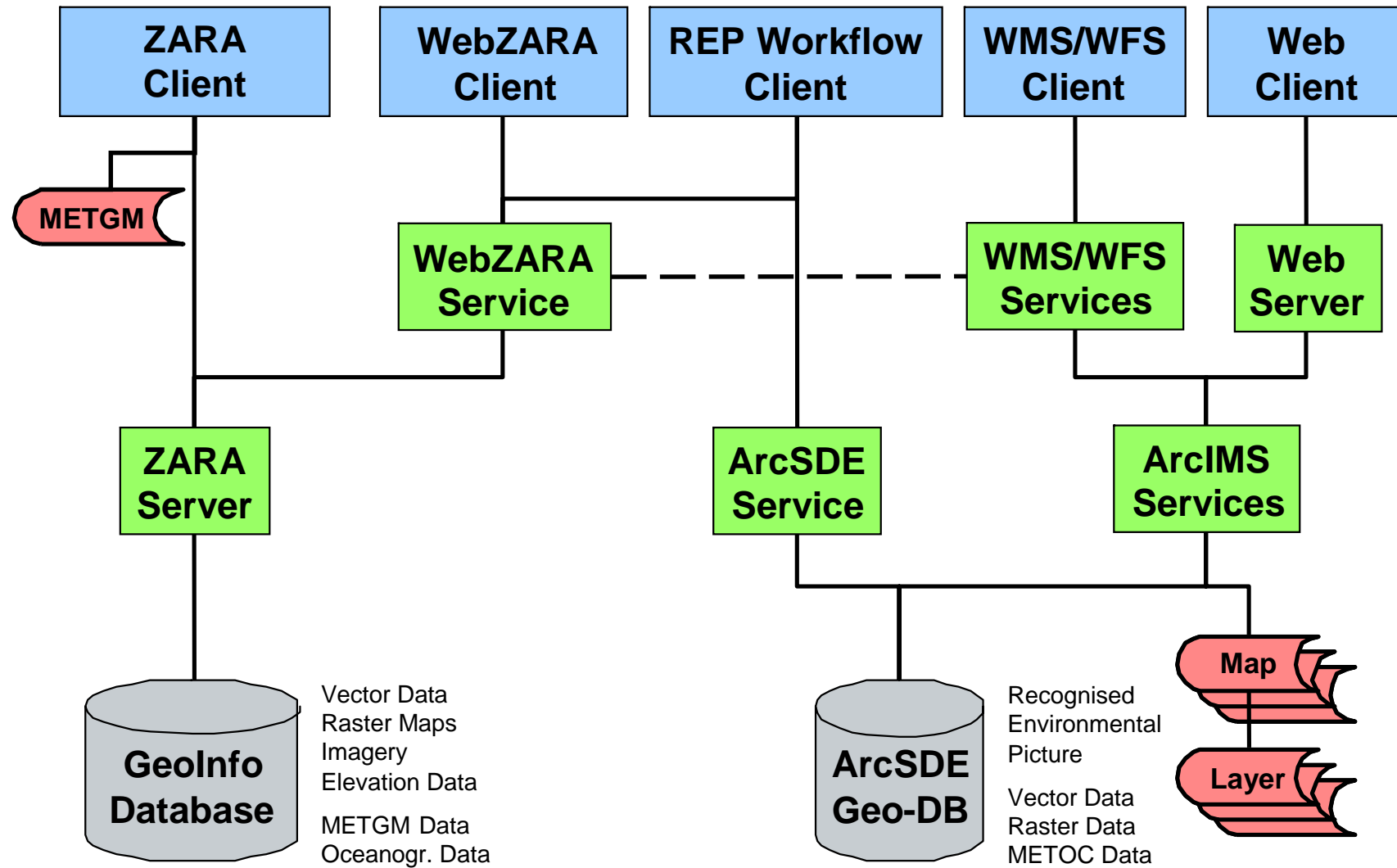
- ▶ Trial partners: 1. GE/NL Corps, NATO, RDE, SBS, FGAN,...
- ▶ Demonstration

Planning for CWID 2007



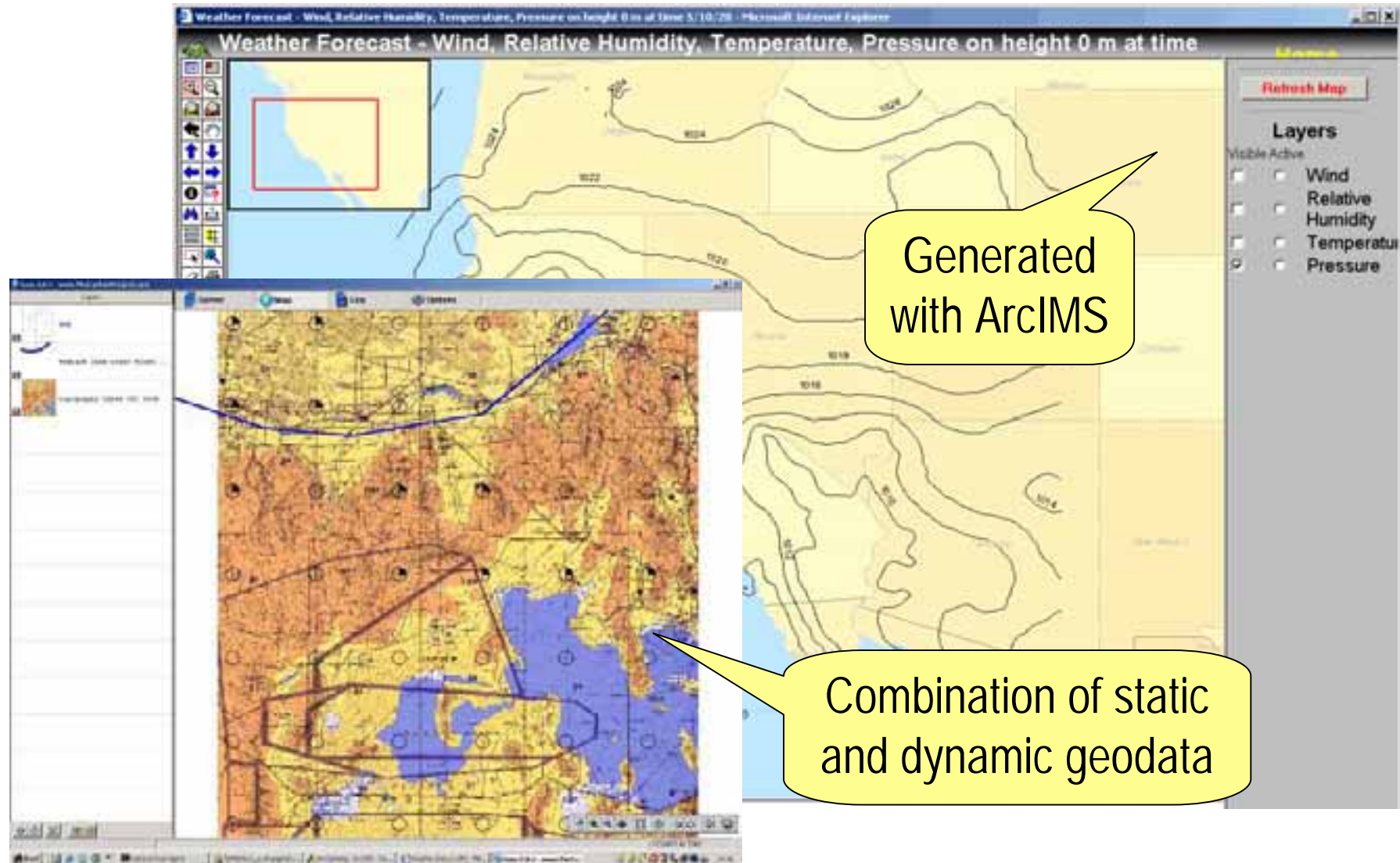
Demonstrator Geoinformation Service

Software architecture



Demonstrator Geoinformation Service

REP (Recognised Environmental Picture) Display



GEOCREW

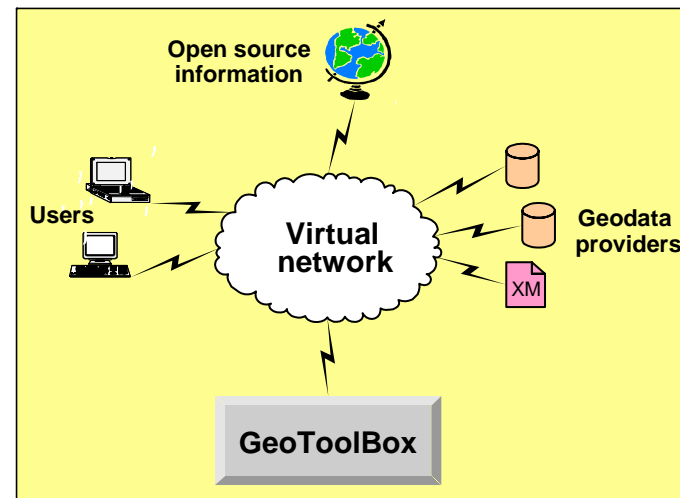
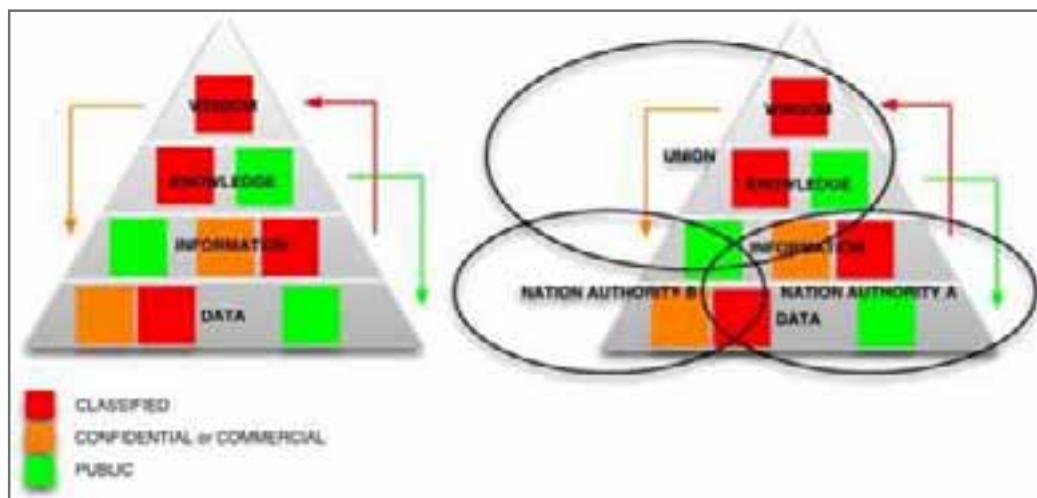
Crisis Early Warning and Situation Awareness



RESEARCH

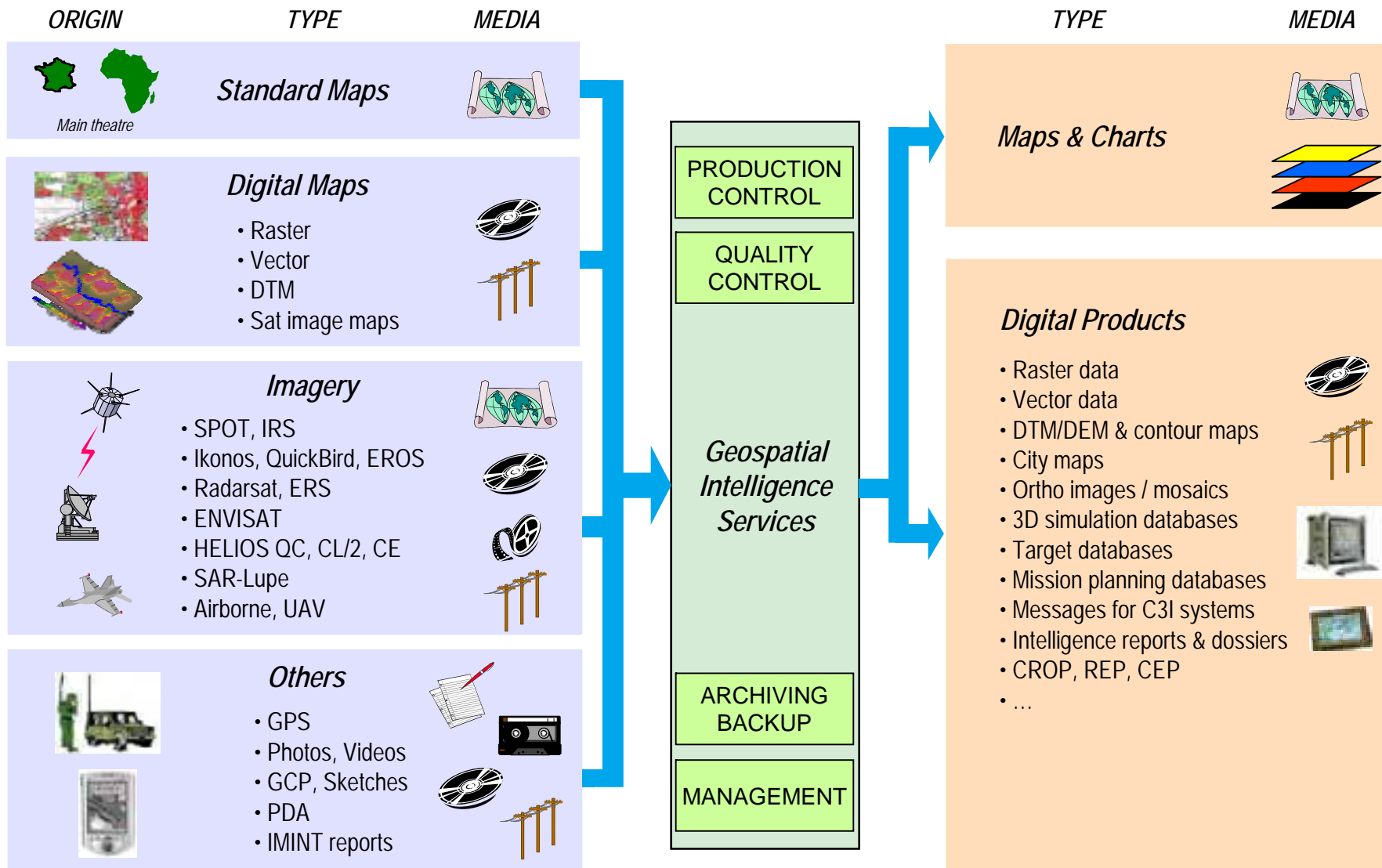
Security Research

- ▶ Concept for a comprehensive architecture for a Europe-wide system for crisis early warning
- ▶ Development of a demonstrator for a “GeoToolBox” based on geospatial data and non-geospatial open source information



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Geospatial Intelligence Services



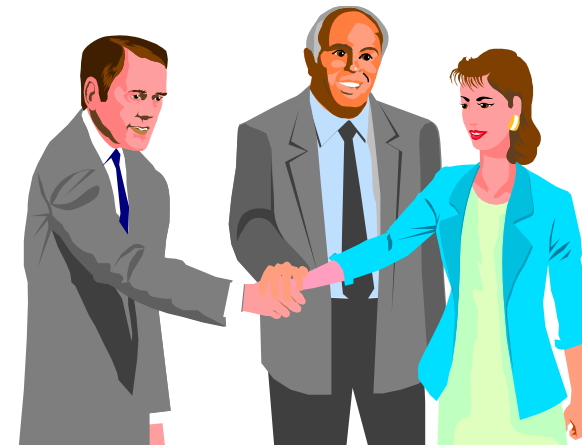
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Acknowledgements



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