Geoinformation Service
for the CWID 2006

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Dr. Timm Ohlhof, ESG

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Abstract

The Bundeswehr Geoinformation Service contributes to the NATO CWID (Coalition Warrior Interoperability Demonstration) conducted during June 2006 in Lillehammer, Norway, with the interoperability trial “Geoinformation Service”, which is also an important step towards a permanent and online provision of geospatial data and services for German and multinational C3I, mission planning and weapon systems.

Aims of the project are the generation of a Recognised Environmental Picture (REP) and the information transfer to selected users within the operational context of the CWID scenario. These tasks are carried out in three steps. In the first step all relevant geospatial, meteorological and oceanographic data are transferred from an open to a classified network. After that, the data are collected, analysed and stored. Finally, the REP is created and published as a web service based on OGC’s WMS and WFS. For the project ESRI’s enterprise solution is used based on Oracle Spatial, ArcSDE and ArcIMS.
Overview

► What is CWID?
► Project goals
► System architecture
► Results
► Lessons learned and outlook
► Practical demonstration
Overview

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CWID
Aims

- On behalf of the Supreme Allied Commander Transformation I would like to welcome you to Coalition Warrior Interoperability Demonstration (CWID) 2006.

- While 26 nations may have different perspectives, they have one goal: to remain an Alliance capable of safeguarding the peace and security of its members.

- The NATO CWID Programme which has evolved into one of the premier events on the Transformation road within the Alliance.

- NATO has adopted the event as a test-bed for interoperability testing to validate and improve the interoperability of NATO, national, and partner C2 systems and to ensure that the interoperability concerns of the operational community are addressed within the scope of the programme, supporting the implementation of NATO Response Forces (NRF).

Source: CWID Homepage

MGen Ruud van Dam
ACOS C4I
Allied Command Transformation
NATO’s strategic vision is articulated in the Bi-Strategic Command paper “The Military Challenge”. This document also lays out a framework for the transformation of the Alliance to ensure that it continues to remain relevant and capable of meeting the future military challenges.

The cornerstone is the NATO Response Force (NRF) which is both an instrument for operations and a catalyst for transformation. By design, these forces will be agile, joint and expeditionary and must be supported by “network-enabled capabilities based on a robust and flexible CIS foundation”.

Source: CWID Homepage
Canada
France
Germany
Italy
The Netherlands
Norway
Poland
Portugal
Romania
Spain
Sweden
Turkey
United Kingdom
United States

NC3A
NACMA
TERMA
Overview

What is CWID?

Project goals

System architecture

Results

Lessons learned and outlook

Practical demonstration
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
Geoinformation Service
Project Realisation

Details:

1. Equipment
   2 Server in Euskirchen, 1 Server in Lillehammer,
   3 Web-Clients in Lillehammer/Euskirchen

2. Personnel
   Euskirchen: 1P ESG responsible for System
   administration and SW-Maintenance,
   2 P AGeoBw for GeoInfo supply
   Lillehammer: 1P ESG for User Support,
   2-3 P AGeoBw for GeoInfo supply

3. Technical Standards
   TCP/IP, HTTP, HTML, SVG, OGC WMS,
   WFS, CS

Goal: Geoinformation Service
All users obtain Geospatial information for use in their systems.
## Geoinformation Service

### Time Schedule

<table>
<thead>
<tr>
<th>2006</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct-Dec</th>
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<td>Project start</td>
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<td>Presentation &amp; acceptance test</td>
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<td>CWID 2006</td>
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<td>Preparation for CWID 2007</td>
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</tbody>
</table>

**Milestone**
Overview

- What is CWID?
- Project goals
- System architecture
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- Practical demonstration
Database
Geospatial and Oceanographic Data

- VMap1 vector data
- CIB imagery
- DTED1 elevation data
- CADRG raster data
- KMRG raster data

- Bathymetry data
- Sea surface temperature
- Sea salinity
Parameter:

- Air temperature
- Wind direction and speed
- Significant weather phenomena
- Cloud coverage
- Precipitation
- Pressure
- Relative humidity
- Sea surface temperature
Software Components

► Server:
  - Internet Information Services (IIS) with Apache Tomcat for web services with integrated J2EE-compliant servlet container
  - ZARA server with mapping and web service for ingest, request and retrieval to the GeoInfo database
  - ArcSDE service with geodatabase including the REP-relevant data
  - ArcIMS services with WMS and WFS connector for web services

► Client:
  - ZARA client and WebZARA client for access to the GeoInfo database
  - REP workflow client for the transfer of geospatial and METOC data from the GeoInfo database to the ArcSDE geodatabase
  - Web client for REP visualisation
  - WMS/WFS client of other systems for REP visualisation
Overview

► What is CWID?

► Project goals

► System architecture

► Results

► Lessons learned and outlook

► Practical demonstration
Weather Briefing
Forecast
## Weather Briefing

### Impact Matrix

<table>
<thead>
<tr>
<th></th>
<th>Ground</th>
<th>Helicopter</th>
<th>Jet</th>
<th>Navy</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><img src="image" alt="Tank" /></td>
<td><img src="image" alt="Helicopter" /></td>
<td><img src="image" alt="Jet" /></td>
<td><img src="image" alt="Navy" /></td>
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<tr>
<td><em>Favorable</em></td>
<td><img src="image" alt="Green" /></td>
<td><img src="image" alt="Green" /></td>
<td><img src="image" alt="Green" /></td>
<td><img src="image" alt="Green" /></td>
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<tr>
<td><em>Marginal</em></td>
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<tr>
<td><em>Unfavorable</em></td>
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<td><img src="image" alt="Red" /></td>
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</tr>
</tbody>
</table>

- **Ground**
  - ![Tank](image)
- **Helicopter**
  - ![Helicopter](image)
- **Jet**
  - ![Jet](image)
- **Navy**
  - ![Navy](image)
  - Water: ~ 15°C
  - Waves: 1-2 m
  - Wind: N 15kts

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Favorable | Marginal | Unfavorable
<table>
<thead>
<tr>
<th>Match</th>
<th>Venue</th>
<th>Wx</th>
</tr>
</thead>
<tbody>
<tr>
<td>NED – ARG</td>
<td>Frankfurt</td>
<td>Cloudy, 24°C</td>
</tr>
<tr>
<td>CIV – SCG</td>
<td>Munich</td>
<td>Chance of TS, 23°C</td>
</tr>
<tr>
<td>POR – MEX</td>
<td>Gelsenkirchen</td>
<td>Light rain at times, 19°C</td>
</tr>
<tr>
<td>IRN – ANG</td>
<td>Leipzig</td>
<td>Showers of rain, 22°C</td>
</tr>
</tbody>
</table>
It is recommended that C4I systems shall support standardised WMS/WFS services for online access to up-to-date geospatial information.
WebZARA Client
Data Request
WebZARA Client
Data Retrieval
WebZARA Client
WMS Display
REP Client
Geospatial and Oceanographic Data Display
REP Client
Meteorological Data Display
WMS/WFS Client
Example: GAIA (The Carbon Project)

REP Client
Gas Cloud Propagation
Integration into CROP
CLiCC

Source: FGAN
Overview

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Lessons learned

- CWID is an important international test bed and shows the latest developments in C4I systems
- Geoinformation Service was highly accepted by the CWID community, more than 80 website visitors during 3 weeks
- Automatic data transfer from “black“ to „red“ network run stable
- Daily weather briefings for the mission scenario were appreciated
- Applied technology (ESG’s GeoBroker/ZARA and ESRI’s ArcGIS) was adequate and powerful
- Full interoperability was proven in several test cases based on OGC‘s WMS/WFS
- REP concept was verified, where the REP provides geospatial basis information for the CROP
Outlook: GeoInfo Online-Provision
System Architecture

Client

Server

Web Browser

GeoInfo Web-Portal for GeoInfo Data and GeoInfo Services

Visualis. Service Routing Service
...  
Metadata Management (Catalog Service)  
Web Services WebMap Services (WMS, WFS,...)

GeoInfo Database Bw (Data, Metadata)

METOC Data  Geogr. Data  Imagery  Vector Data  Raster Maps
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