Using OGC standards to improve the common operational picture
Abstract

A "Common Operational Picture", or a COP, is a single identical display of relevant operational information shared by many users. The term is used mostly within the military and it emphasizes the importance of having a shared and updated view of the landscape, critical infrastructure and the position and status of units. A COP facilitates collaborative planning and decision making. OGC standards are more and more used by Carmenta's customers when establishing the geospatial part of a COP and the standards makes it possible to create and distribute it between applications and over system boundaries. The speech will go through some examples from different user domains on how OGC standards are used as a basis for creating and sharing the geospatial view in a COP.
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Product Management for the Carmenta Server Platform
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Carmenta’s offer
Adding value through innovative Geospatial Technology
High performance GIS

- Geospatial technology for mission critical applications
- Solutions for enterprise, defence and security
- Full compliance with open standards
- Supports any open map data format
- INSPIRE compliant web services
- High-capacity 24/7 web map sites
- Integration with legacy systems
In Mission Critical Applications Worldwide

- BAE Systems
- LFV
- Cassidian
- Airbus Military
- Saab
- Trafikverket
- Finmeccanica
- Swedish Armed Forces
- Nexter Systems
- FMV
- Ericsson
- Thales
- Sapura
- Clean Harbors
Cutting-Edge Technology

- Innovative GIS development
- Own core technology
- Designed for performance
- Robust components
- Scalable solutions
- Integration with legacy systems

...to facilitate new applications and enhance usability
Geospatial Openness

- Based on open standards
  - Open Geospatial Consortium, ISO 19100 …
- Designed for interoperability
  - DGIWG, 2525B, APP-6
- Flexible integration
- Support of any map format

… to simplify integration and evolution
Carmenta OGC TC Membership

- 2010 - Upgraded from Associate Member
- Voting rights in Standard Working Groups
- 2 free seats on every TC Conference

Benefits:
- Possibility to influence standards
- Know-how build up
- Early adaption of standards in products
- Professional networking possibilities
Carmenta Server - summary

- Fast and dynamic web maps
- Built for high capacity
- Flexible layer and object handling
- Easy to install and set-up
- Open and standardized
  - Certified OGC interfaces
  - ISO metadata support
  - INSPIRE ready
- One of the most OGC certified products
Carmenta Server – supporting standards

Clients supporting OGC standard interfaces

Cache and Download Layer

Map Server
- Map Portrayal
- Map Configuration (Layers, ...)
- Geoprocessing
- Service Admin & Monitoring

Catalog Server
- Metadata generation
- Metadata harvesting
- Workflow support

Native reading of all GIS Data and Services

Raster files
Vector files
Databases
OGC Web Services
Common Operational Picture (COP)

- A single identical display of relevant operational information shared by many users
- It emphasizes the importance of having a shared and updated view of the operational landscape
- If facilitates collaborative planning and decision making
- Contains information about the location of units and ongoing operations, and;

- updated geospatial information is a big part of a COP
Use of information by multiple parties

Problems:

- Timely delivery of relevant information in a useful format
- Awareness, access and transmission of information
- Drill down and elaboration capabilities.
- Control and management of information
- Common protocols and representations for information exchange
- Synchronization and scalability of information services

McMaster et al. (2007) and McMaster and Baber (2008)
The Problem

Current knowledge of the Mission area

GIS Data

Application

COP

Application

COP

Application

COP

Application

COP
The Problem

Current knowledge of the Mission area

GIS Data

Application COP

Shape-files
MIF/TAB-files
DXF/DWG-files
GeoTIFF-files
DEM/DTED-files
Spatial DBs
One solution

Current knowledge of the Mission area

GIS Data

Standard interface

Application COP

Application COP

Application COP

Application COP

Application COP
One solution

Current knowledge of the Mission area

Standard interface

Application

COP

Timely Delivery of information
Awareness of data
Control of information
Common protocols
Synchronization of information

GIS Data

Application

COP

Application

COP

Application

COP

Application

COP

Application

COP

Application
OGC Standards to support a COP

- **Web Map Service (WMS/WMTS (Tiled WMS))**
  - Fully rendered and “ready-to-use” raster maps
  - Layer control to turn on and off information
  - Standardized legends
  - Other features such as SLD, FPS, Filtering etc.

- **Web Feature Service (WFS)**
  - For ”Downloading” feature data (Vectors, TINs etc)
  - Needs rendering and further analysis by the client

- **Web Coverage (Service WCS)**
  - For ”Downloading” coverage data (Rasters, Grids etc)
  - Needs rendering and further analysis by the client
Use case 1:
"A geodata supply chain for military missions"
A concept for aggregating map data to packages for supporting the geospatial part of the COP in mission Command & Control systems
Customer: The Swedish Armed Forces
"The Case"

Current knowledge of the Mission Area

GIS Data

C2 System

COP

C2 System

COP

C2 System

COP

C2 System

COP

C2 System

COP

C2 System

COP

C2 System

COP

C2 System

COP
Aggregation of map data to packages

**Geodata Package Production**

**GDP Studio**
- **Builder**: to do basic map configuration, quality assurance and metadata declaration
- **Installer**: to build delivery packages
- **Viewer**: to inspect packages
- **Carmenta Studio**: for advanced cartography
- **GDP Studio Express**: to build add-on or update packages in Mission Area

- **Raster Data**
- **Vector Data**
- **Height Data**
- **Mission Data**
- **WEB services**

**Base Packages** (DVD, USB Stick, FTP...)

**Add-on/update Packages** (DVD, USB Stick, FTP...)

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**Images and Logos**
- [Geodata Package Production](image1.png)
- [GDP Studio](image2.png)
- [Builder](image3.png)
- [Installer](image4.png)
- [Viewer](image5.png)
- [Carmenta Studio](image6.png)
- [GDP Studio Express](image7.png)
- [Raster Data](image8.png)
- [Vector Data](image9.png)
- [Height Data](image10.png)
- [Mission Data](image11.png)
- [WEB services](image12.png)

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**Logos**
- [carmenta](logo1.png)
- [geospatial innovations](logo2.png)
Previously

Current knowledge of the Mission area

GIS Data

C2 System

Shape-files
MIF/TAB-files
DXF/DWG-files
GeoTIFF-files
DEM/DTED-files
Spatial DBs
Previously

Current knowledge of the Mission area

GIS Data

C2 System

COP

Shape-files

GeoTIFF-files

DEM/DTED-files

C2 System

COP

C2 System

COP

C2 System

COP

C2 System

COP
Now

Current knowledge of the Mission area

GIS Data

GDP Studio

GDP Studio Express

Web Server

Carmenta Server

Automatic publishing of GDP maps as OGC services

WMS

WFS

WCS

File store

Network PC

C2 System

Map Engine With OGC support

COP
Now

Current knowledge of the Mission area
GIS Data

Disconnected PC

C2 System
Carmenta Engine
COP

Disconnected PC

Local file store
Native Reading

GDP Studio
GDP Studio Express

Now

Disconnected PC
C2 System
Carmenta Engine
COP

Disconnected PC

Local file store
Native Reading

GDP Studio
GDP Studio Express
Now

Disconnected PC

Current knowledge of the Mission area

GIS Data

GDP Studio

GDP Studio Express

Localhosted Server

Carmenta Server

Automatic publishing of GDP maps as OGC services

WMS

WFS

WCS

Local file store

Native Reading

C2 System

Carmenta Engine

COP
Implementing

Current knowledge of the Mission area

GIS Data

GDP Studio

GDP Studio Express

Disconnected PC

Localhosted Server

Carmenta Server

Automatic publishing of GDP maps as OGC services

WMS

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Local file store

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COP

Native Reading

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Automatic
publishing
of GDP
maps
as OGC services

WMS

WFS

WCS

Local file
store

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Automatic
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of GDP
maps
as OGC services

WMS

WFS

WCS

Local file
store

C2 System

Carmenta Engine

COP

Native Reading
Implementing

Disconnected PC

Localhosted Server
- Carmenta Server
  - Automatic publishing of GDP maps as OGC services
- WMS
- WFS
- WCS

C2 System
- Map Engine with OGC support
- COP

Current knowledge of the Mission area
- GIS Data
- Local file store

GDP Studio
- GDP Studio Express
Benefits with the GDP approach

- Establishes a common map appearance in many systems
- Use the same packages for both disconnected and connected applications
- Control over GIS data quality and relevance
- Central validation and authorization of GIS Data
- Metadata harmonization and distribution to applications
- Simplifies the addition of new systems (with OGC support)

- Cost-efficient way to establish a mission-specific COP
Use case 2: "Map data management in a Traffic Management Centre"

Establishing a server-based map solution to enable a common overview of assets and traffic situation

Customer: The Swedish Transport Administration
Traffic Management Centre

- Provides Traffic Management on a National level
- 24/7/365
- Gather data from many sources
- Dispatch resources and provide traffic information
- Up-to-date geospatial information is very important
Traffic Management Centre

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Common Operational Picture
"The Case"

Current knowledge of the Mission Area

GIS Data

- Shape-files
- MIF/TAB-files
- DXF/DWG-files
- GeoTIFF-files
- DEM/DTED-files
- Spatial DBs
Now

Current knowledge of the Mission Area

GIS Data

Common background map

Shape-files

MIF/TAB-files

DXF/DWG-files

GeoTIFF-files

NTS (National Traffic Management System)
- Control and monitoring of traffic equipment
- Management and control of the Road Assistance
- Management of technical alarms
Traffic Management Centre
Implementing

Current knowledge of the Mission Area

GIS Data

NTS (National Traffic Management System)
- Control and monitoring of traffic equipment
- Management and control of the Road Assistance
- Management of technical alarms

VMS (Variable Message Signs)
- Control information on large message signs

MTS (Monitoring Traffic Signals)
- Monitoring and control of traffic signals
- Traffic data collection

WMS
- Control information on large message signs

Common background map
- GeoTIFF-files

Carmenta Server

VMS/UMS2 COP

WMS

VMS COP

MTS2 COP

NTS COP

NTS COP
Benefits with the central WMS service

- Simplifies GIS data distribution to many TMC Systems
- Cost-efficient way to add maps to new systems
- Possible to “map enable” bespoke systems
- Provides a rich map background also for special systems
- Coherent map appearance for users of many systems
- Cost-efficient way to establish a TMC COP
Summary

- Web map server technology is well suited to provide the geospatial part of a COP:
  - Facilitates central management of maps
  - Identical map display in all clients (OGC WMS)
  - Changes and updates are propagated simultaneously

- OGC Standards are key to make it work

- The OGC WMS standard is the great GIS COP enabler!