Using **Visual Weather** to redefine the weather forecasting in web-enabled environment

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Outline

1. What is behind?
2. Desktop: already well mature
3. Web-Service oriented achievements
4. Problems faced
5. Preparing Rich client
Context on where we are coming from:

WHAT IS BEHIND VISUAL WEATHER?
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What is Visual Weather/SWIFT?

• Strategic Weather Information Forecasting Tool - UK Met Office project for workstation upgrade

• Meteorological Workstation SW providing:
  - Met. data processing and visualisation
  - Interactive forecasting tools
  - Forecast production and workflow management
  - Batch production
  - Extensibility with Python API
  - Web services (WMS, WCS, WFS, JMBL)

• Everything in one box or Client-Server

• Highly configurable and integration-capable
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Current statistics...

- Written in C++/Python, designed for high portability, now became a development platform on its own!

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“Traditional” environment

DESKTOP: WELL-ESTABLISHED AREA
Desktop: been there for a while...

- Visualisation of standard data formats including GRIB2 (+EPS) and BUFR with customizable styling - via *internal* data-model
- Powerful computation engine: in-build equation editing, pre-processing & field diagnostics
- Outstanding graphical and processing customisation possibilities open to user - thus had to introduce not just presets, but also their inheritance and version management
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Desktop: not just visualisation
Consistent Field Modification

**METMORPH***

* MetMorph is technology developed by UK Met Office and is Crown Copyright
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**MetMorph - Main Features**

**Model merging**
- Various models e.g. global and mesoscale can be merged into desired projection and resolution.

**Dynamical field change**
- (quasigeostrophic potential vorticity change)
  - a change in Potential Vorticity, MSLP, Precipitation, Surface Temperature implies change in almost all parameters.

**Time Linking**
- Any change can be performed to vary.
- Geospatially - shape and change-vector morphing.
- In time - variable of change-strength in time.
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MetMorph - Other Features

- Editing of wind.
- Precipitation enhancing, reduction, wind advection.
- Precipitation orographic modulation.
- Clouds wind advection.
- Merging and wind advection of precipitation from radar.
- Field spatial and time smoothing and interpolation.

Comparing to UKMO Horace 4 MetMorph:

- Facelifted and integrated
- Removed some original limitations
- Access to history of changes
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Met Morph - Dynamical MSLP change
Walked through Area 51 (not just once)

WEB-SERVICE ORIENTED ACHIEVEMENTS
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Why (OGC) Web-Services

Need for SOA approach has been manifested several times in different parts of project.

Standardized protocol is a key for success of system interconnection, therefore OGC family was utilized.

For real world applications, not just “wrapper” but powerful web-service has to be present.

VW now contains native web service with SSL and Auth support, dynamic capabilities, multi-threaded, server-optimized.
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Services Up & Operational

OGC WMS
1.1.0-1.3.0 dynamic support
User configurable dimensions, dynamically populated
Access to all data types and visualisation methods
Supports styles, GetFeatureInfo, GeoTIFF, JPEG2000

OGC WCS
1.1 support
GRIB1 and GRIB2 NWP data including Ensemble Prediction Systems
Exposing also radar and satellite imagery (raster data)
Supports all field pre-processing and diagnostics of server

OGC WFS-T
1.1.0 support
Retrieval of observations
Access to “feature” database - authored forecast objects
Transactions allow storing objects back to server
PROBLEMS FACED

(When trespassing)
OGC WS implementation dilemmas

- The challenge for building web applications is to find the proper border between server and client, and to choose the proper protocol.
- Also there are some technical problems:
  - Rotated WAFC projections
  - Compression vs. transparency
  - Depending dimensions
  - Non-geospatial projections
  - MIME types
  - Date line
  - 2D time
  - Dynamic capabilities vs. GML clients
  - Lack of "good" GeoTIFF
  - Absence of GML schemas
  - Elevation units
We need to progress, so what now?

**Need to go forward**
- End users already require service, and can’t wait.
- Standardization is way behind

**Problems seen and solved**
- Problems were analyzed and interpretations made already

**MetOcean DWG**
- Good step for creating floor for discussion
- But faster progress needed
Web 2.0 is already here:

PREPARING RICH INTERNET CLIENT
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New workflow?

Central servers
- Will still handle all data for traditional workstation
- At will expose same data and functions via Web-services

Chief’s guidance
- Uses advanced intervention tools
- Coordinated guidance, not preparing all forecasts

Front-line weather delivery
- Adding extra value where needed, adding context
- Providing tailored weather information
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Decisions made:

• Adobe Flex as platform, runs in Flash VM in variety of systems
• Let the server do the hard job (client will be simpler)
• Scales with server
• Secure operation with HTTPS and Authentication
• Provide range of specific meteorological tools for exploring and editing (resulted in exploiting W*S protocols to the limits)
So how RIA Client works?
Thank you for your attention!

Questions?

(Hands-on possible this afternoon 17:00 UTC)