An International Workstation Project

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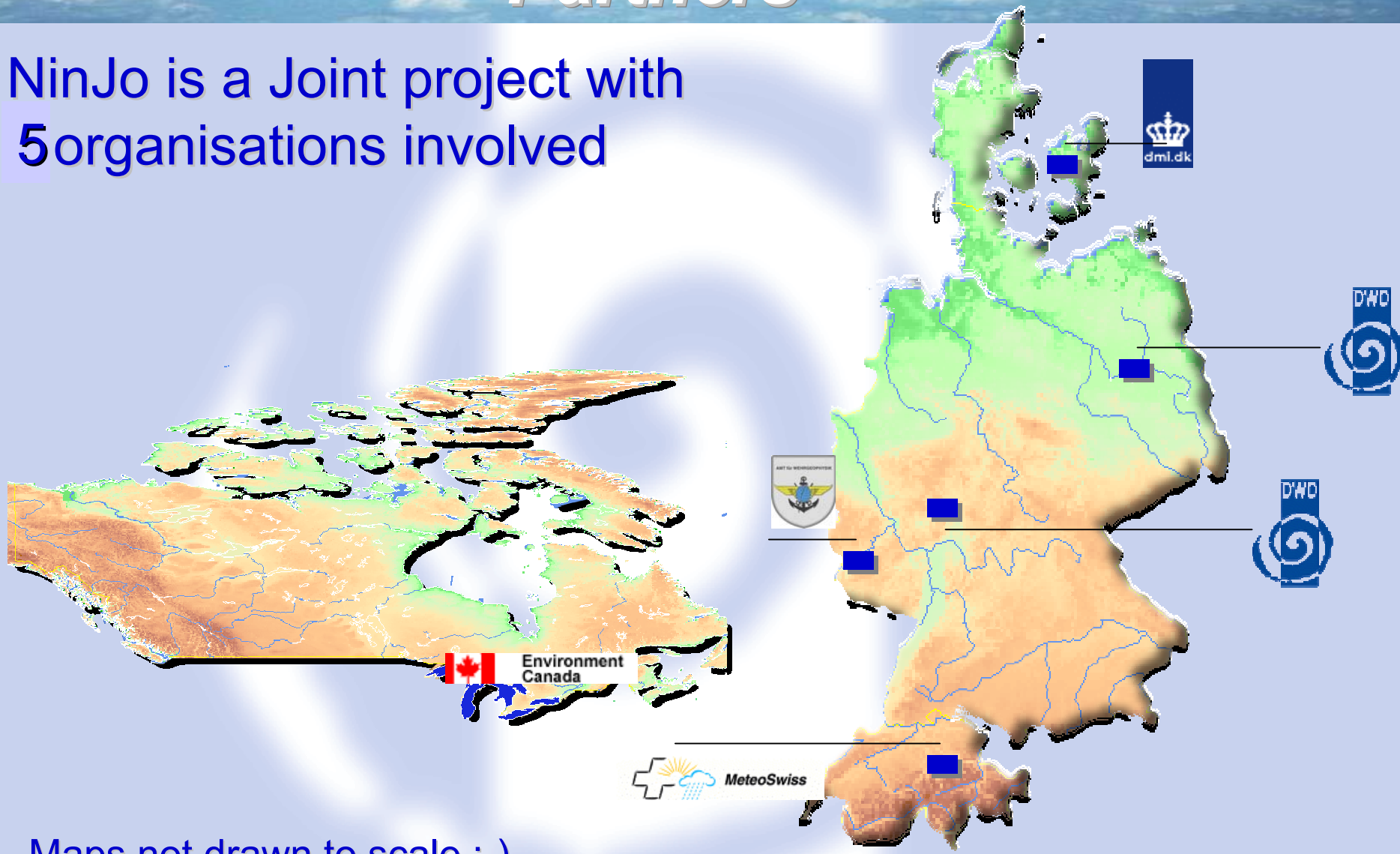
NinJo
Outline

- The Project
  - Partners and Collaboration
  - Meteorological Goals
- Architecture
  - NinJo: A Generic Meteorological Workstation System
  - Overview Client/Server
- Status
  - Components
  - Milestones

NinJo - The Project
Partners

NinJo is a Joint project with
5 organisations involved



Maps not drawn to scale ;-)

NinJo - The Project
Collaboration

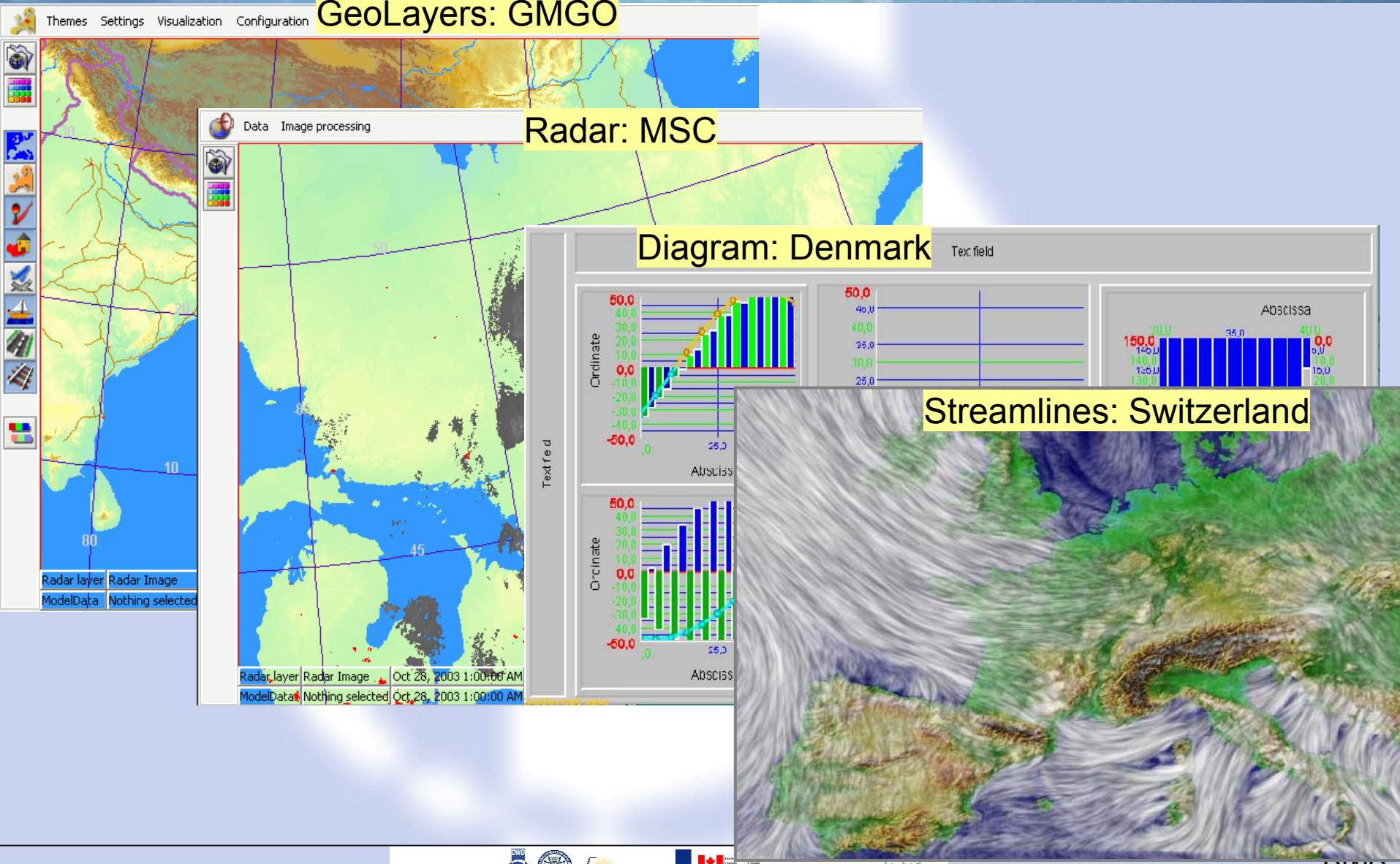
- Distributed Teams
  - 3 locations in Germany
  - 1 location in Switzerland
  - 1 location in Denmark
  - 2 locations in Canada
- Project Bodies
  - Project office in Offenbach
  - Steering Committee
    - Project Managers of all Partners
    - Topics: Planning, Budget, Risk Management
    - Every 2 months
  - Project User Group
    - accompanies the project from the users standpoint
    - appoints members of the evaluation group
    - reports to the steering committee

NinJo - The Project
Collaboration 2

- The Development Team
  - Work packages
    - are handled completely at one location
      - E.g. geography, point data layer, point data server ..
      - Makes sure that no additional overhead is introduced
  - One exception to the rule
    - Architecture team consists of members from all locations
      - Decides technical issues
      - meets every 6-8 weeks
- IDEs and case tools
  - Standardized software products
    - Common configuration management tool
      - common code and document repository in Offenbach
      - product perforce
      - accessible through firewall :-)
    - IDE, Performance analysis tool, UML-modeling tool
    - Bug tracking, requests for enhancements, Bugzilla (hosted in Offenbach)

NinJo - The Project

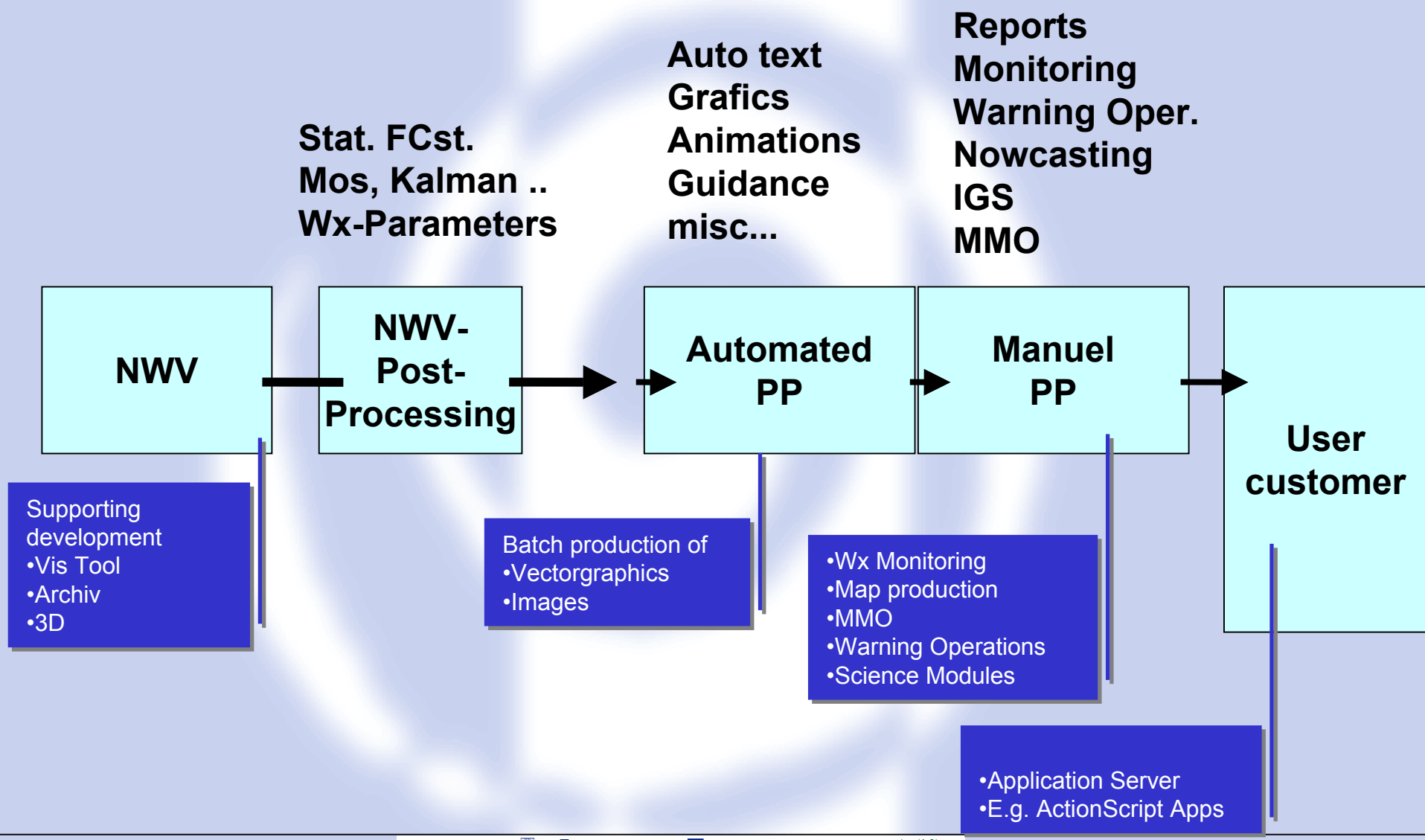
Examples of Work Packages



NinJo - The Project
Meteorological Goals

- Support the whole forecast process
  - Interactive display of all meteorological data
  - Batch production
  - Product generation
  - alerting and monitoring, warning operations
- Support the workflow of other departments as well (Research, reports, training)
- Access to standard infrastructure (archives)
- Replacement of most legacy software

Where to we place NinJo in the forecast process?



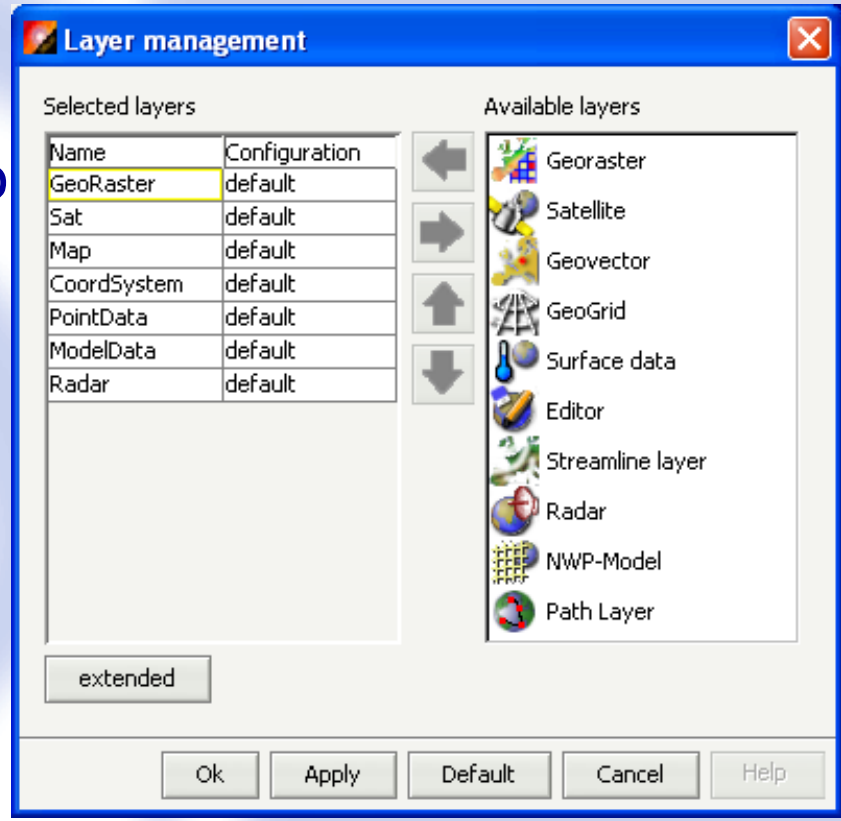
Meteorological Goals

- Technical functionality
  - Geographical display with pan and zoom
  - 2D display of data in different layers
  - Integrated 3D Visualization
  - Animation, automatic update
  - Context menus
  - Multiple scenes/windows

- Meteorological functionality
  - Product editor
  - On Screen Analysis / data modification
  - Modified Model Output
  - Editor to support warning operations
  - Interactive product generation

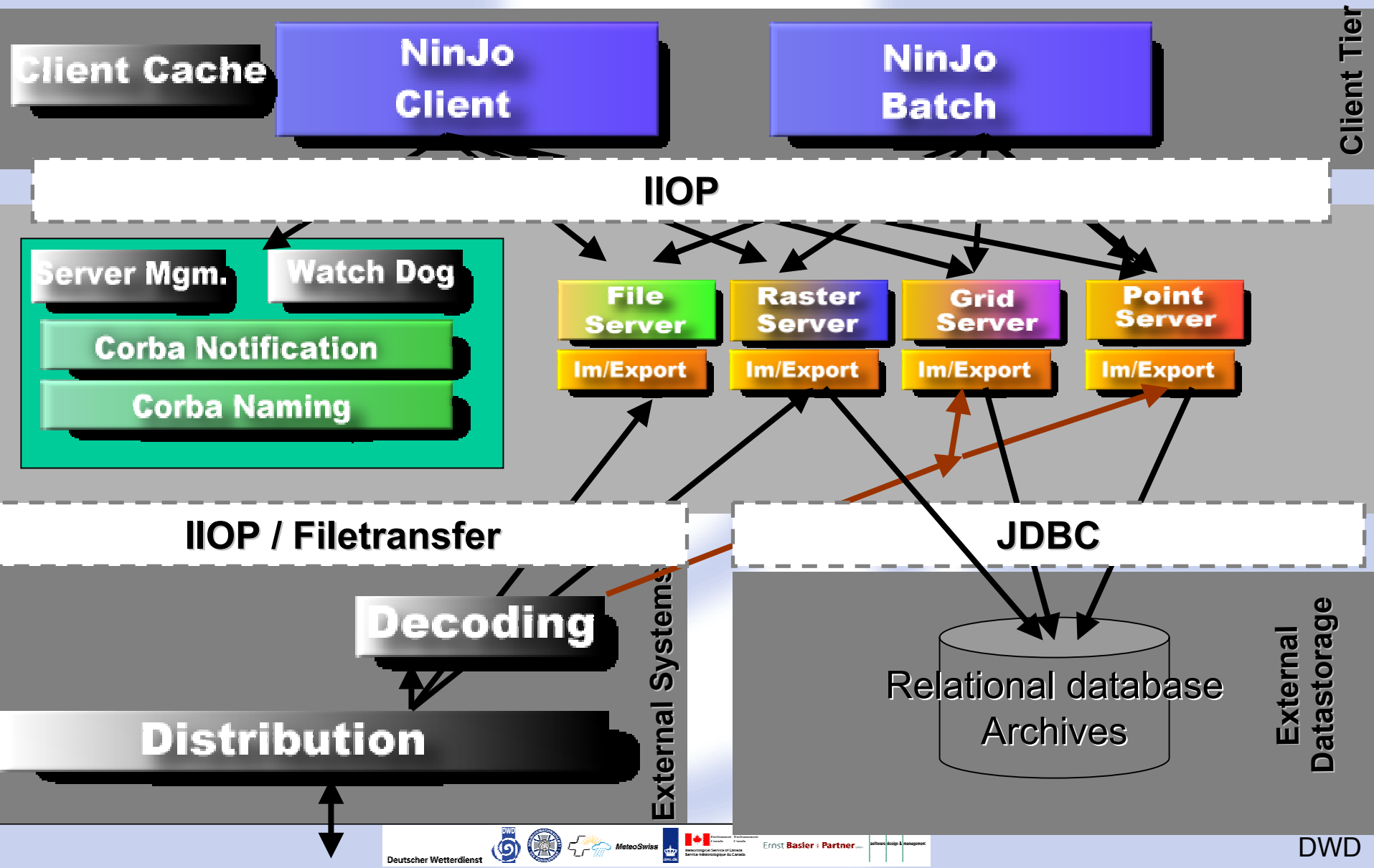
What is NinJo?

- A building kit in order to assemble applications
  - ranging from satellite viewers to full blown workstations
- A flexible programming model
  - to allow partners to develop their own application
- A highly configurable Tool (Partners build their own NinJo)
- A generic Meteorological Workstation



Architecture

The NinJo Tiers



The key components of the NinJo Meteorological Workstation

- Clear, open, and expandable software architecture
- Portability
- The PAC-Framework
- The Client Access Layer
- The Configuration Framework
- Flexible servers

Portability

- Portability
  - Independence from the operating system
  - Independence from the underlying hardware
  - Java as a computing platform fulfills the requirement
  - NinJo is 99% Pure Java!
    - No platform specific code (except HDF5-reader)
    - No JNI calls (except JOGL, one of the available graphic APIs)
- Benefits of Portability
  - Development can be carried out on any operating system
    - DMI: Debian Linux
    - DWD: Windows, SuSe Linux
    - MeteoSwiss: Windows, Sun Solaris
  - Operational implementation on local infrastructure
    - Eg. IBM AIX (DWD, Server Apps)

Building Applications
The Frameworks

- Flexible Application and Programming Model
  - Basis of application development in NinJo is a set of frameworks
    - Configuration framework
    - **Layer Framework (PAC)**
    - Server
    - GOF (Graphics API)
    - NIC (Imaging)
    - Editing
    - **Client Access Layer (generic data access)**
    - Error and logging
    - Diagrams
    - Batch
    - ....
  - And documentation / training material

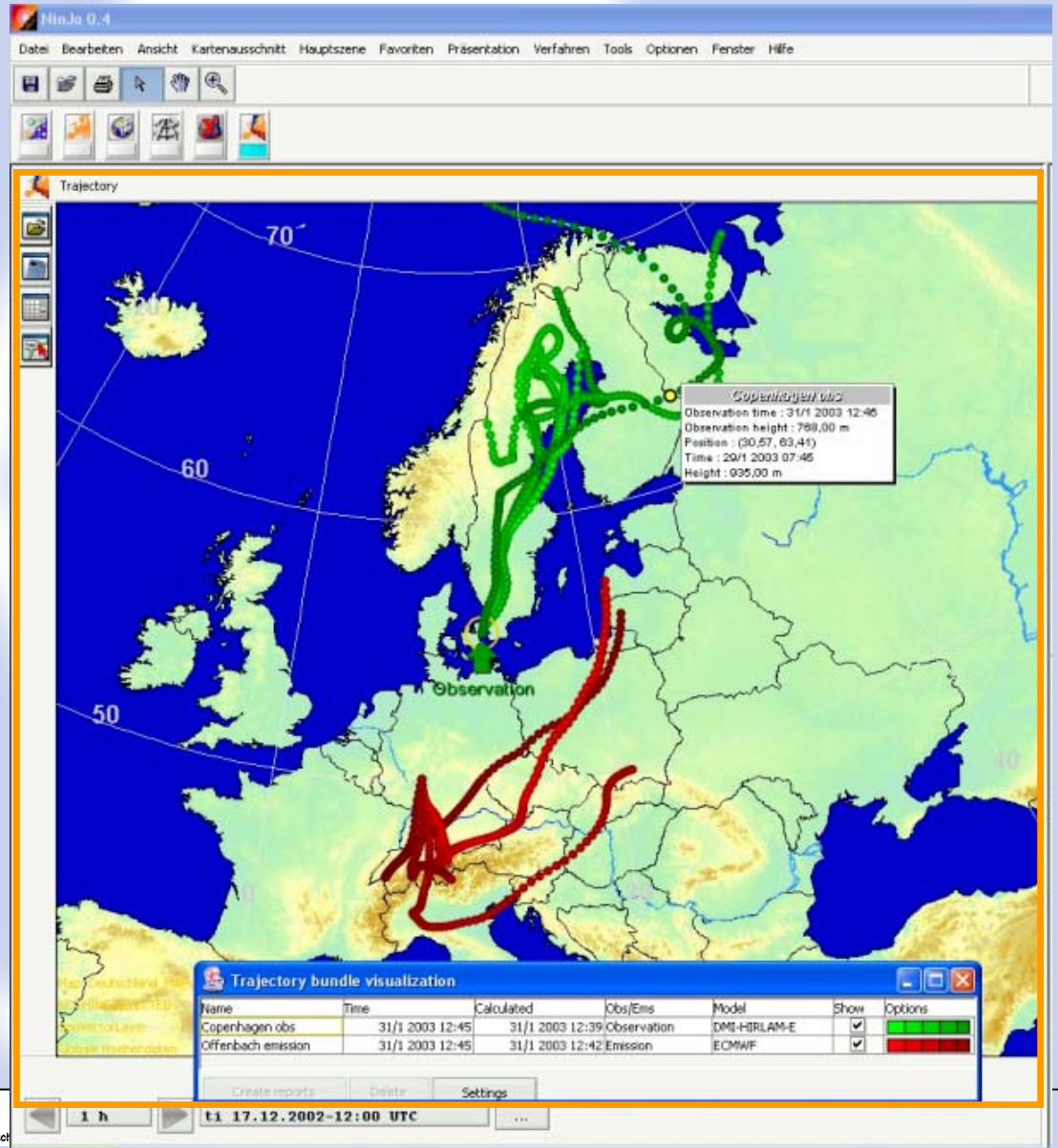
Building Client Applications
The PAC Framework

- Allows the construction of a NinJo Client
  - Enables NinJo to display data in independent, stacked layers
  - Configuration is loaded from XML-Files or can be done during run-time
- Design pattern used is called PAC
  - A hierarchy of MVC-triplets
  - Strict decoupling of layers
  - Every layer holds it's own data
- All layers are integrated by a Layer Container
  - integrates GUI-components provided by the layers
  - responsible for global event handling

Building Client Applications

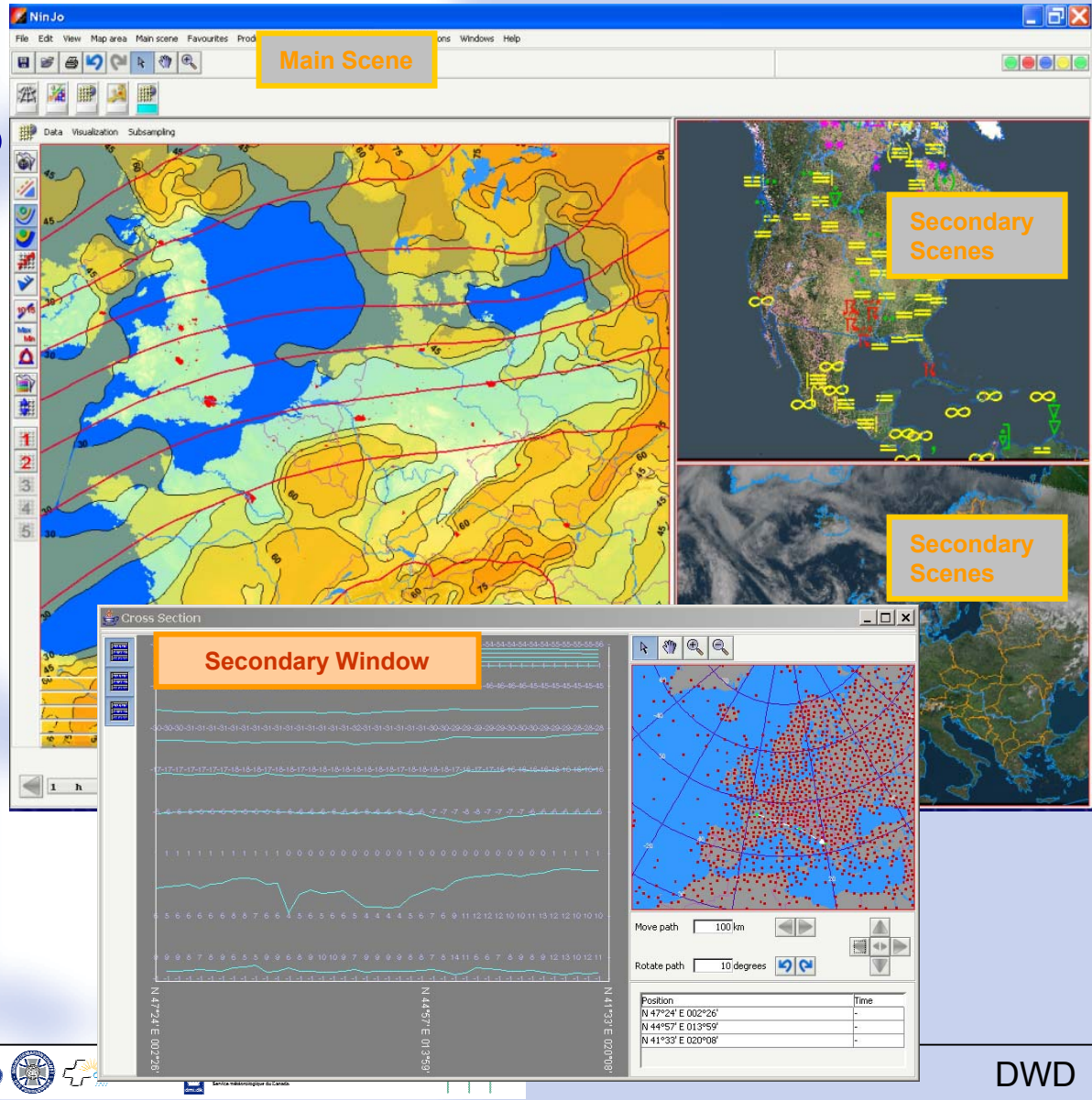
The PAC Framework 2

Layer supplied by project partner



Building Client Applications

- Main Window
  - One main Window with one main scene and up to 3 secondary scenes (layout configurable)
- Several secondary Windows
  - mostly specialized applications
  - e.g. Meteograms, Cross-Sections, Aerological Diagrams, 3D ...
  - Based on a Diagram Framework

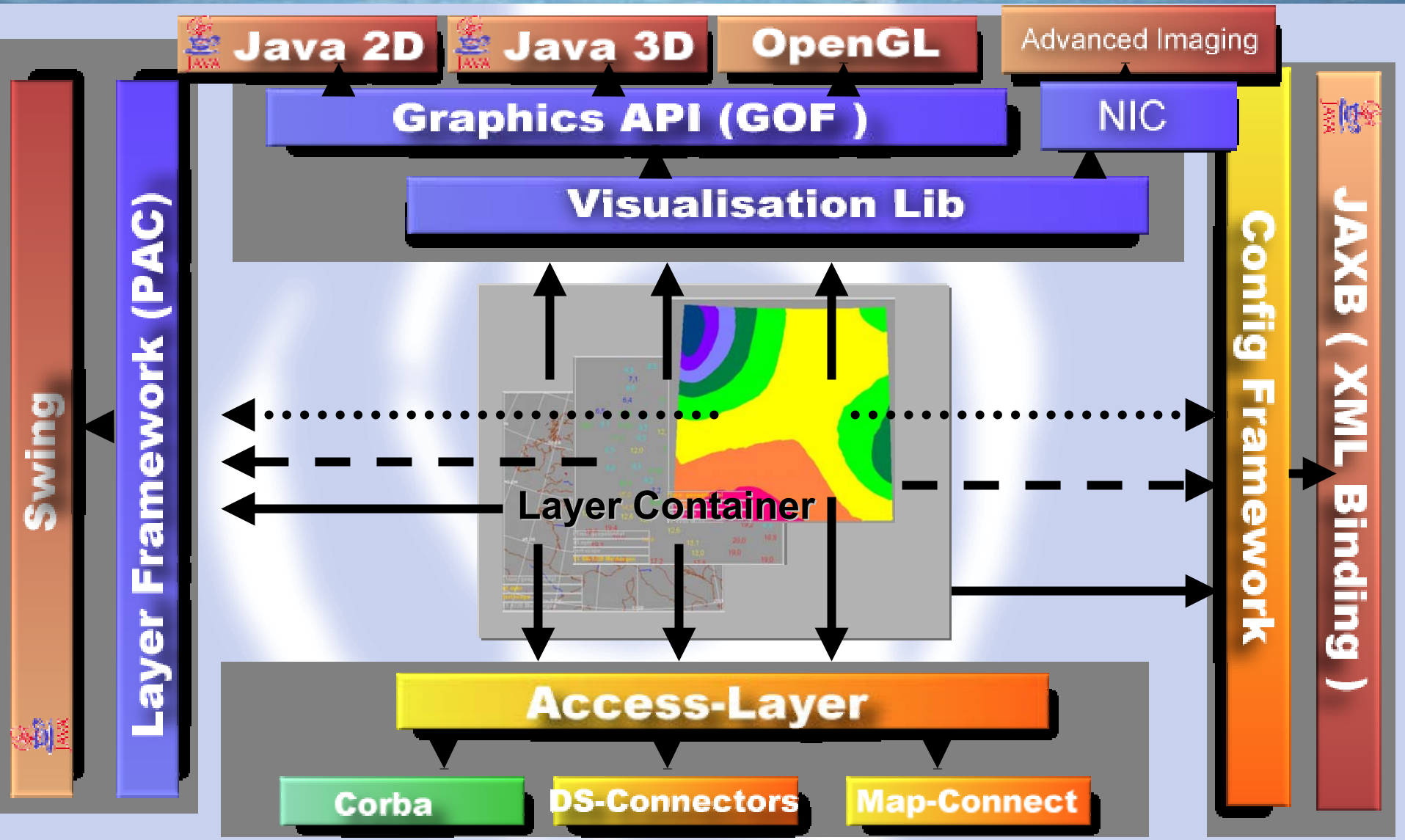


Accessing Data
The Client Access Layer (CAL)

- The CAL is the only entry point to access data
- Generic design to handle
  - arbitrary types of data
  - different data sources
    - like local file systems, NinJo data servers, RDBMS'
  - different middleware infrastructures
    - CORBA, sockets, RMI
  - Cares for the transparency when accessing any of these data sources
- All information is stored in a metadata tree
  - Both data type and data source
  - Adapter classes can be used to retrieve data from legacy data sources
    - NinJo partners can write their own adapter classes to fit NinJo into their environment

The Client Architecture

GUI and Client-Framework



Architecture Summary

- The architecture of NinJo is open and portable
- It can be adopted easily to the needs of organizations involved
  - different hardware and OS-infrastructure
  - different configuration of clients
  - different primary data storage mechanisms: files or database
  - different data supply and backend systems
  - different communication and middleware infrastructures
- It can be easily extended
  - new data types
  - new storage types (data sources)
- Till now our experiences with Java are mostly good

Project Status

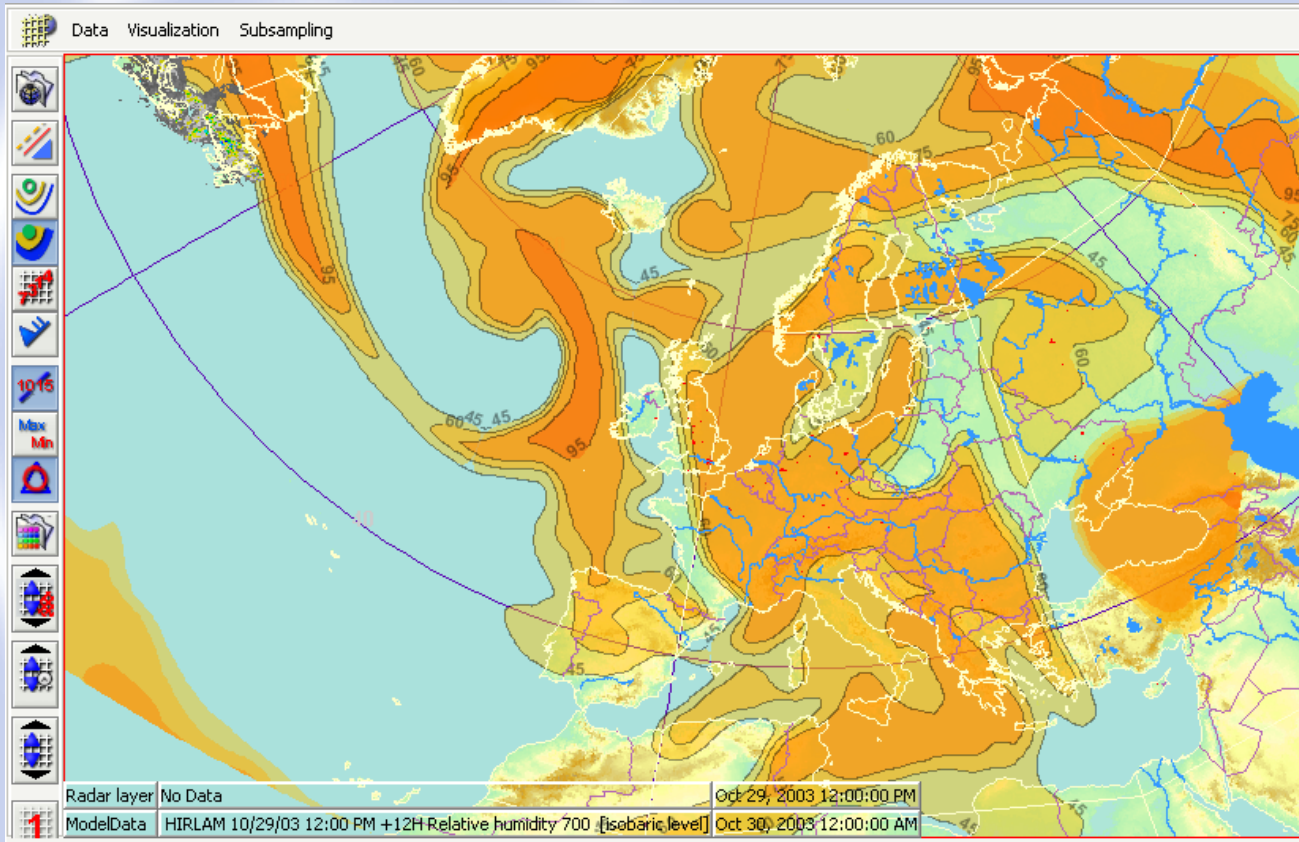
- Essential client framework components nearly finished
  - PAC, Config, GUI, Vis, GOF, Diagrams
  - But, some new functionality and consolidation necessary
- Seven application layers close to final version(Grid, Point Data, GeoVector, GeoRaster, Satellite, Trajectories, Streamlines)
- Minor system framework modules essentially finished
  - error handling, logging, i18n
- some application layers under development
  - Graphical/Product Editor, requirement specs nearly done
  - Radar requirement specs currently rewritten

Project Status
Servers

- Servers
  - Grid server running pre operationally
    - aLMo (MeteoSwiss), LM/GME(DWD), HIRLAM(DMI)
    - MSC models (GEMGLOBAL, GEMLOCAL and ENCEP model) will follow in January
  - Point data server running pre operationaly
    - import through decoding component GLOBUS (pure Java too)
    - currently FM12, FM13 only
    - later this month: METAR, SPECI, FM35, SCIT alike
  - Product data server running pre operationally
    - currently 2 implementations: satellite- and radar imagery
    - more implementations to come (Config)
  - Modification interface to be developed shortly

Project Status
Gridded data

- Handles most partners NWP-models
- Convenience widgets to speed up interaction

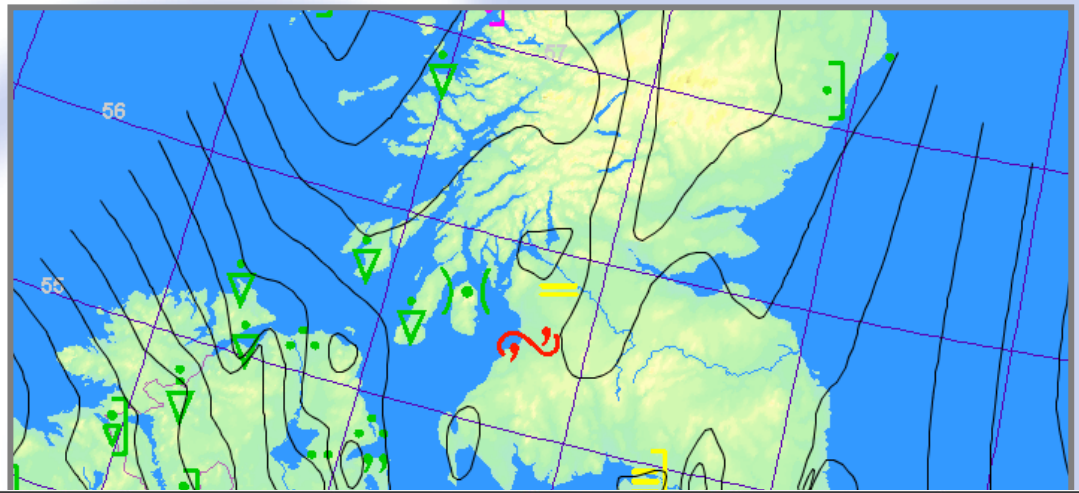


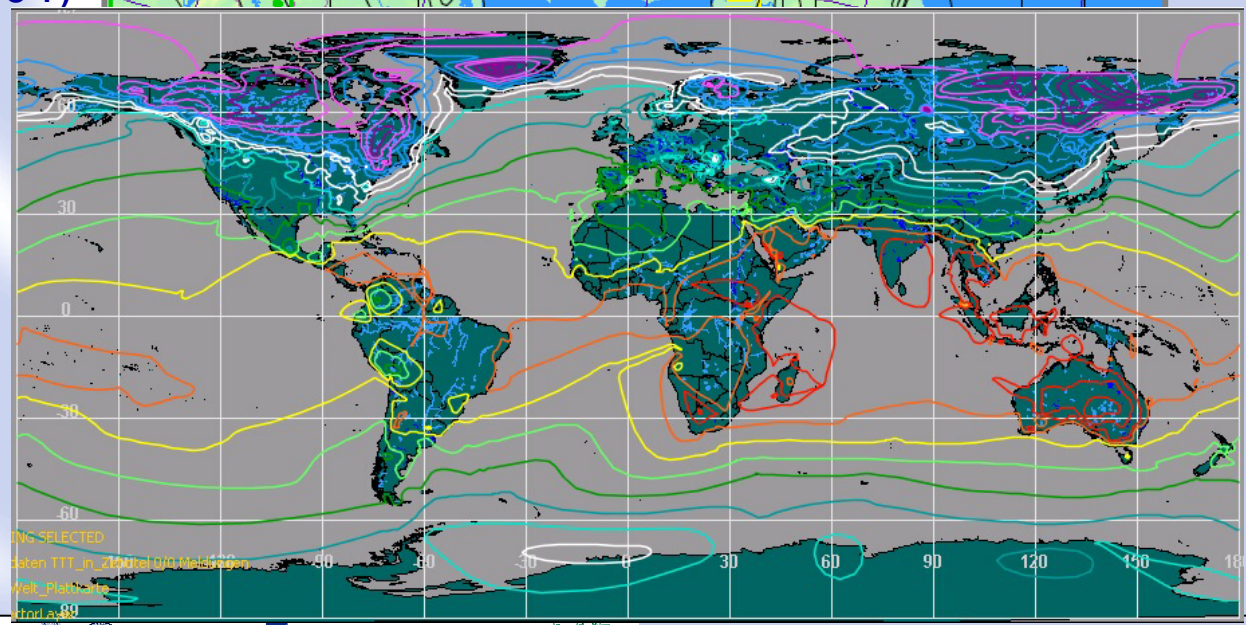
Hirlam model, polar stereographic map

Project Status
Point data

- Base point data layer developed
- Extended by several other layers e.g.:
  - Surface observations
  - Konrad (SCIT)
  - Temp (Sep 2004)
  - Lightning (March 2004)

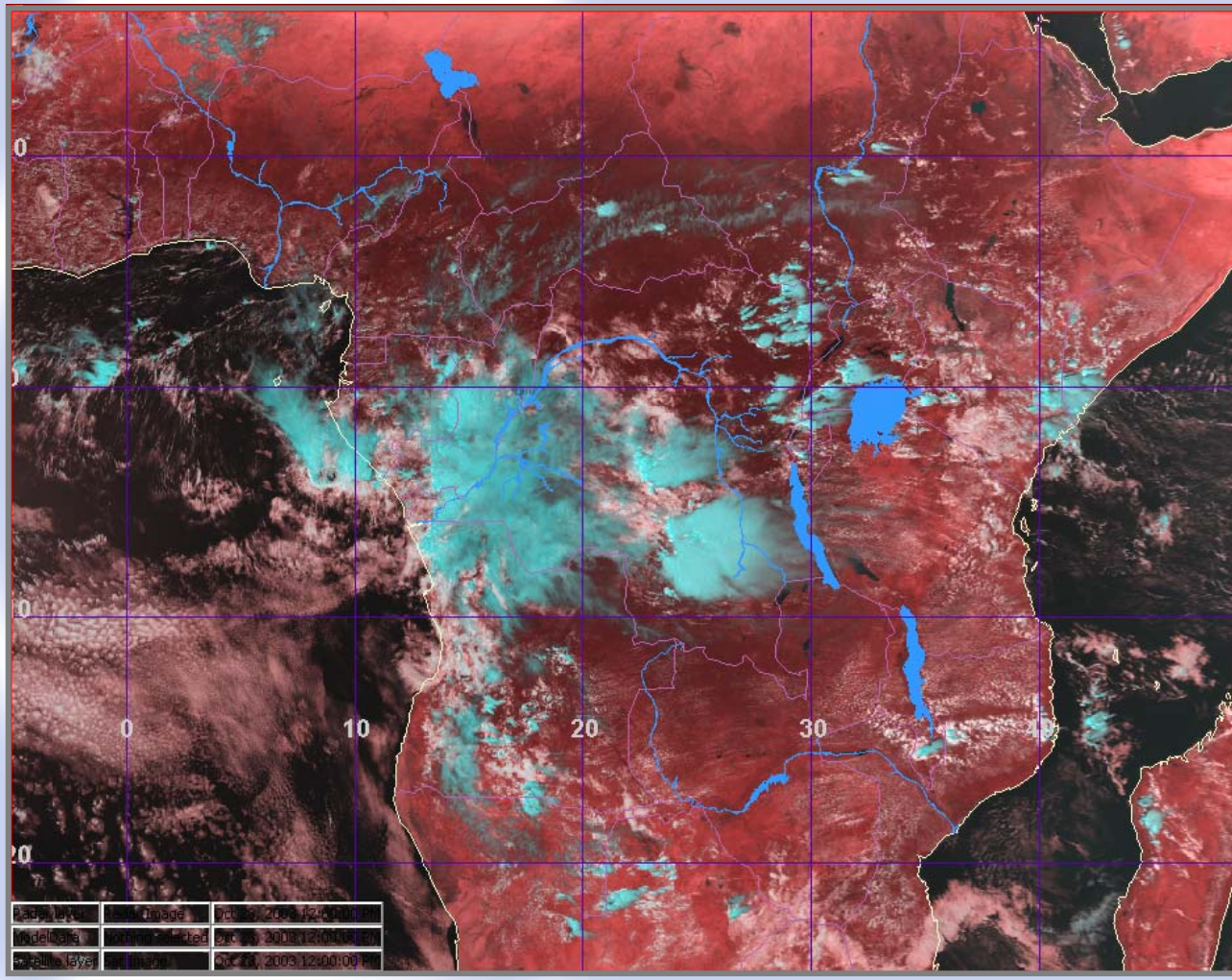
Wx + analysis of sfc pressure based on triangulatio





Project Status
Satellite Processing

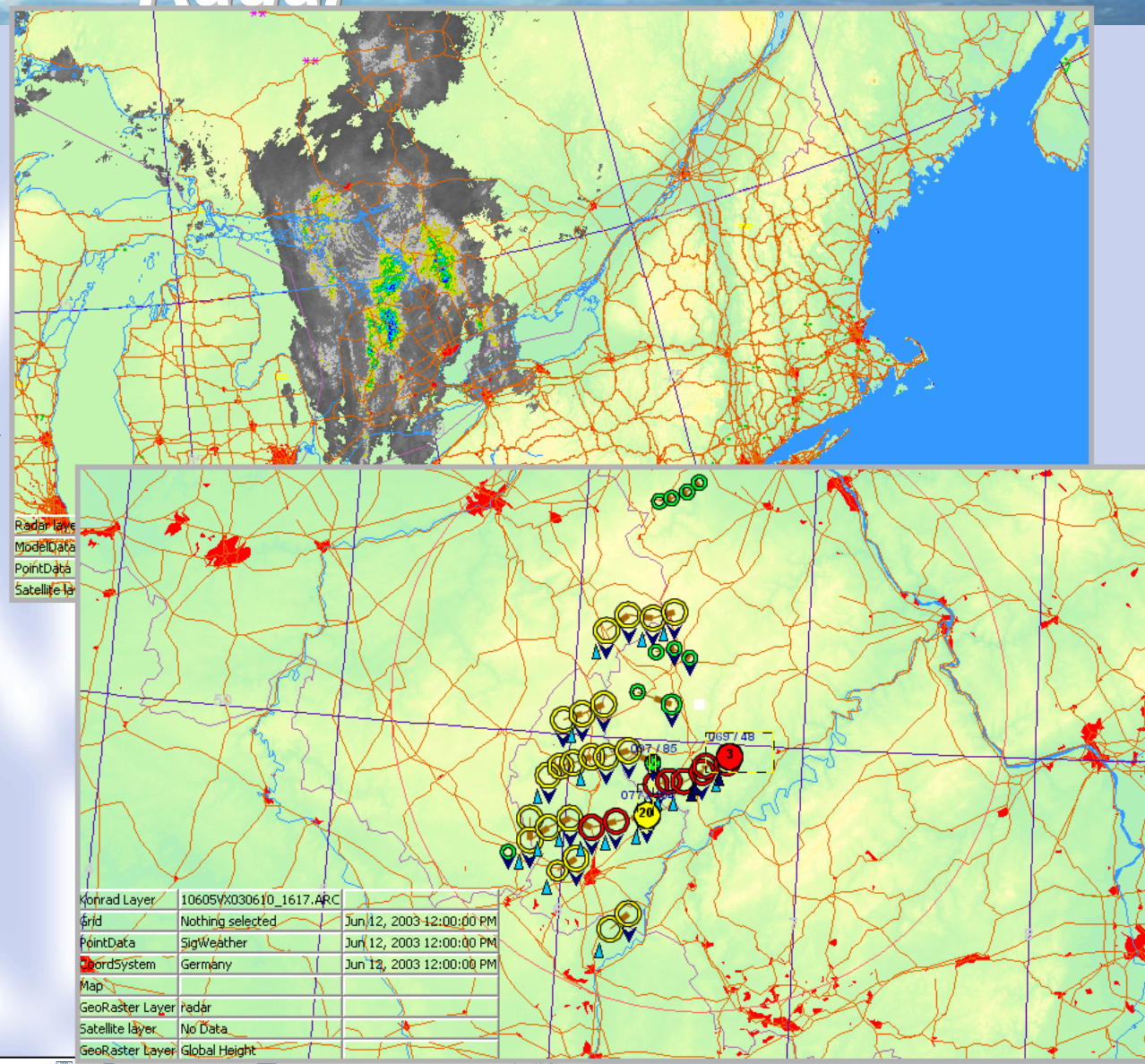
- Import and Server pre operational
- Geostationary satellite based, multiresolution composites available
- MSG integrated
- Polar orbiting satellites and Nowcasting SAF (HDF5-reader already available) to come march 2004



MSG 3 channel composite , Mercator

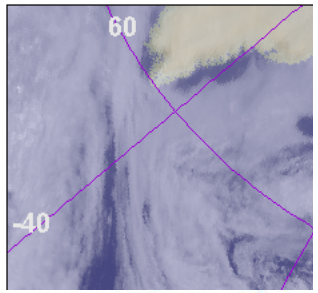
Project Status
Radar

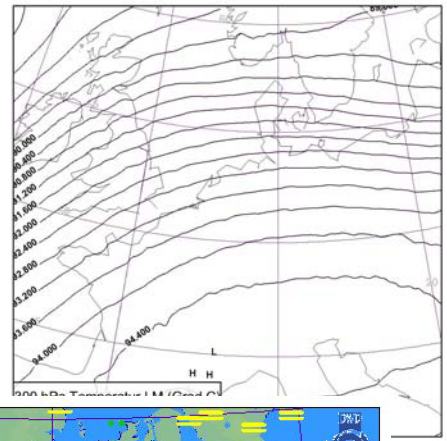
- Imagery currently product based
- DWD implements SCIT-type display
- Radar design on the way
- Radar processing/layer will implement MSC's enhanced CARDS technology

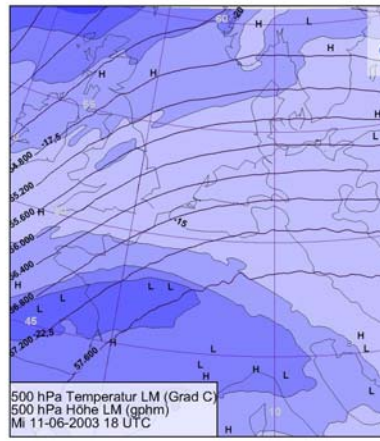


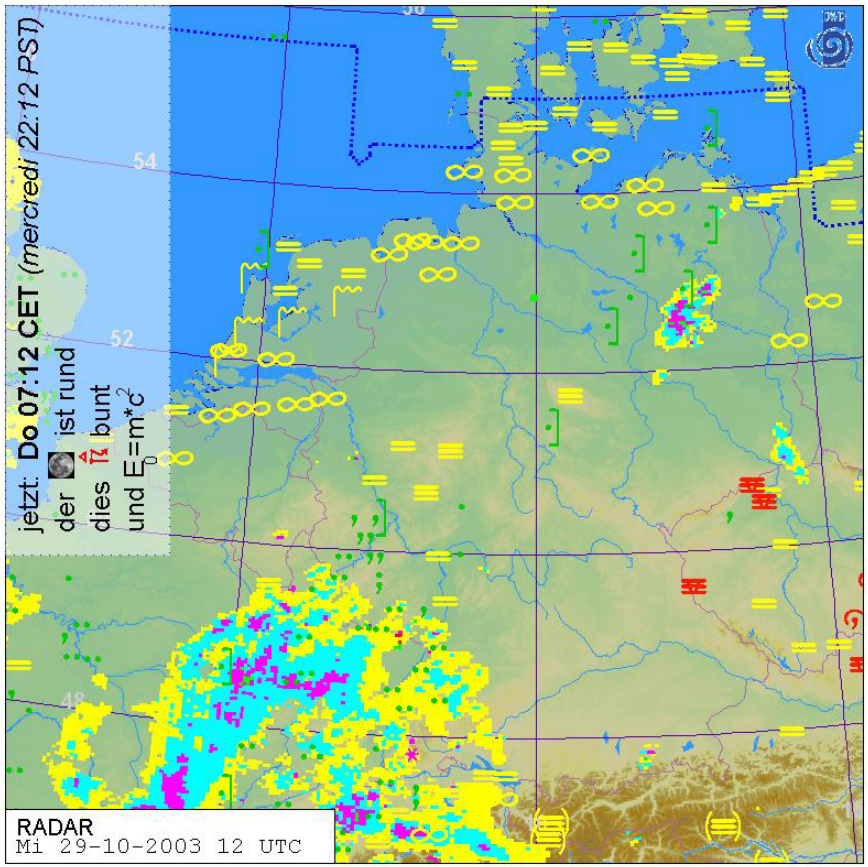
Project Status
Batch

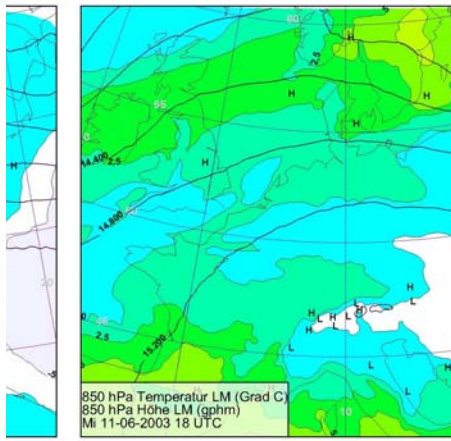
- Image and vector products can be created
  - jpg, png, tiff...
  - PDF, SVG, FLASH, PS incl. Animations
- Flexible legend with html-style language
- SMS-based scheduling
- Sophisticated layout and NinJo scheduler to come (March 2004)
- Basis for application serving (NinJo 1.0+)

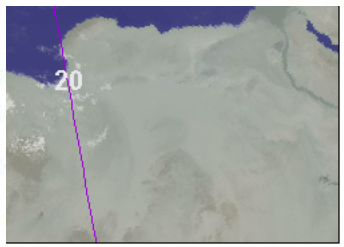






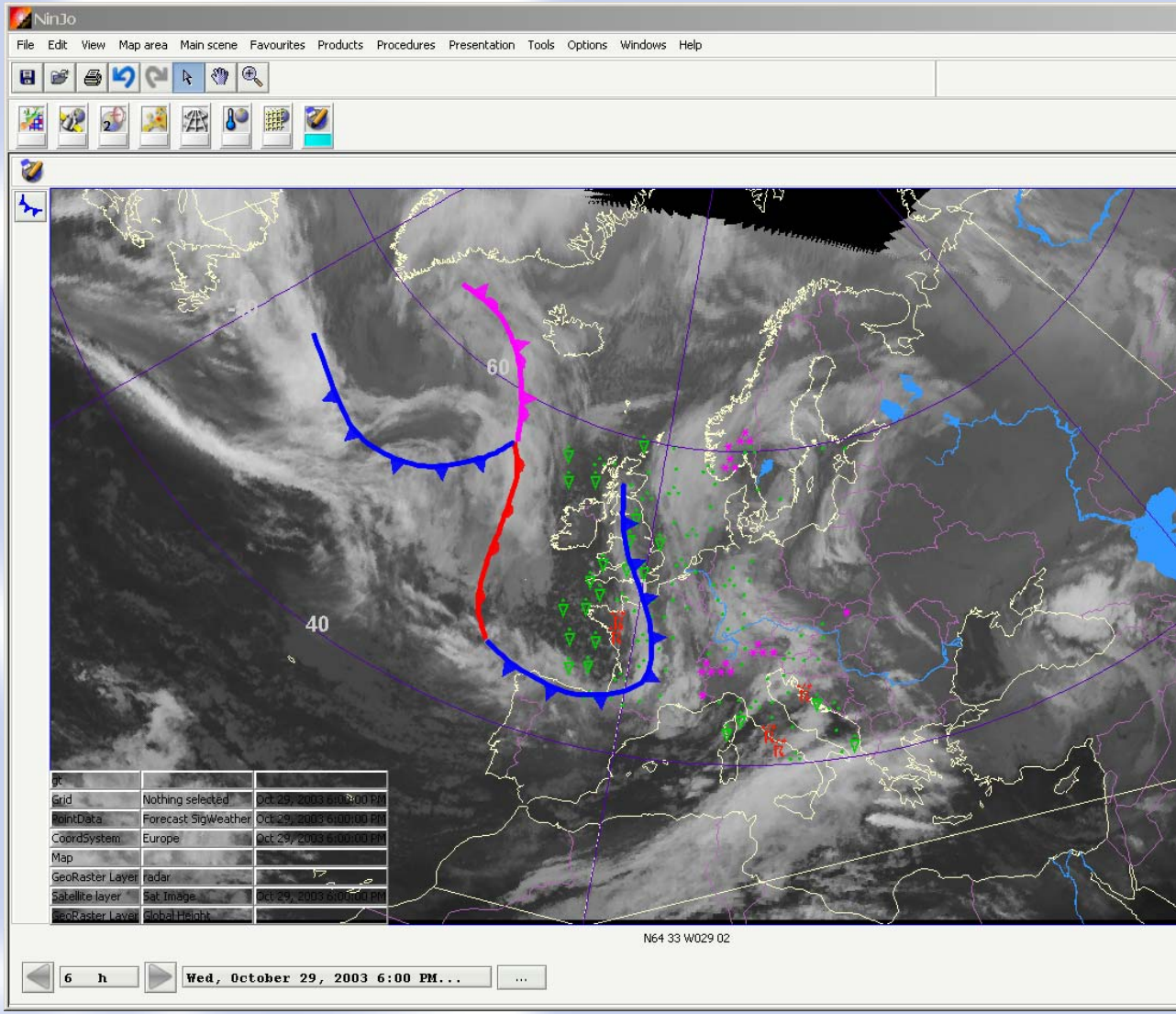






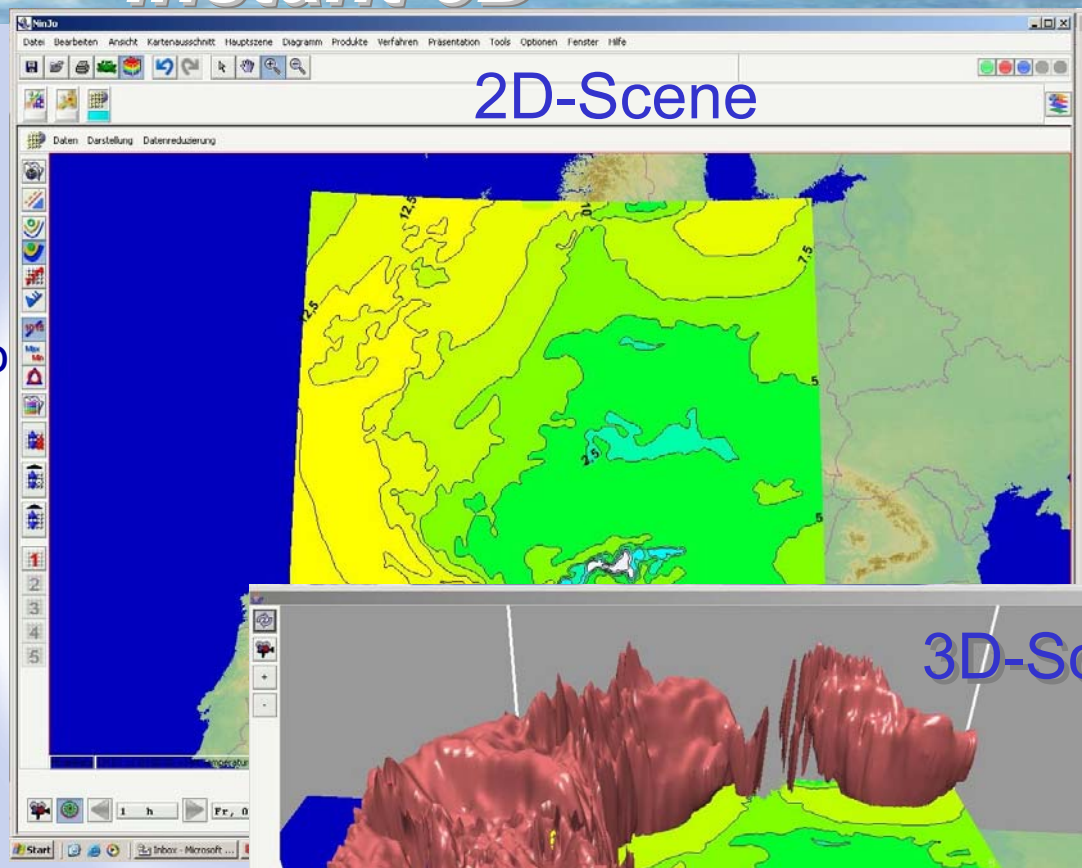
Project Status
Grafical Editor

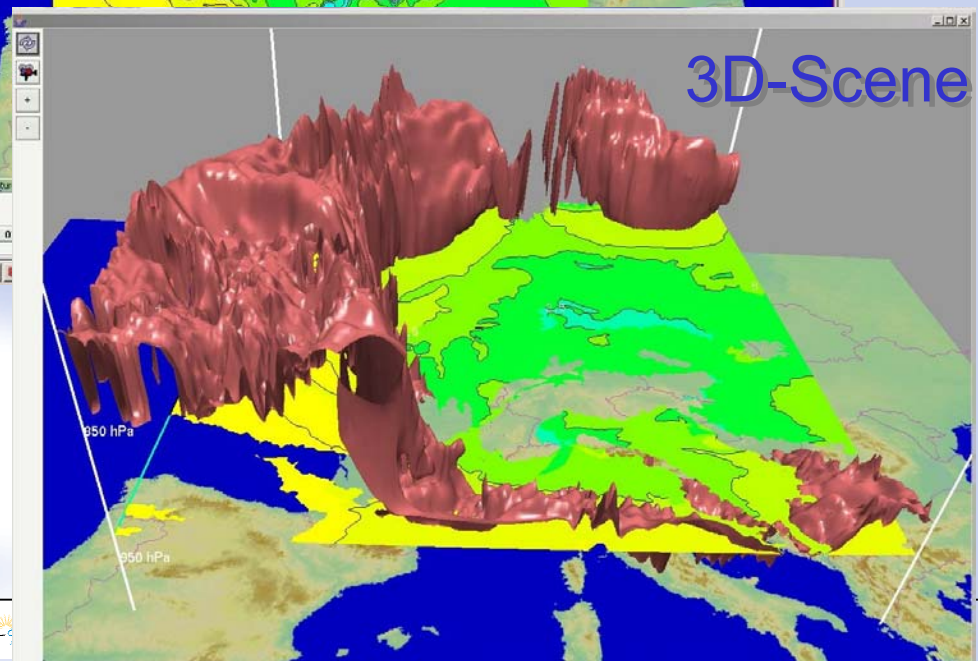
- Basic framework available
- work package handed over to MSC



Project Status
Instant 3D

- Instant 3D - concept
- 2D scenes mapped to 3D-scenes
  - intelligent mapping
  - geo and time link to 2D scene
- First prototype, only limited grid para-meters and georaster/geovector implemented
- First release with full NWP-support, point data, satellite- and radar products to come (march 2003)



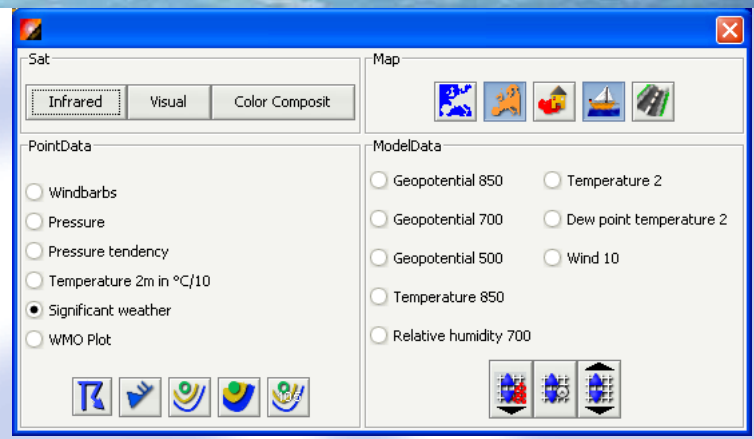


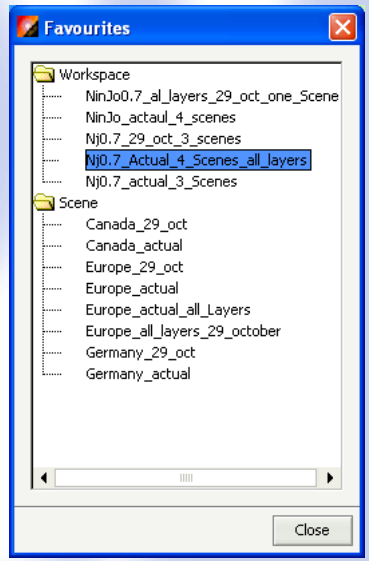
Project Status
Evaluation

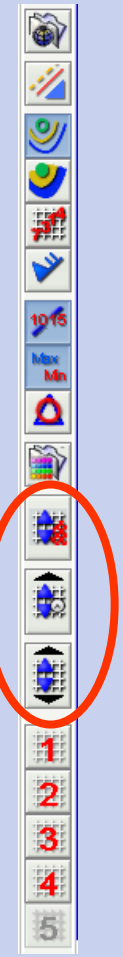
- Important NinJo version are reviewed by the NinJo Evaluation group
- Forecasters and researches can evaluate the software on locally available desktops
- Very valuable input received
- The latest results (NinJo 0.41):
  - Visualization should just be one click away
    - Currently it's somehow cumbersome - under certain circumstances
  - Shortcuts and convenience functions
  - Navigator panel
  - User manuals less technical

Project Status
GUI - enhancement

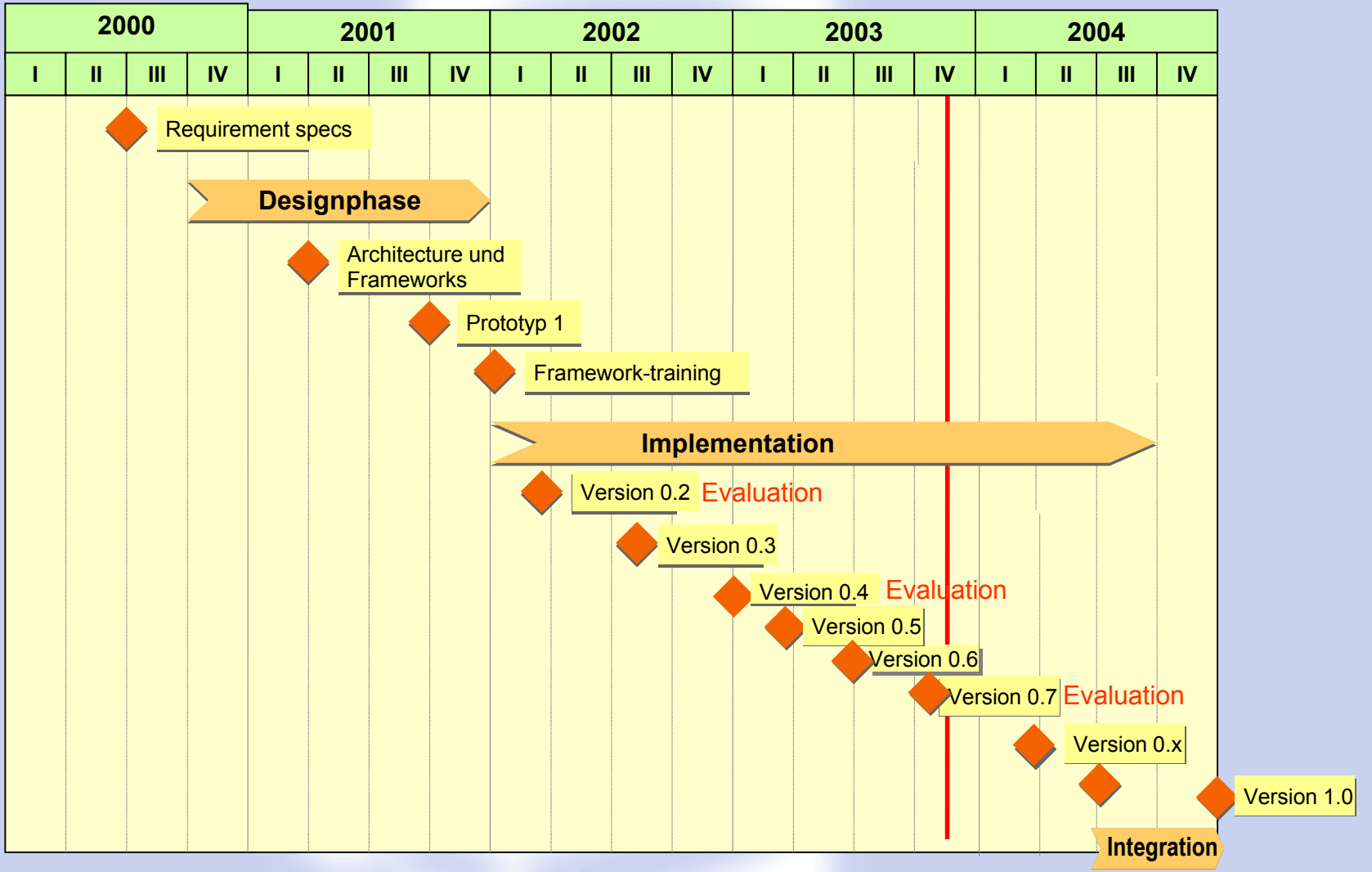
- Integrates results of NinJo prototype evaluation by forecasters
  - e.g. Navigator panel
- Quick access to use cases
  - myGUI
  - favorites
- Undo / Redo







The Project
Milestones



The Project Status

Version Feature List

Version/ Release Date	Features	
.....		
Feb, 18th, 2003, NinJo 0.5	■ Satellite Layer, no Server Functionality	
June, 2003, NinJo 0.60	■ Consolidated layers and frameworks ■ Point data server export ■ Favourites and undo ■ New features in existing layers ■ Trajectory layer	EGOWS
November, 2003, NinJo 0.70	■ Evaluation Group input ■ Diagrams ■ Graphical Editor (framework) ■ Batch ■ More point data ■ Radar ■ Streamlines ■ More Servers pre operational ■ Formulas (only point data)	**Now!**
December, 2004, NinJo 1.0	■ Interactive chart production ■ Data modification ■ Monitoring/alerting/warning ■ New radar software (MSC's CARDS) ■ Sounding applications ■ More layers (lightning ...) ■	

The End

There will be a NinJo demo today

in the Class room

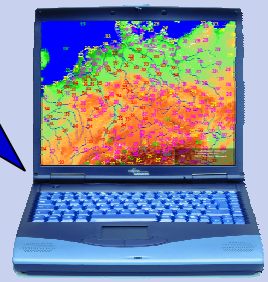
The Project

Version Feature List 1

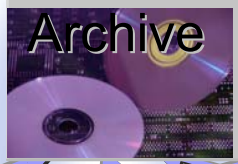
Version/ Release Date	Features
0.1, Oct. 2001	Graphic API 3D-Visualisation of isosurfaces 3D-textured DEM data
0.2, Feb. 2002	Client frame work 1.0 Surface observation layer (FM12 only) with limited functionality Geovector layer based on VMAP0 and german high res. Data First Version of Access layer
0.3, Sep. 2002	grid layer Geo vector layer Configuration framework Logging and error handling Start QM
0.41; January 15th	Raster image framework New FM 12 layer Geo raster data Gridded data server Redesign Access Layer

NinJo
Communication

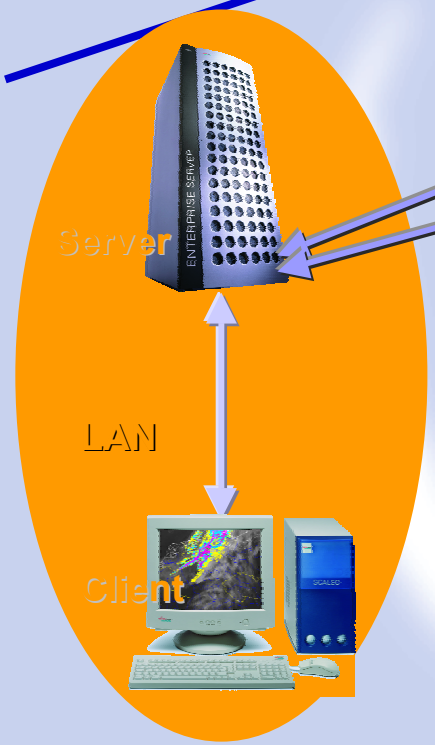
Internet



Central Office



AFD



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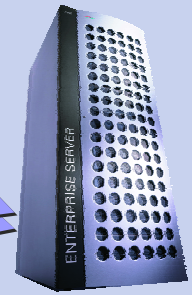

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