# Environmental Informatics – ICT for the Environment

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# Environmental Information

# Contents

- History, definition, "production" and communication of Environmental Information (EI): the air quality example

- Towards Environmental Informatics

# The history of EI: ancient deforestation…

Plato, **Critias:**

- "… 9.000 years ago (e.g. approx. 11.500 years from today) the land of Attica, was very fertile… what now remains compared to what then existed is like the skeleton of a sick man, all the fat and soft earth having wasted away, and only the bare framework of the land being left…"

Eupolis, **Goats:**

- Proudly professing their omnivorous grazing habits!

# The history of EI: air pollution
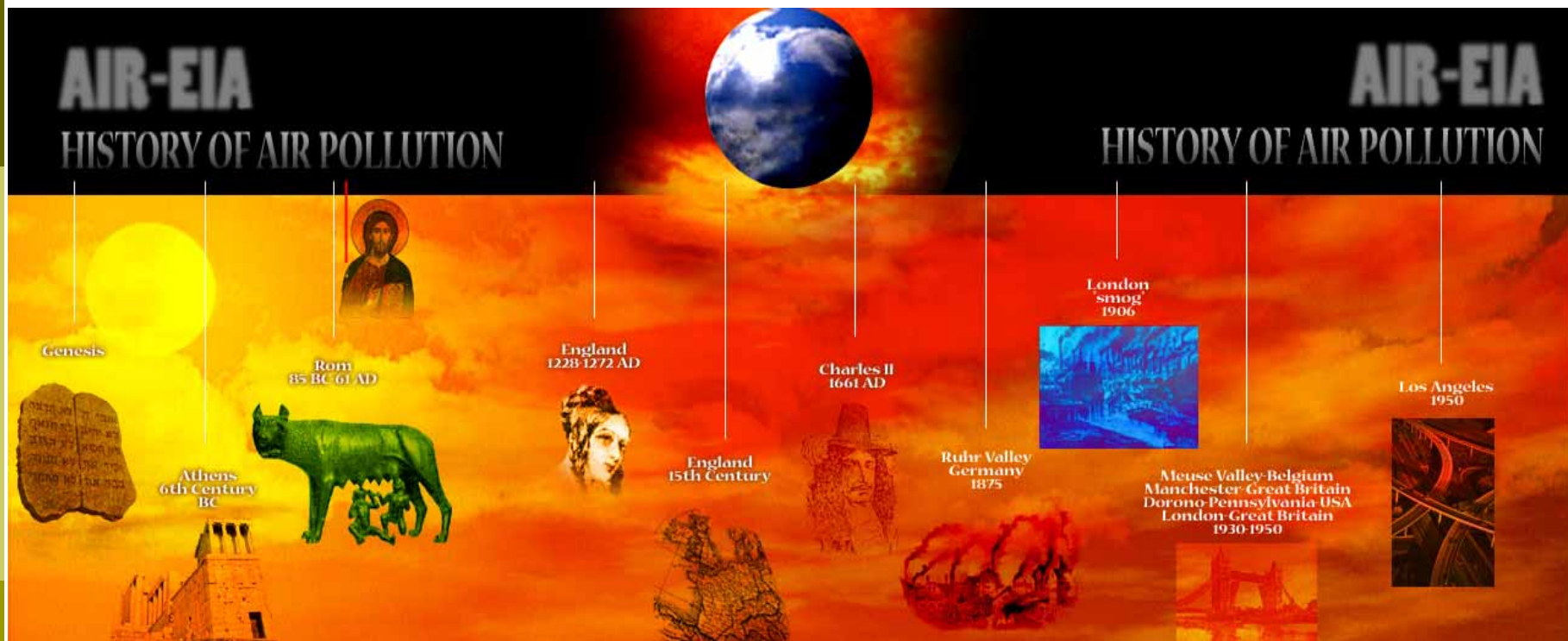


Air quality data (information) was made available as
complaints about the quality of the environment

# BIBLE

**GENESIS**

Air pollution has been around as long as man has walked the earth. Indeed, in the earliest extant from dawn of civilisation, emissions from forging operations for bronze, iron, and other implements were well known (Genesis, chapter 4) and the emissions from smoking fires and blazing torches were also known (Genesis, chapter 15).

# Literature: an alternative source of information

*The classic era:*

While there is no specific written evidence regarding environmental problems, indirect evidence of concerns or actions related to the quality of the environment come from classic literature and other indirect sources of information.

THOUKIDIDES

**ATHENS**

Maybe the first sulphur dioxide air pollution episode in history is related to the siege of the city of Plataies from the Athenian forces: the latter used burning sulphur to force the people of Plataies to surrender. (430 B.C., **Thoukidides**, Book II, chapter 77). It is also interesting to mention that the first legislation towards decentralisation of industrial activities was put into force by **Solon** in Athens, (6th century B.C), and was related to air and noise pollution caused by iron smelters.

# ROME

The link between urbanisation and environmental problems was established later in the ancient times: **Vitruvius (75-26 B.C.)** described city climates and climatic conditions in the Roman cities, to which an allusion on smoke pollution also appears in the poems of **Horace (85-68 B.C.)**, while **Seneca** comments the 'bad air' over the capital of the Roman Empire (61 A.D.).

QUEEN ELEANOR

EDWARD I

# ENGLAND

It was in England in 1228 that coal smoke was determined to be 'decremental to human health' since Queen Eleanor of Aquitaine had complained that it hurt her lungs. She then left the palace of Nottingham in favour of the less polluted countryside. The first known 'attempt' to manage air quality at that time was made in England by King Edward I, who tried to clear the smoky sky over London in 1272 by banning the use of sea coal. It is interesting to note that the British Parliament ordered the torturing and hanging of a man who sold and burned the outlawed coal.

The example of transboundary air pollution: not a very recent problem!

ENGLAND-FRANCE

**ENGLAND**

In the 15th century evidence is available for the first transboundary air pollution problem in Europe: smoke coming from open burning of biomass was transferred above the English channel towards France, thus causing the French vineyard owners to strongly complain about the reduction in their production.

KING CHARLES II

# ENGLAND

In 1661 a pamphlet was published by royal command of Charles II, written by John Evelyn, which dealt with smoke, its deterious qualities and offered some remedies.

The existence of polluted air in towns prior to the modern industrial era has also been substantiated by scientific analysis of samples of older interactions. It is interesting to note that a recent published work on the study of crusts found in Arles and Bologna, which formed in the periods 1180-1636 and 1530-1887 respectively, provided evidence of past air pollution. The same tracers were also encountered in the smoke from experimental wood fires. This approach confirms the presence of air polluted by wood combustion in the towns of Southern France and Northern Italy during the Medieval up to pre-industrial age.

# RUHR VALLEY

With the rise of industrialisation in the late 18th and 19th centuries, the effects of air pollutant emissions were noted on great portions of the population. Industrial centres such as the Ruhr Valley in Germany were known to significantly impact life in general, and health and appearance in particular, while in 1873, 268 unexpected deaths from bronchitis were reported in London. Even then, air pollution problems were not as pronounced as in the 20th century.

# SMOG

The term smog, a contraction of the words smoke and fog, was popularised in Great Britain as a result of a report by a Dr. H. A. Des Voeux in 1906, while the earliest record of the word's usage in America is in a 1923 headline by Hubbard Keavy, a Des Moines, Iowa newspaper man.

**PHOTOCHEMICAL SMOG**
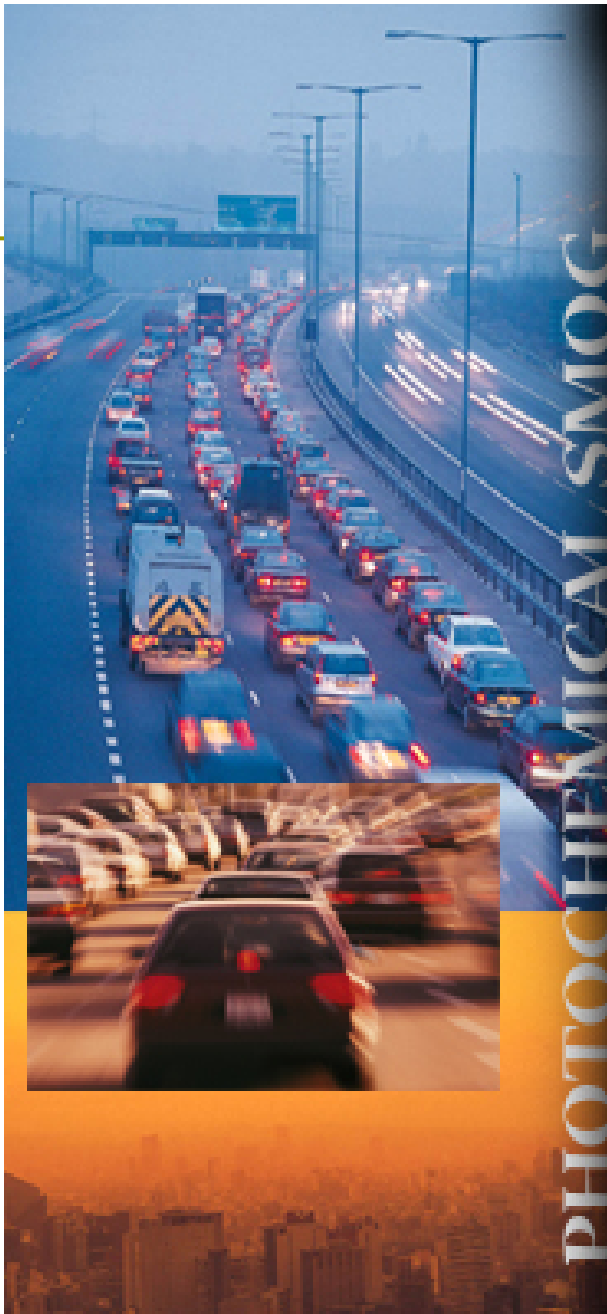
The earliest attempts to understand the dispersion of air contaminants were made by observers and meteorologists of the British army artillery corps during World War I and afterward by observations of antiaircraft shell bursts. It wasn't until the post World War II era, however, that a better understanding of air pollution was gained and control technology approaches were instituted, while the number and the type of sources changed dramatically, the increase of car fleet size in urban areas being the most important of all. Thus, in the late 1940s and early 1950s in Los Angeles, a new type of air pollution was noted, photochemical smog. Since that time, photochemical air pollution has been found in virtually every urbanised area in the world, although its existence is most probable in urban areas of the so called 'developed' countries, rather than in urban areas of the so called 'developing' countries.

# The resulting human perception

Yet a smoking chimney and a smoking car exhaust were the symbols of some of the enthusiasts of the industrial era



- *Sydney Morning Herald, 1 May 1930, p.6 :* A caricature of a little boy offers Australians a bright, secure, and productive future, holding the symbols of productivity: a **smokestack** and a **plume** of **smoke**! (Robert Crawford, 'A Slow Coming of Age: Advertising and the Little Boy from Manly in the Twentieth Century', *Journal of Australian Studies*, no. 67, 2001, pp. 126–143)
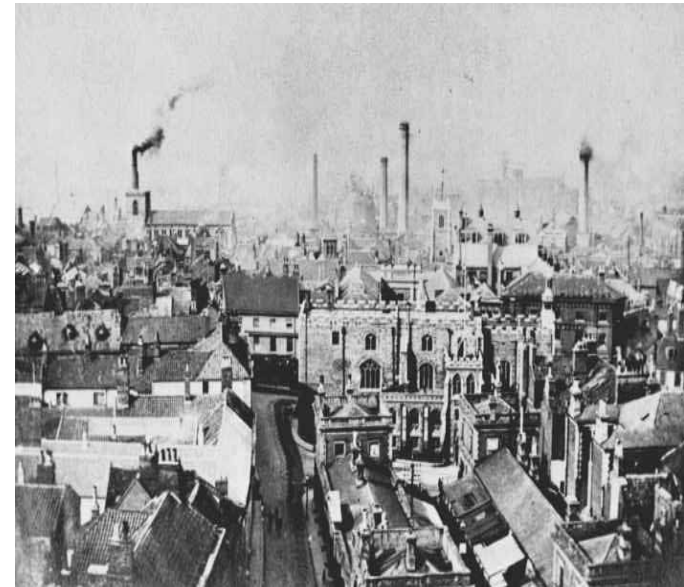
# The resulting human perception



Dlugach, Mikhail
Ice Carnival, 1925

Vehicles were expected to pollute!

# Definition(s) of Environmental Information

# Revisiting EI definitions ….

- Environmental Information is the "process" that transfers data and information from source to user in any field of knowledge of activity applicable to environmental problem solving (Dr.Marta Dosa, now Professor Emerita in the School of Information Studies at Syracuse University )

- **Aarhus convention**
    - The state of elements of the environment, such as air and atmosphere, water, soil, land, landscape and natural sites, biological diversity and its components, including GMOs;
    - Factors, such as substances, energy, noise and radiation, and activities or measures, environmental agreements, policies, legislation, plans and programmes, affecting or likely to affect the elements of the environment, and cost-benefit and other economic analyses and assumptions used in environmental decision-making; and
    - The state of human health and safety, conditions of human life, cultural sites and built structures, inasmuch as they are or may be affected by the state of the elements of the environment or, through these elements, by the factors, activities or measures referred to in subparagraph (b) above;

# "Production" of Environmental Information

# Environmental data/information production

□ **E**nvironmental **D**ata (ED) result from "instruments", either …

**measurements** or …

**computations/ estimations**

And are **quantitative** rather that **qualitative**!

□ **E**nvironmental **I**nformation (EI) = the result of a **process** over ED

In the far past: such instruments did not exist, therefore

▪ data = information!

Consequence: **any** data (including environmental) were presented and distributed, via the information channels **available** at that time (physical language)

# Communication of Information

# "On-line" data in ancient times

- "on-line" data (information) were exchanged in ancient times, but were related to exceptional (and usually not pleasant) events; due to the low "capacity" of information available, a kind of **symbolic**, **simplified**, **easily recognizable** "language" was used:

  - Fryktories (a network of fires on mountains that allowed for the quick transfer of predefined information mainly for military purposes)
  - Hydraulic telegraph (Aenias Tacticus)
  - The color of the sails of Theseas' chip (black/white)

- Thus: "on-line", i.e. instant, was initially considered to be *threatening* per se, and was avoided ("good news can wait")!

- More or less, this continues to be the case today, When transferred to the environmental sector!

# Access to environmental data: Motivation

- Dir. 90/313/EEC:
    - "Information relating to the environment" = **any** available information in written, visual, aural or database form on the state of water, soil, air, fauna, flora, land and natural sites, and on activities or measures adversely affecting, or likely so to affect these, and on activities or measures designed to protect these (including administrative measures and environmental management programmes).
    - Public authorities are required to make available information relating to the environment to any natural or legal person at his request and without his having to prove interest.
- …repealed by Dir. 30/04/CE
    - Increased access to environmental information and the dissemination of such information contribute to a greater awareness of environmental matters, a free exchange of views, more effective participation by the public in environmental decision making and, eventually, to a better environment.
    - Environmental information should be disseminated by means of available computer telecommunication and/or electronic technology
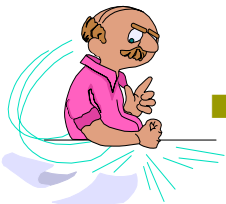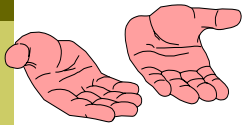
# But…what is the public interested in?

| | Very interested | Interested | Possibly Interested | Not Interested | Valid answers | Interest index | Interest ranking |
|---|---|---|---|---|---|---|---|
| Public Transport | 76.78% | 17.41% | 3.69% | 2.11% | 379 | 2.69 | 1 |
| Air Quality | 63.85% | 29.82% | 6.07% | 0.26% | 379 | 2.57 | 2 |
| Traffic | 55.67% | 29.82% | 11.87% | 2.64% | 379 | 2.39 | 3 |
| Water Quality | 45.33% | 40.00% | 13.33% | 1.33% | 375 | 2.29 | 4 |
| Recycling / Waste management | 41.38% | 40.58% | 15.38% | 2.65% | 377 | 2.21 | 5 |
| Environmental Health Risks | 39.10% | 35.90% | 22.34% | 2.66% | 376 | 2.11 | 6 |
| Noise Pollution | 34.75% | 33.42% | 25.99% | 5.84% | 377 | 1.97 | 7 |
| Biodiversity / Ecology | 30.50% | 34.75% | 30.50% | 4.24% | 377 | 1.92 | 8 |
| Land Use / Planning | 27.49% | 34.23% | 32.35% | 5.93% | 371 | 1.83 | 9 |
| Contaminated Land | 26.20% | 35.29% | 32.62% | 5.88% | 374 | 1.82 | 10 |
| Environmental Regulations | 16.89% | 35.92% | 37.27% | 9.92% | 373 | 1.60 | 11 |
| Environmental Campaigns | 17.43% | 28.95% | 44.77% | 8.85% | 373 | 1.55 | 12 |

Source: Haklay 2000, London Environment On-Line, CASE Special Report
(http://www.casa.ucl.ac.uk/leosurvey.pdf)

# EI communication: what exists?

- ☐ **Off-line**: newspapers, bulletins, reports, TV and radio broadcasts, etc. All on the basis of a "no-pay-for-the-data/info" principle, the citizens "pays" for accessing the relevant media.

- ☐ **On-line** = (electronic media)
  - ■ Internet (html, e-mail)
  - ■ Street panels
  - ■ Voice servers
  - ■ Mobile phone operators

- ☐ **Classification**
  - ■ **Pre/non internet**
  - ■ **Internet**
  - ■ **Beyond internet**

# Pre/non-internet

- Collected environmental data are presented with/without electronic media (examples: Variable Message Signs (VMS), info-kiosks, Radio Data System-Traffic Message Channel (RDS-TMC), newspaper bulletins, etc ), that are operated by a human.
  - Provider: local governments, municipalities, media owners or users
  - Cost for the public: no cost
  - Establishment and maintenance costs: provider

# Pre/non-internet: examples

- VMS
  - Car Park (http://www.vmslimited.co.uk/ )
  - Traffic info (http://www.state.nj.us/turnpike/nj-conditions-vms2.htm)
- Info-kiosks
  - City of Munich, HEIC-MUC project (http://www.muenchen.de/)
- RDS-TMC
  - http://www.tmcforum.com/
- Newspapers, etc

# Internet

- ❑ Collected environmental data are presented/made available via the Internet, either automatically or via a human operator.
    - Provider: local governments, municipalities, private companies
    - Cost for the public: no cost, with the exception of subscription
    - Establishment and maintenance costs: provider

# Internet: examples on EI systems

- AirQUIS: www.nilu.no
- ENSIS: www.norgit.no, www.nilu.no
- AirWARE: www.ess.co.at
- EnviMan: www.opsis.se
- Air Quality Archive: www.airquality.co.uk
- AirViro: www.indic-airviro.smhi.se/

Costs: 20- 50 kEuro for the whole system, support and consulting on top

Usual "buyers": city level authorities

# Internet: examples on applications

- Athens real-time traffic map:
  http://www.transport.ntua.gr/map/index.html
- Coastal water quality (blue flags):
  http://www.blueflag.org
- Waves and surfing: http://www.surflink.com/
- Weather on-line http://www.ntua.gr/weather

# Internet: on-line meteorological data

❑ COST 715: [http://www.mi.uni-hamburg.de/cost715/](http://www.mi.uni-hamburg.de/cost715/).

The database includes basic information about meteorological sites in urban areas**.**

❑ ECMWF: [http://www.ecmwf.int/](http://www.ecmwf.int/). ECMWF, from its operational and research activities, has collected a set of global Numerical Weather Prediction data in its archives.

❑ EUMETNET: [www.eumetnet.eu.org](www.eumetnet.eu.org) The Network of European Meteorological Services, provides links to sites at which near real-time measurement data of air pollutants are presented to the public for European areas

❑ World Weather Information Service: [http://www.worldweather.org/107/c01006.htm](http://www.worldweather.org/107/c01006.htm) Presents official weather forecasts as well as climatological information for selected cities supplied by National Meteorological Services (NMSs) worldwide.

❑ World Meteorological Organization (WMO): [www.wmo.ch](www.wmo.ch)

# Internet: on-line topography data

❑ Google Earth, Google Map

❑ ECON-GI www.uni-saarland.de/projekte/econ-gi/egi-e.htm is a project, co-funded by the European Commission through the eContent Program, to unlock Geographic Information in the Saar-Lor-Lux-region.

❑ Corine Land Cover database
http://dataservice.eea.eu.int/dataservice/metadetails.asp?table=landcover&i=1

# Internet: Emission data

❑ CORINAIR is the ETC/ACC database which covers emission data of EEA member countries and for the EU as a whole http://etc-acc.eionet.eu.int/databases/#emisdocdata

❑ The EDGAR database: http://www.mnp.nl/edgar/ is a joint project of RIVM and TNO and stores global inventories of direct and indirect greenhouse gas emissions from anthropogenic sources including halocarbons both on a per country basis as well as on 1o x 1o grid.

# Beyond Internet

- Collected environmental data are presented electronic information channels like mobile phones automatically, QA/QC and final authorization may be provided by a human operator
  - Provider: local governments, municipalities, media owners or users
  - Cost for the public: the cost of the information channel used. Added value services may be charged on a subscription or pay-per-use basis.
  - Establishment and maintenance costs: provider.

# Beyond Internet: APNEE

☐ The APNEE/APNEE-TU projects:

- Provide an air quality portal with pull and push services
- Employ complementary communication channels to reach the citizen
- Implement a supply chain of content from trusted sources, via portal operators to the citizen

# Beyond Internet: APNEE
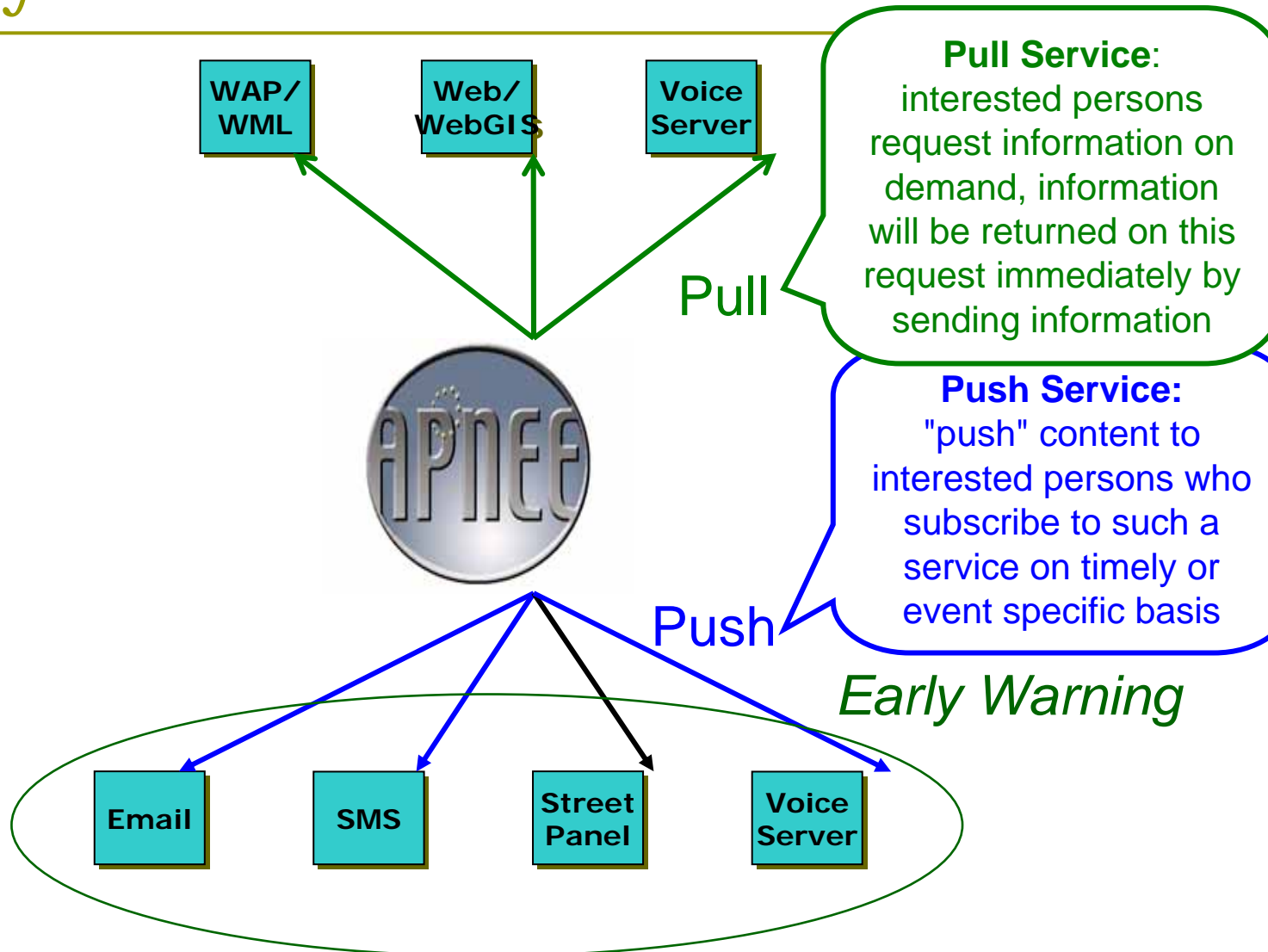
**WAP/ WML**

**Web/ WebGIS**

**Voice Server**

Pull

**Pull Service**: interested persons request information on demand, information will be returned on this request immediately by sending information

**Push Service:** "push" content to interested persons who subscribe to such a service on timely or event specific basis

Push

*Early Warning*

**Email**

**SMS**

**Street Panel**

**Voice Server**

# Beyond Internet: APNEE



**WAP**

**SMS**

**WWW**

**EMail**

**...**

**UMTS ...**

**PDA/ Smart Phones**

**Voice**

**Panel**
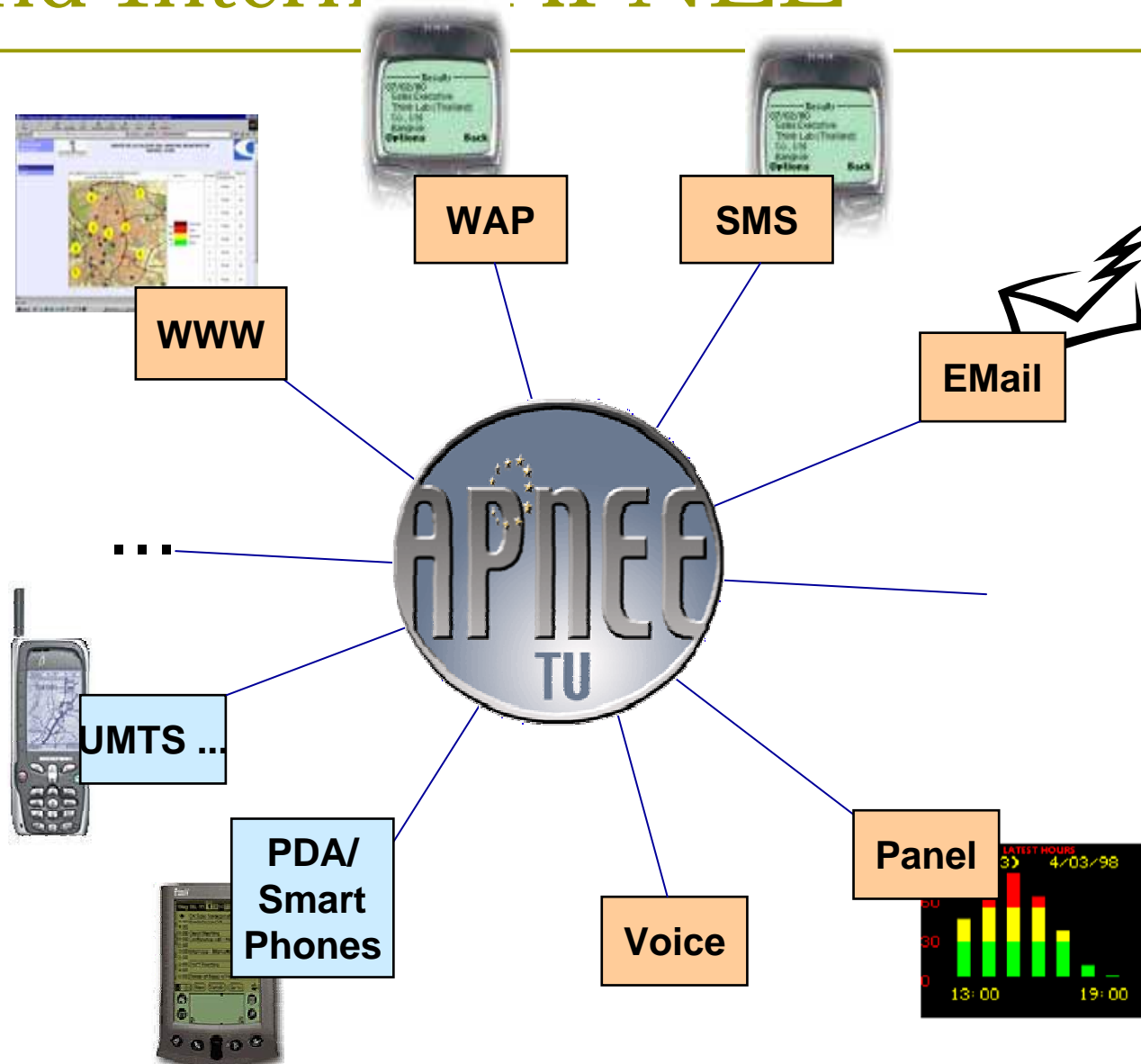
# Proof of APNEE concept:
# the growth of similar, independent applications!
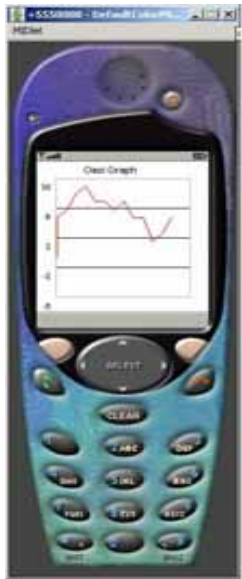
**J2ME web services**

for the OASI project                    [E. Arauco and L. Sommaruga (2004), Web Services for Environmental Informatics, paper to be presented in http://www.iemss.org/iemss2004/, June 2004, University of Osnabrück, Germany]

The MINNE project on

**Mobile Environmental**
     **Information**
**Systems and Services**

http://www.minne.oulu.fi

# Proof of APNEE concept:
# the growth of similar, independent applications!

□ Your air (SMS messaging for AQ forecasts)



□ MARQUIS



□ Tsounami alarm

# Proof of APNEE concept: the growth of similar, independent applications!

□ www.lorano.de

□ SMS in Hong Kong

Vodafone Germany

**Help for allergy sufferers: up-to-date pollen alert forecasts from Vodafone live!**

› The pollen alerts take into account the u... personal allergy profile and current locati...
› Also available by SMS text message

Düsseldorf, 18 May 2004. Allergy suffers can br... of relief: from now on, the Vodafone live! porta... providing a personal pollen alert forecast servi... users. This service enables them to avoid risk a... take medication in time to alleviate their allergy... The service is unique because it takes the user... allergy profile and current location in the Germa... network into account.

**SUNDAY Launches "Smog Alert" -- Hong Kong's First Location Based Air Pollution Index Service Available via SMS**

November 10, 2004

**HONG KONG, November 10, 2004** -- SUNDAY Communications Ltd. (SEHK: 0866; NASDAQ: SDSY) today announced the launch of "Smog Alert", Hong Kong's first location based Air Pollution Index (API) available via SMS.

"The air quality in Hong Kong obviously concerns all of us," said Bruce Hicks, Group Managing Director, SUNDAY Communications Limited. "Smog Alert is SUNDAY's latest location based service that provides real-time information. Just press a few digits on your SUNDAY mobile phone to determine the Air Pollution Index wherever you are, shopping or having fun. The quality of air varies across Hong Kong - so, if you want to know what the air quality is your location, just use Smog Alert."

# Proof of APNEE concept:
# the growth of similar, independent applications!

□ **HiGRID: Mobile Access to Environmental Information for coastal zones**
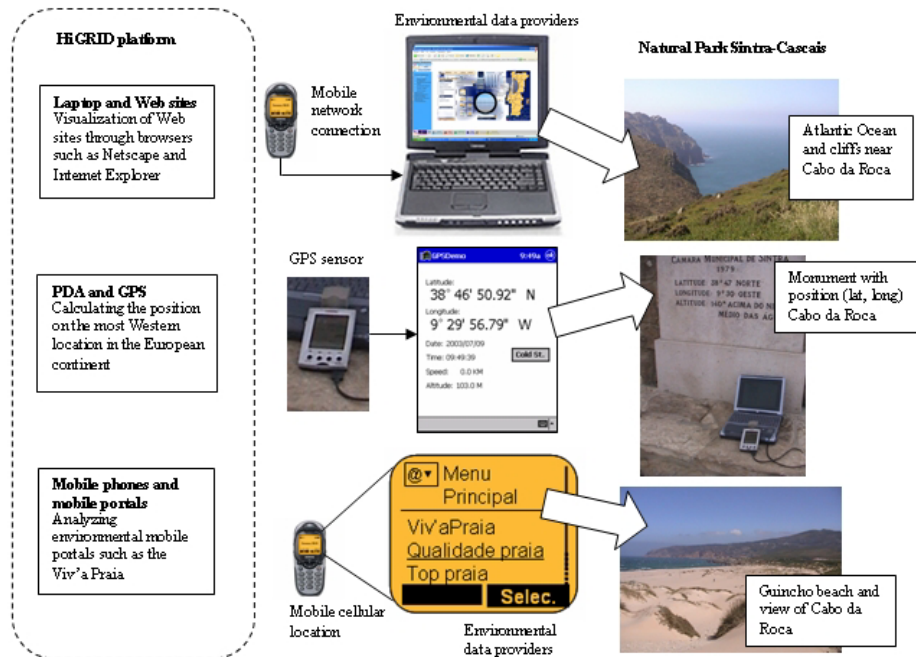


□ **cnlab/FEDRO** project for Traffic information (Switzerland)

□ **O3-WAP. Ozon- und Wetterdaten** (wap.hlug.de )

# And what about EI presentation methods?

- Initially used: **numbers** with a verbal interpretation (common for pre/non Internet solutions) and color coded index charts
- **Static graphs** : 2-D graphs, used mostly for time series, spatial graphs.
- **Dynamic graphs**: animated concentration fields
  - Interesting interpretation of moving colors as a thread (isolines)
- Combination of the above plus text
- **Voice**
- **Multimedia**

# Which presentation methods are preferred?

- Charts-graphs are more easily understandable than numbers
- The use of color may support or disturb understanding
- Moving pictures have a more "dramatic" interpretation
- The use of GIS related presentation seem to be preferred (citizens can spot their location in relation to their physical environment)
- Voice may be used as an advanced method, yet its limitations should be taken into consideration
  - Verbal culture and communication culture may be the most important factor!

# So, what do we need for using and communicating environmental information?

# Personalized EIS (1/2)

- Systems that cover the life cycle of environmental information, from "production" to "consumption".

- Important note: Increasing citizens' awareness on quality of life has resulted in a demand for an "interactive city".

# Personalized EIS (2/2)

- The Environmental Informatics approach

  - EI should be considered as the combination of software and environmental engineering methods and tools for the creation of a new "<u>knowledge-paradigm</u>" towards supporting environmental well-being at an international, national, regional, community or personal level.

  - Citizen centred, environmental information services that will support societal sustainability while promoting personal well being.

# Environmental Informatics applications (1/2)

- The concept of environmental informatics can be materialized in the frame of EIS by supporting the task of authorities towards environmental management for a sustainable society.

- Creation of new, user-friendly, citizen-centered services.

- Improvement of the general quality of life in the city.

- Valuable aids for city authorities as they migrate from static to real-time interactive environmental administration systems.

# Environmental Informatics applications (2/2)

- Special care should be taken for the implementation of system components in an optimized and effective way
- User requirements analysis should be exercised rigorously and in advance to avoid system engineering problems
- A new service-oriented relationship between city authorities and the public based on applied use of ICT innovations

*And as an example of environmental informatics in action….*

# Internet-based management of environmental simulation tasks

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# The U.E. System Concept



Urban environment
(data "generator")

Monitoring-
Modelling
(data "production")

**Legislative
Framework
(LF)**

U.E. management
• info dissemination
• scenarios
• measures
• policy making
• urban design
• etc
(data post-processing)

"Information generation"
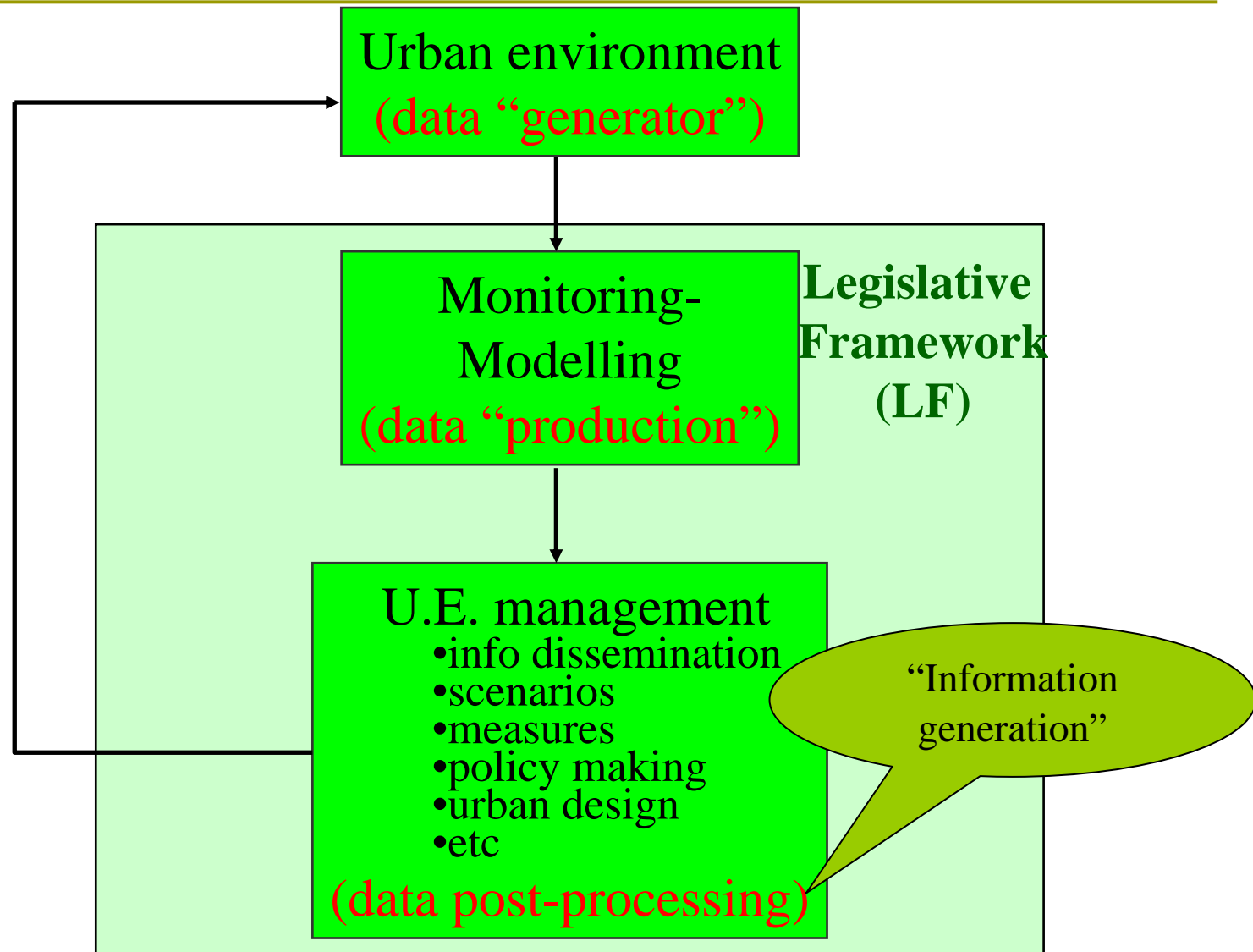
# Air Quality Management Concept



Source: S. Larssen

**——** **Main system loop**

**——** **Sub system loops and data elements**
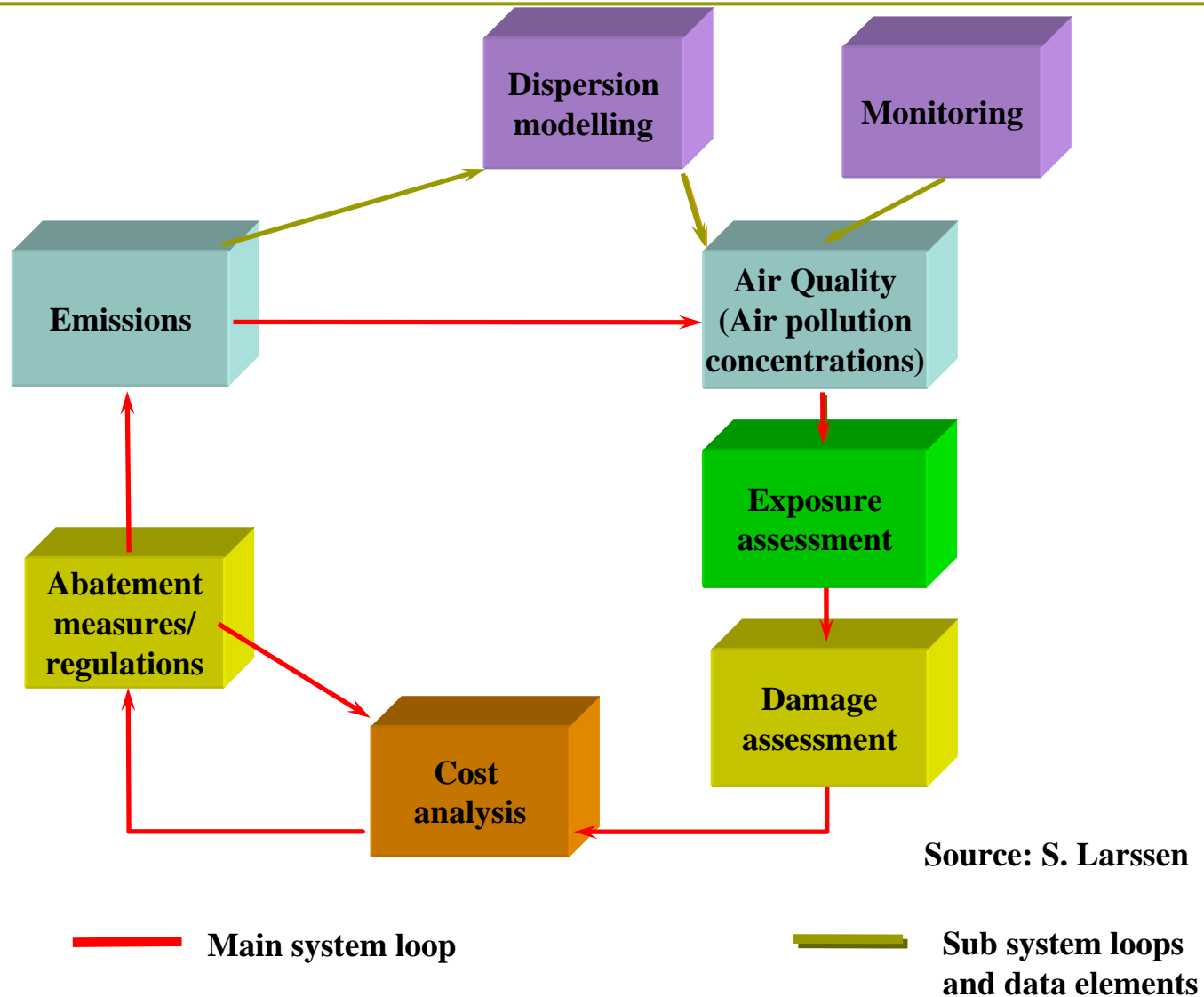
# Rationale (1/2)

- Environmental / air quality management & decision making problem characteristics
  - multiple sources of information, including on-line monitoring systems;
  - a dynamic and spatially distributed structure involving multiple temporal and spatial scales for the complex dispersion and transformation processes, that "translates" emissions into ambient air quality conditions, which is the domain of air quality modelling proper;
  - distributed (and mobile) emission sources with pronounced temporal patterns that include industry, households, and traffic sector and may be modelled as a network (dynamic) equilibrium process;

# Rationale (2/2)

- accidental releases that may not be categorised within the existing "emission profile" of an urban area; these releases may typically include industrial accidents, accidents related to the transportation of dangerous goods, urban scale "disasters" (e.g. fire in a shopping mall), releases of dangerous gases or biological compounds by mistake (e.g. laboratory faults), criminal-terrorist activities, etc.;

- direct regulatory and indirect economic control on emission sources;

- multiple objectives and criteria at different spatial and temporal scales for the different actors and the regulatory framework;

➡ *WWW is the technological - methodological platform for managing environment related tasks!*

# The regulatory framework (1/2)

Council Directive 96/62/EC of 27 September 1996 on ambient air quality assessment and management (Framework Directive) general aim:

- Define and establish objectives for ambient air quality in the Community.
- Obtain adequate information on ambient air quality and ensure that it is made available to the public.
- Maintain and improve ambient air quality.
- Assess the ambient air quality in Member States

    Important:

- **It stresses the need of model application as a supplementary assessment method to reporting of monitoring data.**

# The regulatory framework (2/2)

*"…criteria and techniques shall be established for (a) the measurements, (b) the use of other techniques for assessing ambient air quality, particularly modeling…"* (Article 4, p. 3)

*"…For zones and agglomerations within which information from fixed measurement stations is supplemented by information from other sources, such as emission inventories, indicative measurement methods and air-quality modeling,…"* (Article 7, p. 3)

# Assessing urban air quality

Urban air quality =
f (meteorology, emissions, land use, regulations)
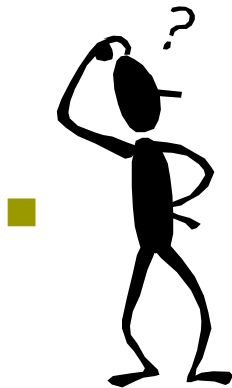
I want to take everything into account...
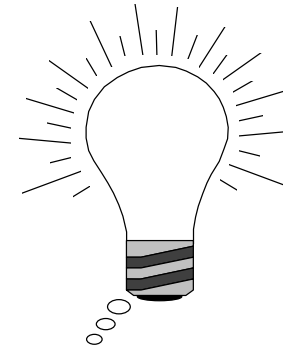
$$\iint_{time,space} f(meteorology, emissions, land\ use, regulations)dsdt$$

# UAQM system prerequisites

*Be able to:*

**Simulate**:

Appropriate AQ models

**Handle and visualise**:

Geographical information systems

**Provide user support:**

Expert systems & decision support tools

# UAQM and Env. Informatics

Goal: integrated urban environmental management information system using distributed information resources (integrated through Telematics) to provide easy to use but scientifically sound information to a broad range of users.

 WWW: the proper platform

# Technological framework

- Distributed client-server (TCP/IP, http) for both HPCN cluster computing and monitoring data acquisition (*solution already available from the 90ties*)

- Multi-media user interface

- Integration with GIS

- **3D dynamic simulation models**

- Embedded AI tools (expert systems)

# TCP/IP – HTTP approach (1/2)

Client-server architecture based on TCP/IP and http.

Main system server co-ordinates:
- user interface and dialogue
- information display, GIS
- external information resources:
    - data bases, monitoring data
    - **simulation models.**

# TCP/IP – HTTP approach (2/2)

Co-ordination through the main system server

Communication through local and wide area networks based on TCP/IP and http

Network connections (note: in 1996!):

- 10/100Mb Ethernet, ATM (LAN)
- dedicated ISDN  (64/128 Kb)
- Internet access > 64Kb (WAN)

# System overview: it is history now!
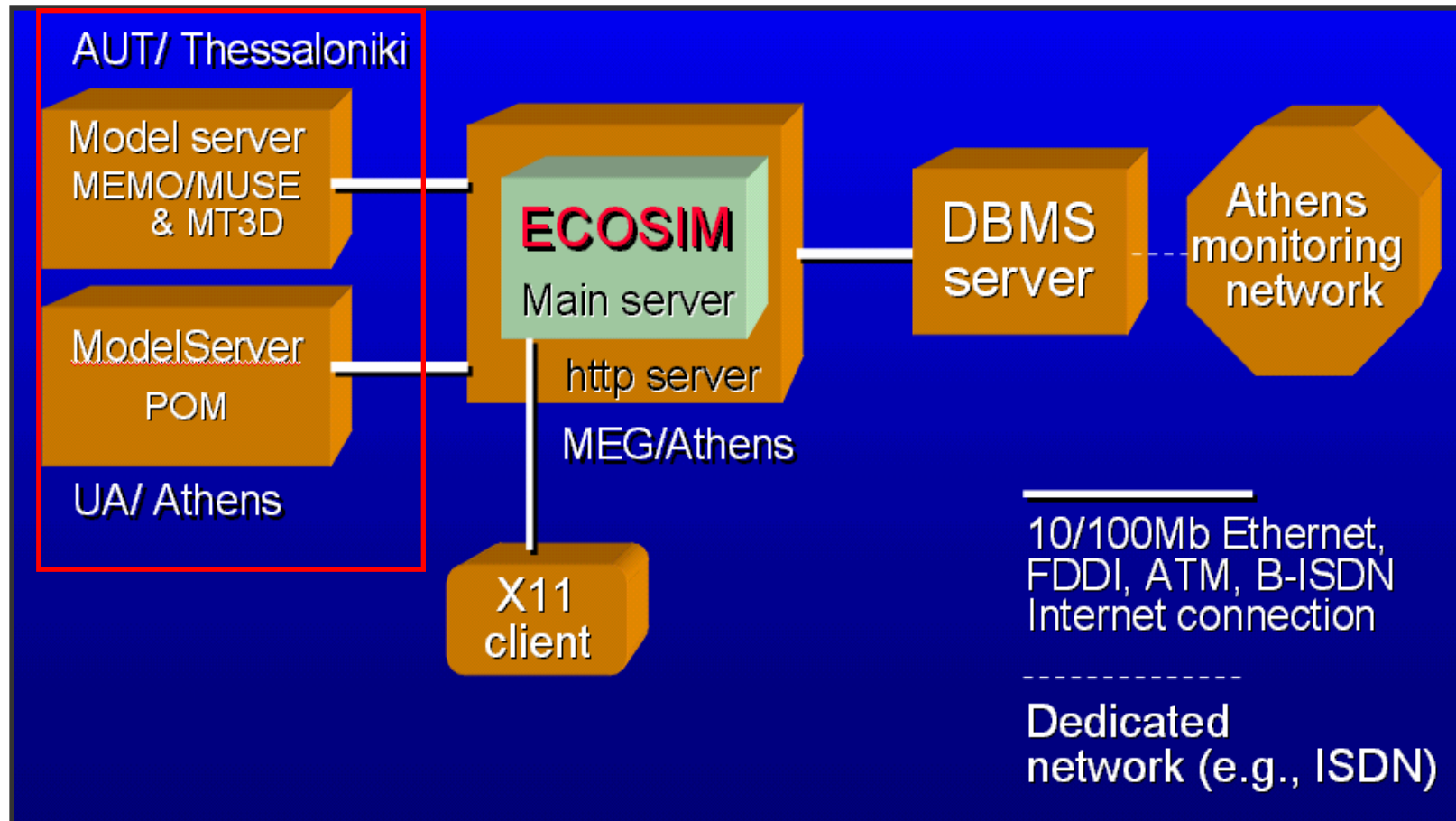


The ECOSIM project system overview
(http://www.ess.co.at/ECOSIM)

# Model integration

Demonstrator through X11 GUI starts
FORTRAN model(s) at the MODEL Server(s)
through a *cgi* written in C (communicating through
stdin/stdout)
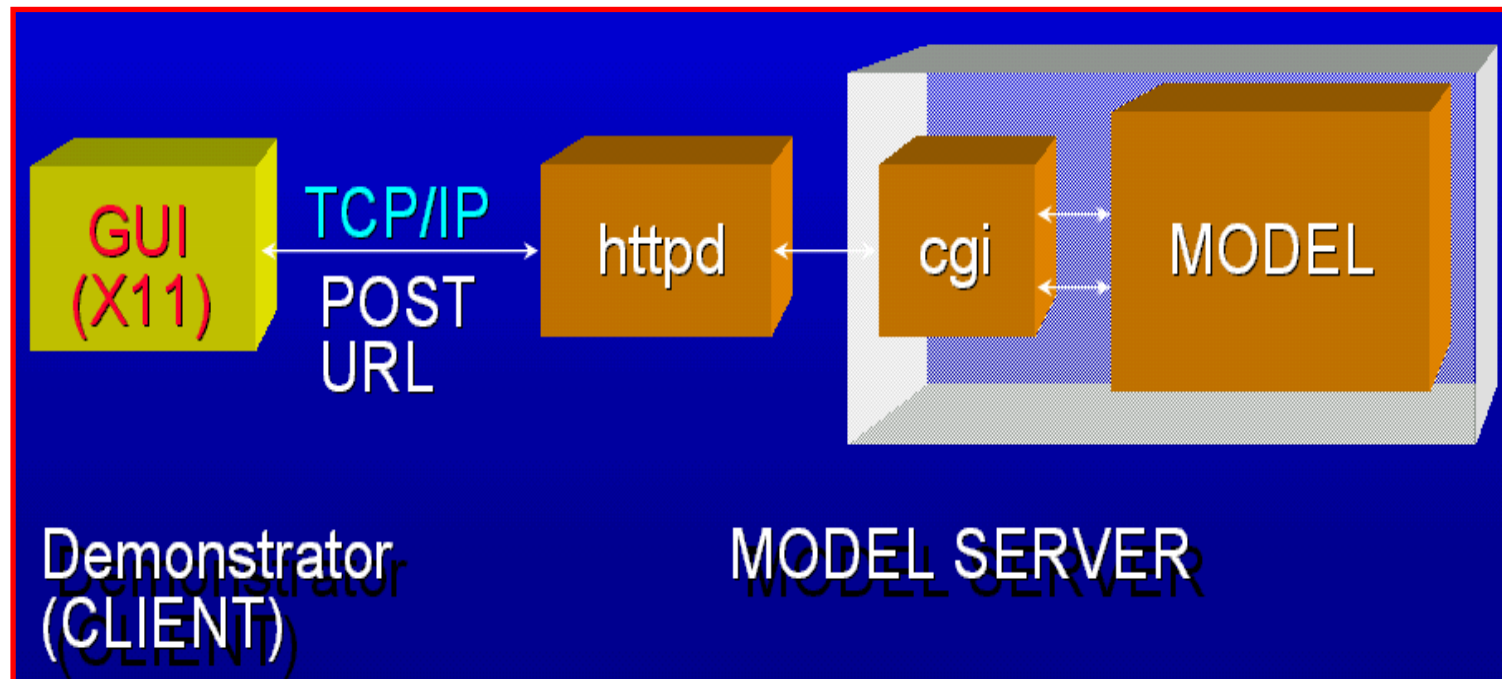
# An example
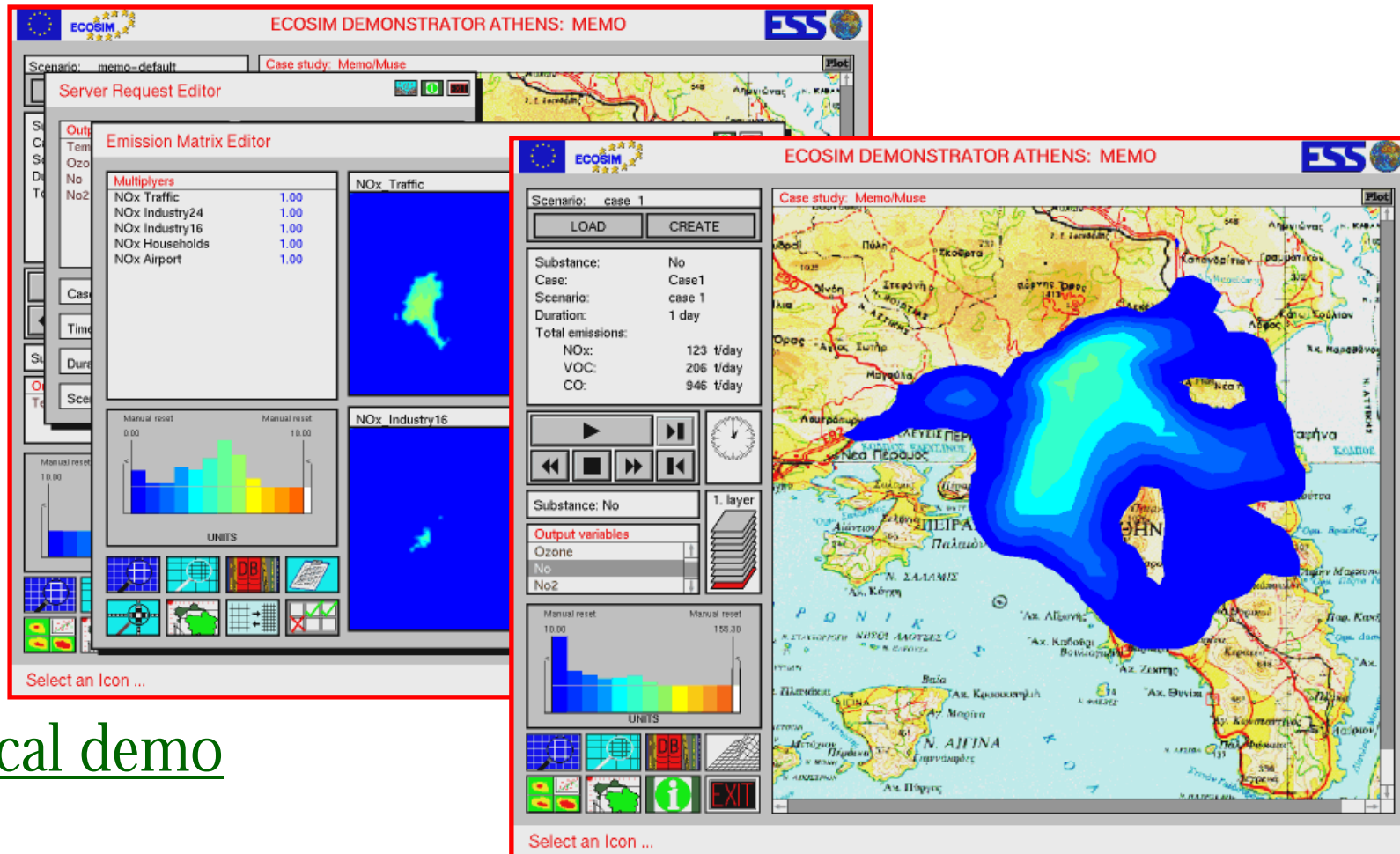


Local demo

# An updated approach: wizards

In many cases AQM usage requires advanced knowledge, CPU resources and domain expertise, while the requested outcome is information for a decision maker/politician, and the operator may be a "usual" employee of the Dept. of Environmental Management.

> ⇨ **wizards**, i/e interactive applications that support the user by providing information and guidance and by navigating him/her towards possible interfaces

# AQM wizard for serving the FD

The directions within the Directives rise a twofold challenge for the modelling research community;

    (i)  estimating spatial distributions of pollutant concentrations and

    (ii)  doing so for at least one year

The challenge can be met by using various AQM

↪A generalised **Model User's Interface** that guides users and supports compilation of input data/files, handling of model execution and output dissemination is required.

# The Model User's Interface (1/4)

- The MUI is a Java-based, general purpose environmental model interface.

- The application example presented here refers to the air quality model <u>OFIS</u>.

  - OFIS model characteristics
    - One executable file
    - Written in Fortran90
    - Gets parameters from <stdin>
    - Multiple data files
    - Multiple output (result) files
    - Less than 2 hours in a P4 2.0 GHz for a year simulation

# The Model User's Interface (2/4)

- MUI basic functionality
  - Check/authenticate user
  - Accept case studies (upload datafiles)
  - Manage the execution order
  - Provide status information to the user

# The Model User's Interface (3/4)

Client/server approach using Java2

- Client (user interface)
  - Establish connection to server
  - Data collection & parameterization
  - Upload/download data facilities
  - Show status of previous requests
- Server
  - Authenticate user
  - Store data until model execution
  - Store result data until user download
  - Provide status of current requests

# The Model User's Interface (4/4)
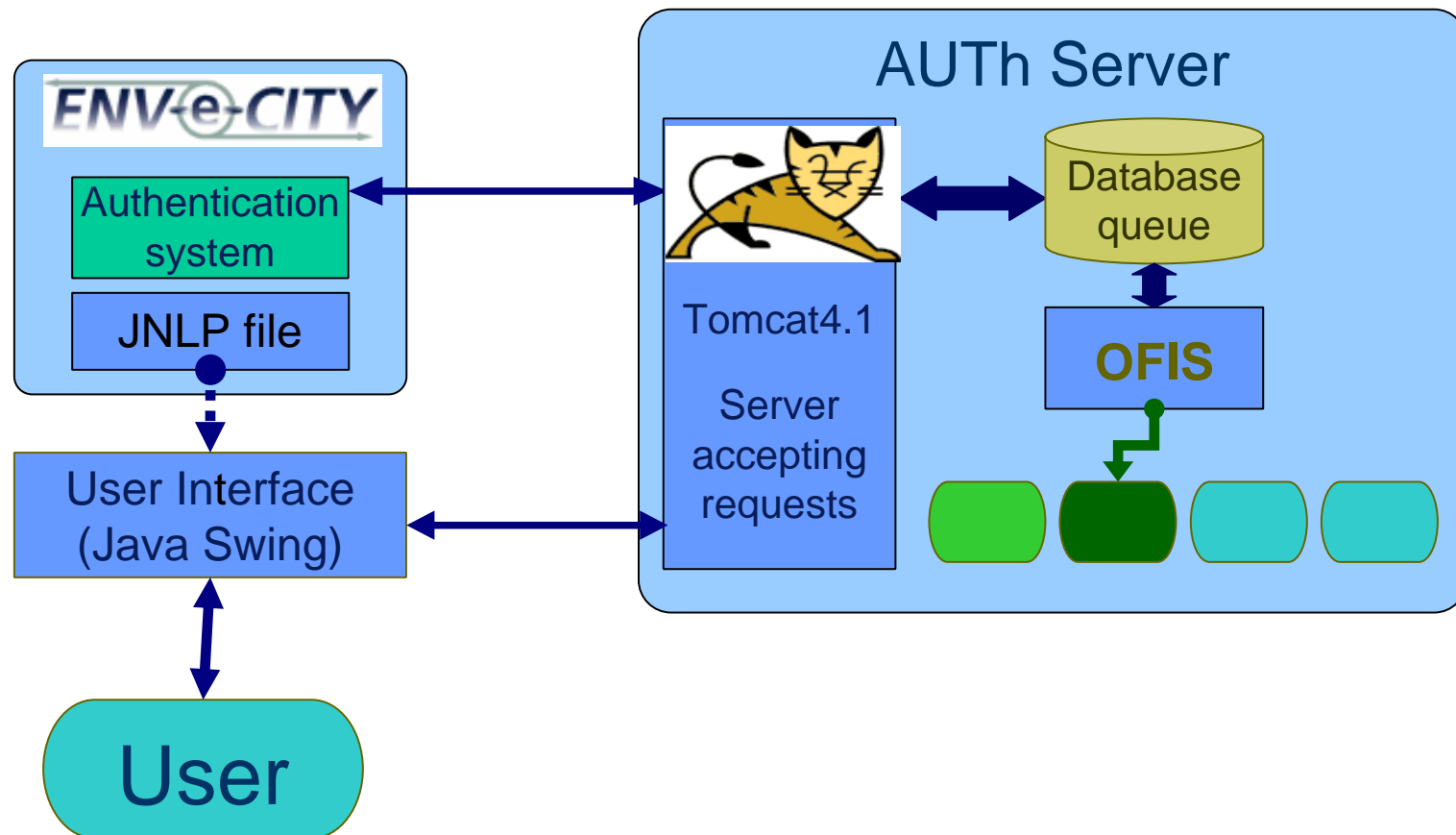
# MUI application example (1/9)
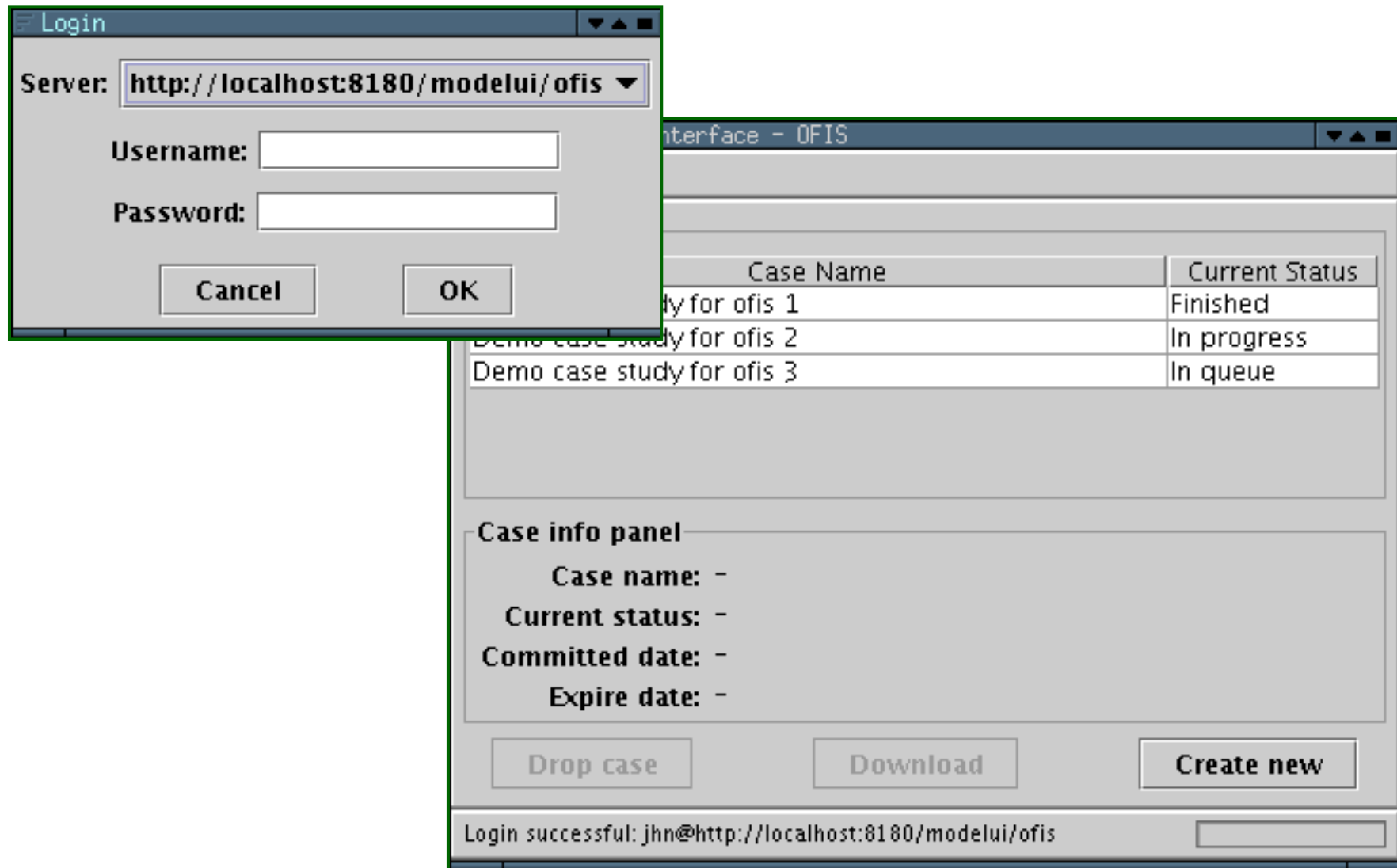
# MUI application example　　(2/9)
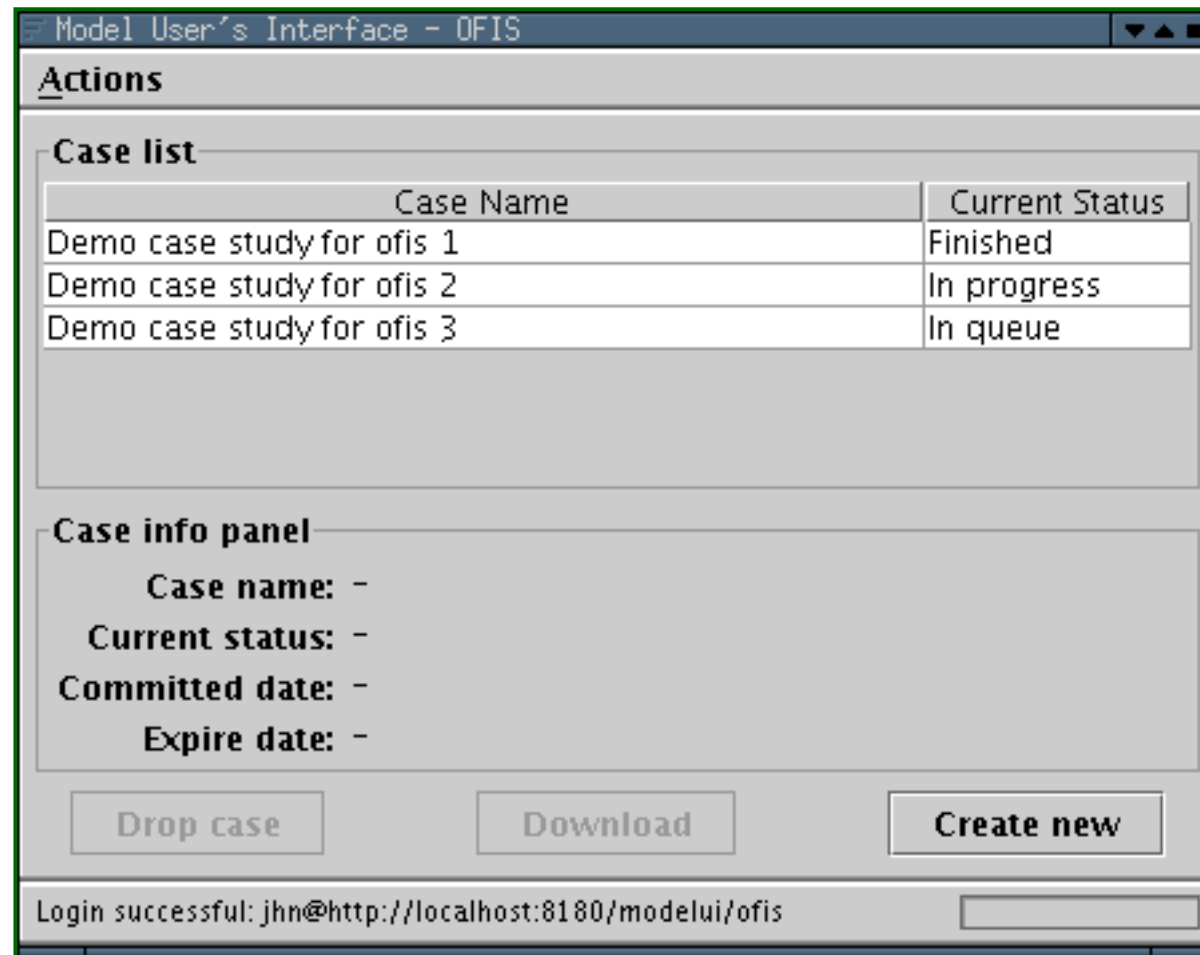
# MUI application example     (3/9)

Create new case study
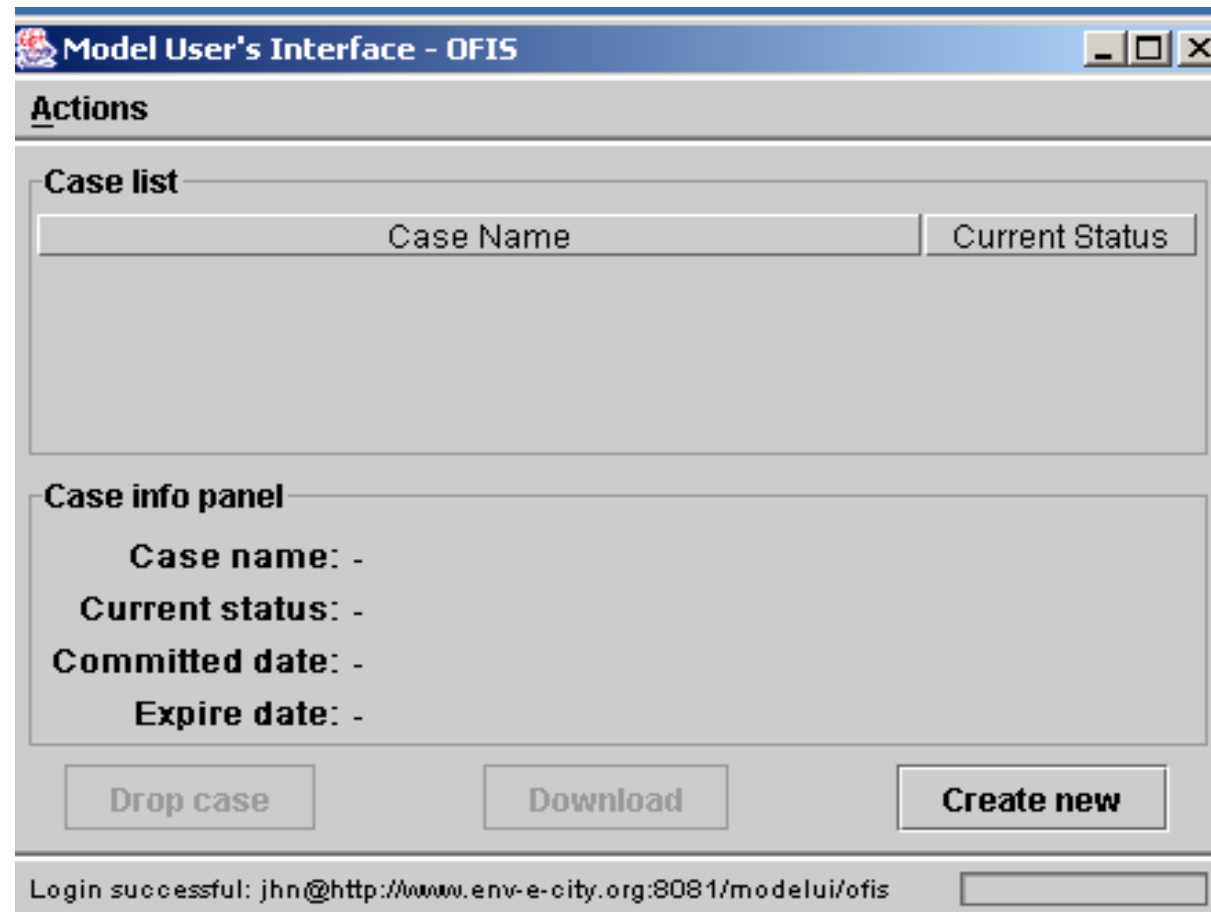
# MUI application example (4/9)

As a first step, insert case specific data.

Input files must be prepared according to the AQM (OFIS) manual available.



Press "Commit case" to run OFIS model.

# MUI application example      (5/9)

The interface continuously provides information on the status of the model run. The model run is in queue if the server is busy with other runs.

# MUI application example     (6/9)

When computations begin, the model run status indicates "in progress". The case can also be dropped, if so required.
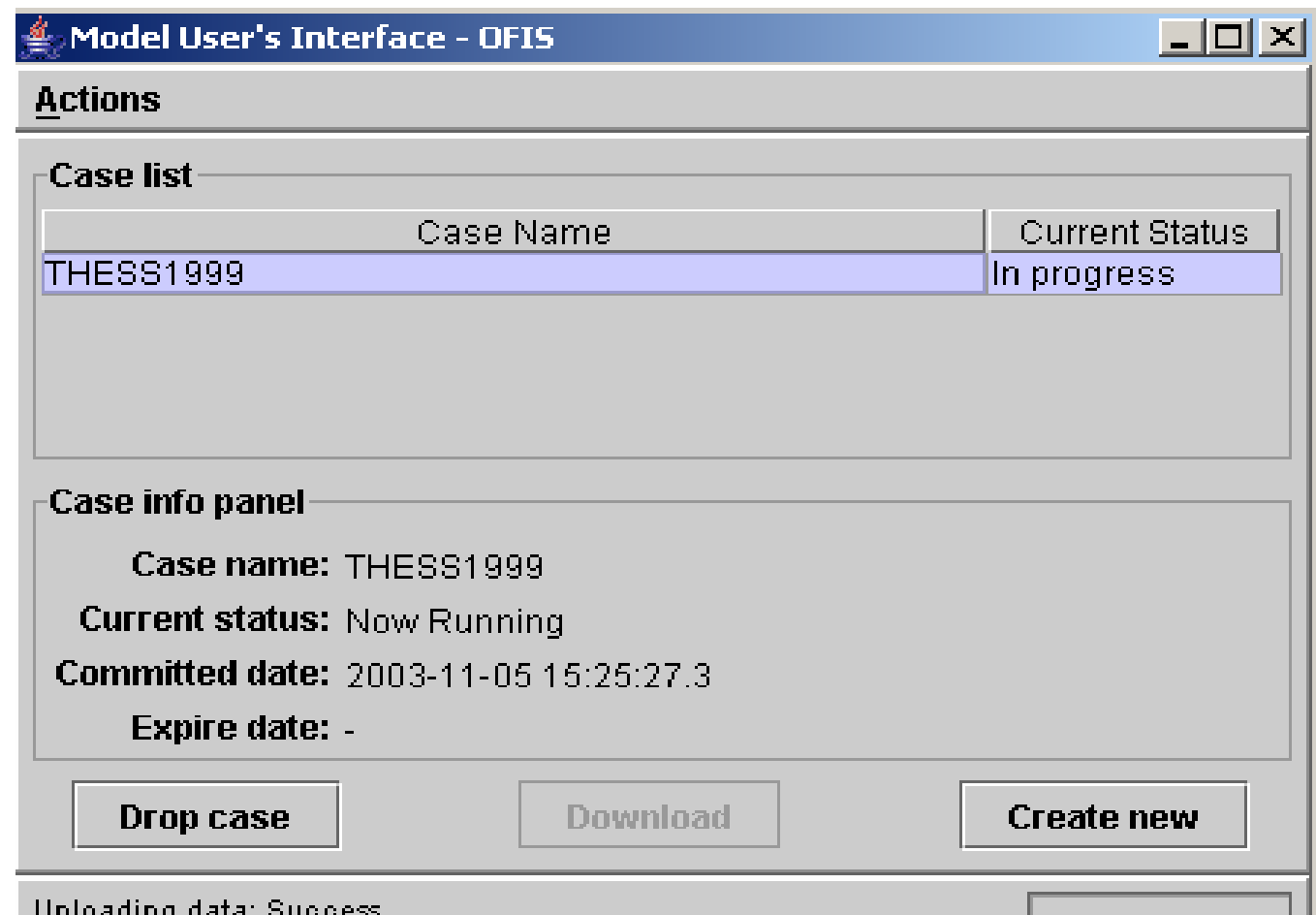
When the model run is finished, the results can be downloaded or the case can be dropped.
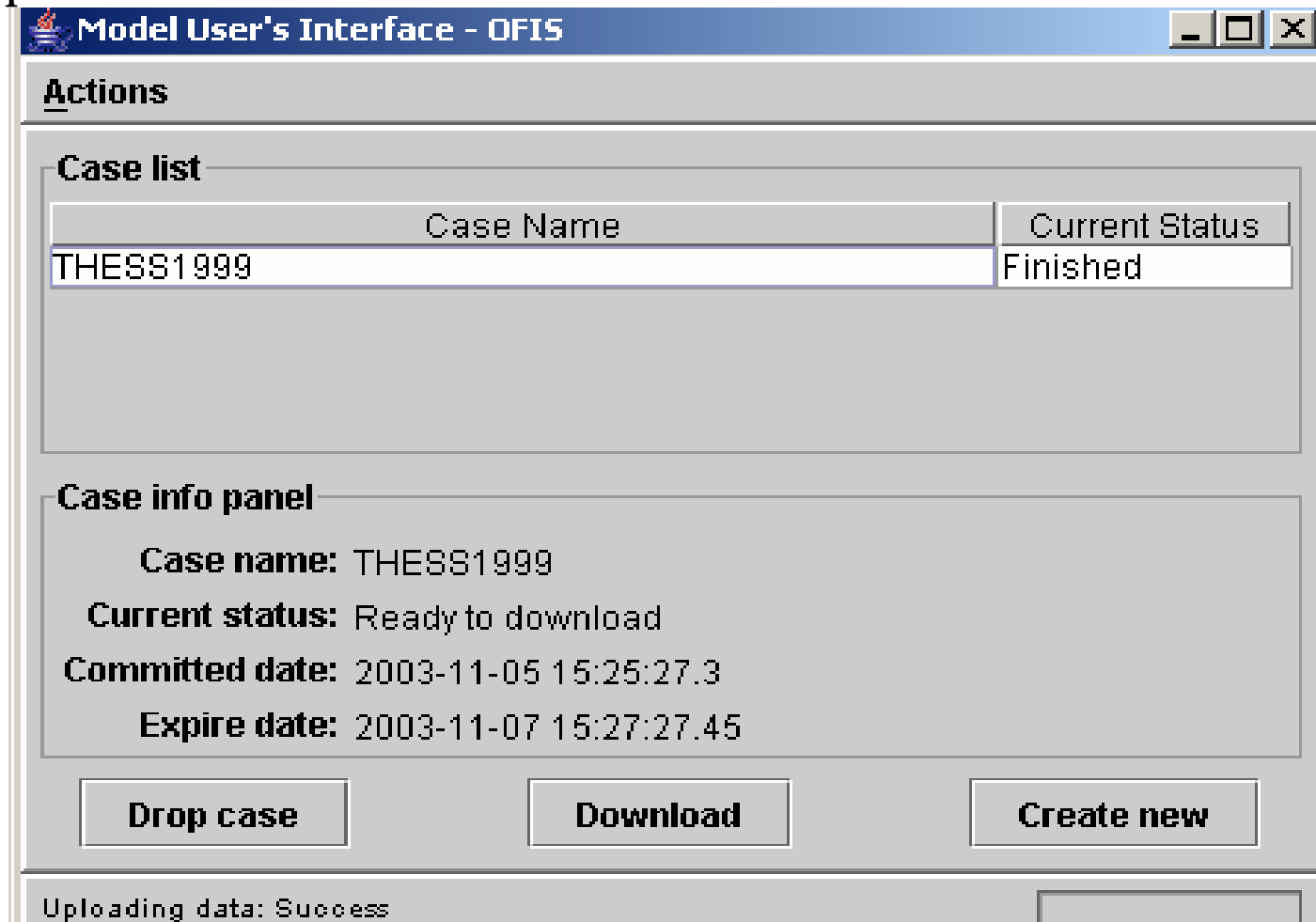
A zip file contains the case model results
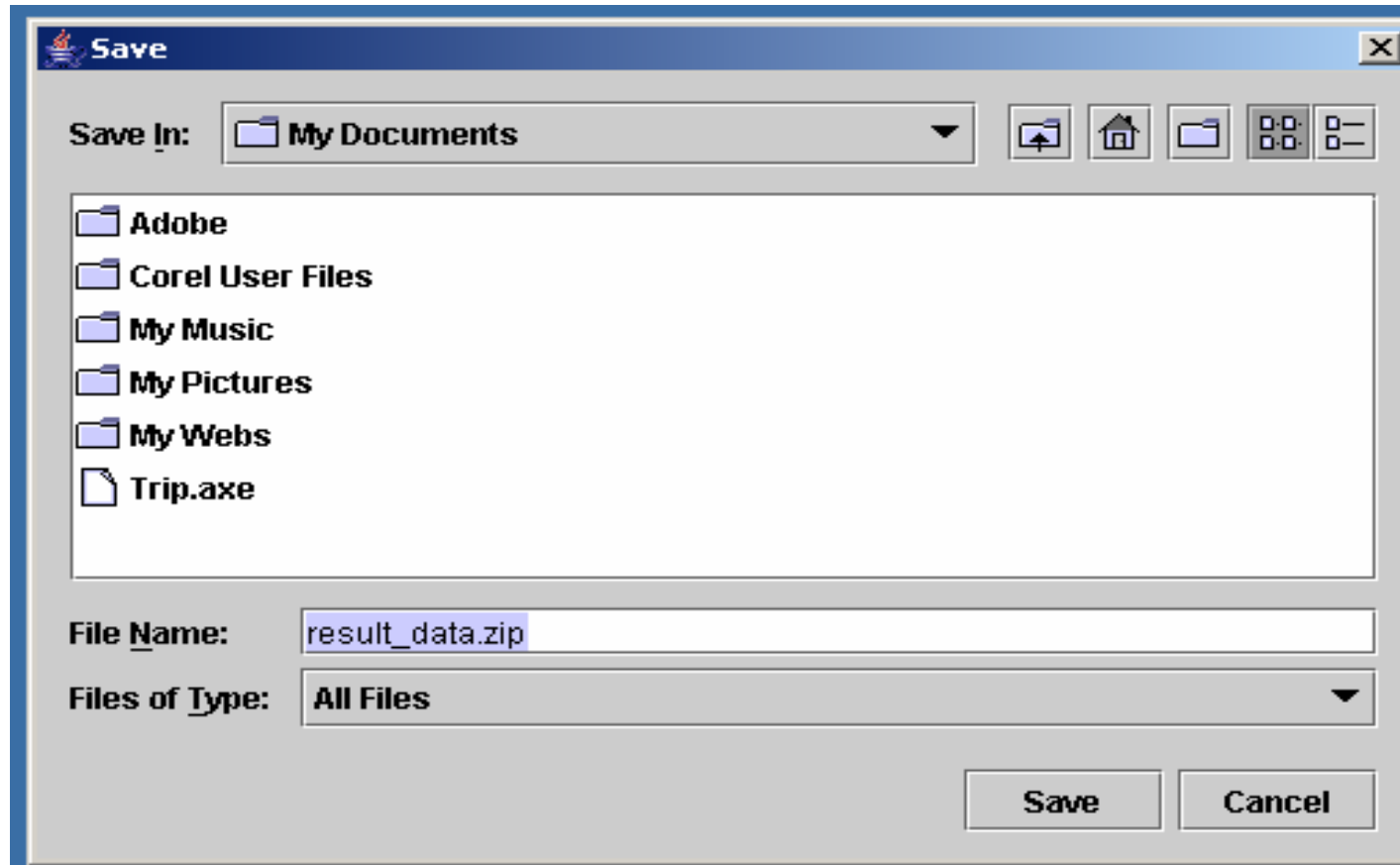


A .doc file is included, which contains a short description of the output.

## $O_3$ exceedance days above $120 \mu g/m^3$
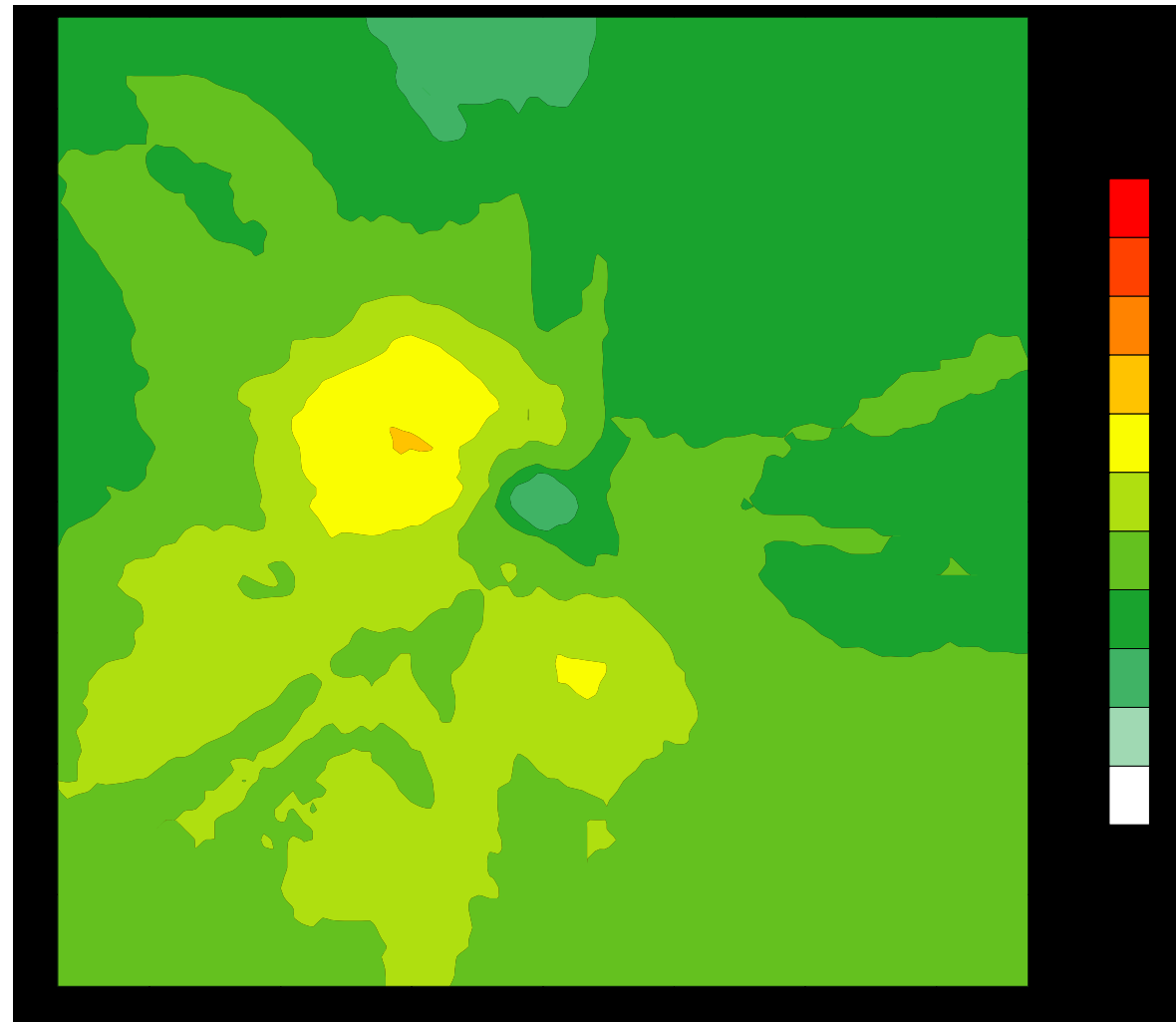
# The Model User's Interface

- A "how-to" document is available including:
  - Dependencies
    - *Running*
    - *Compiling*
  - Functionality
  - How to adapt **any** model
    - *Code structure*
    - *Model specific code*

# Some concluding thoughts
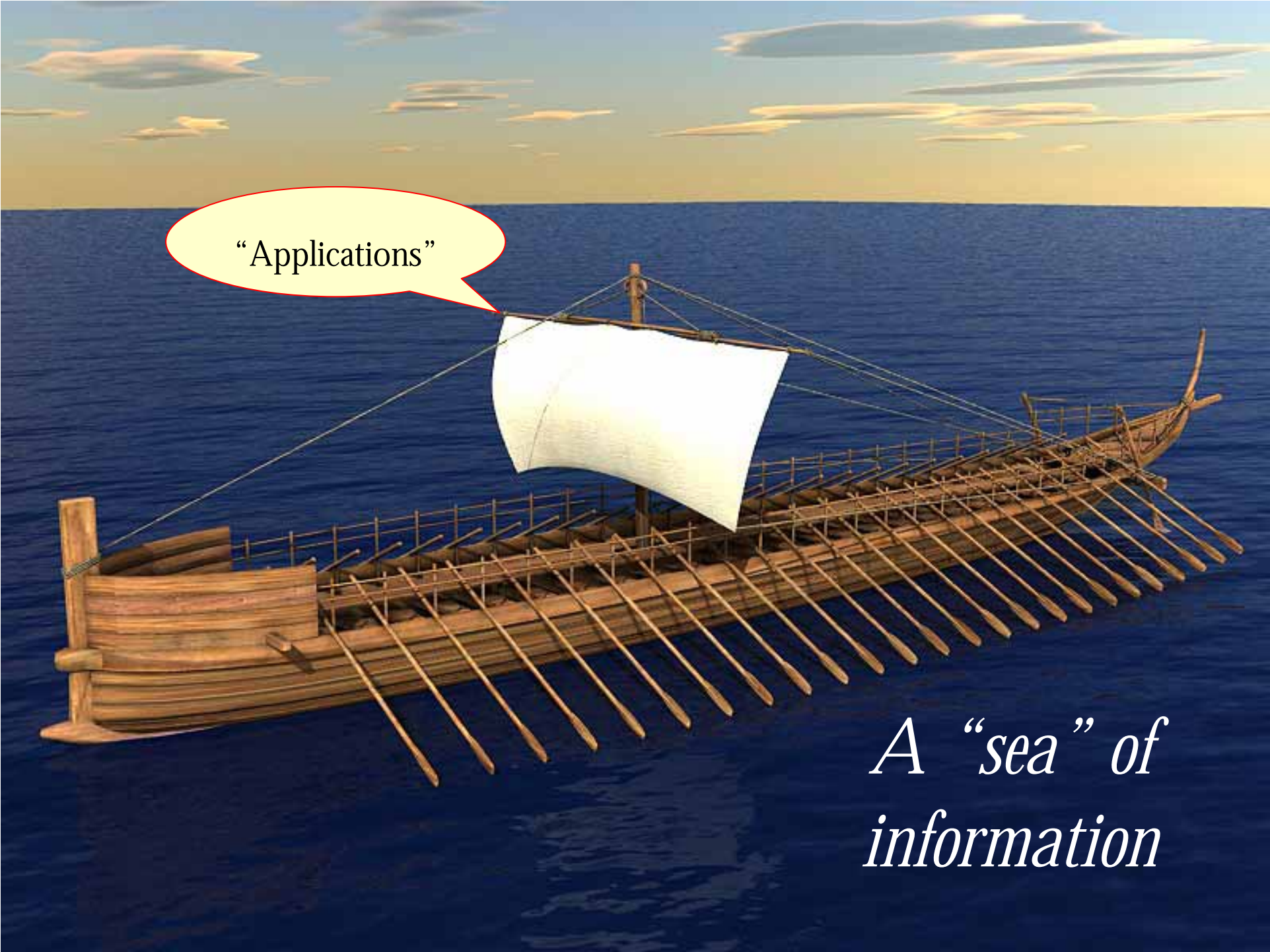
- AQM applications call for multi-domain, secure, interdisciplinary, frameworks for tool development and implementation.

- Thus, environmental simulation tasks call for internet based, flexible, secure, adaptable, low budget, ready to follow technological development, scalable solutions.

- Internet based and internet related technologies demonstrated, provide proof of concept.

- The future: distributed, heterogeneous, platform independent scientific simulation markup language ?

And…

You are invited to collaborate and join!

# Current and future trends in ICT for the environment:
# Environmental Information portals, services, and retrieval systems

# Applications: the "Argo" for EI

Due to the developments of ICT, the EI "universe" fuses more and more with cyberspace technologies, leading to interesting applications; two examples (paradigms) to be presented:

- Multi-dimensional categorisation, search and retrieval of EI within the textual universe of the world wide web, applying EI keywords and search tags that are semantically interconnected, for the renewable energy sector.

- A system that provides guidance for the adoption, implementation and support for the usage of environmental management and assessment methods in various production areas.

# Part A:

"Scouting for Renewable Energy Resources"
A short story

# What is it?

- Renscout is part of the B2B Renewable Energy portal
  - http://www.b2brenenergy.com
- News aggregator
- Notification system for renewable energy news, events, legislation and more.
- Multilingual
- First deployment for the Renewable Energy domain

# The Portal



**Navigating and retrieving information concerning Renewable Energy**

# Modular overview
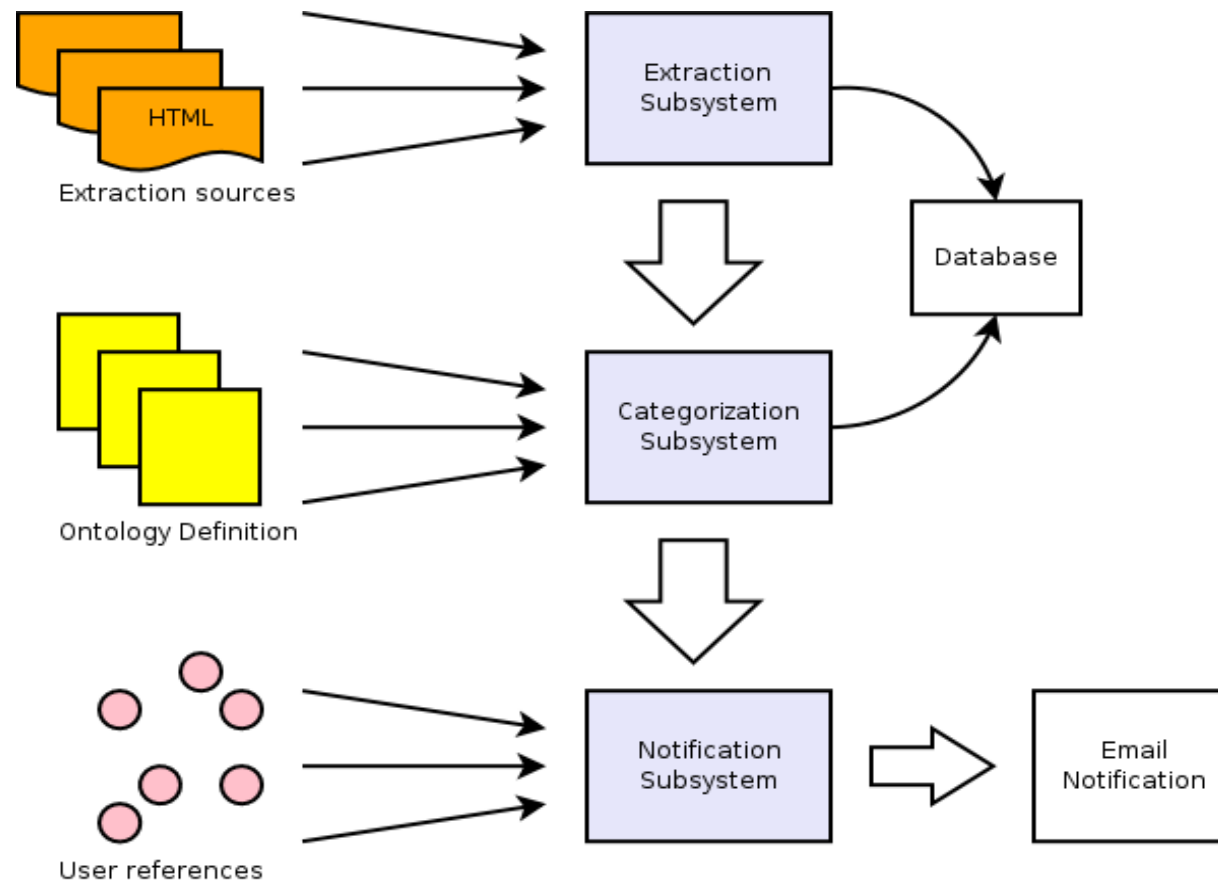
# What does it do? News Aggregation!
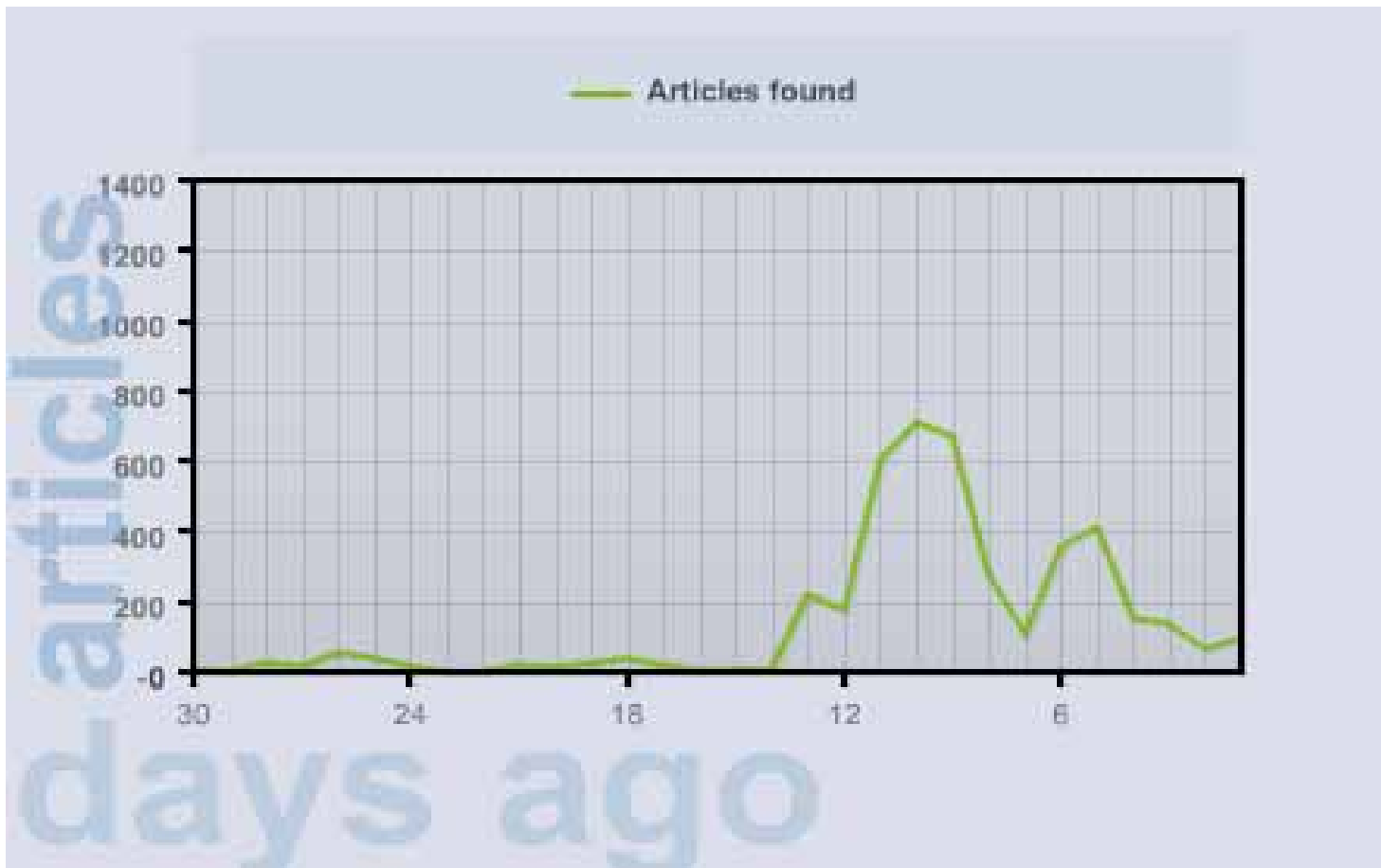
- News Aggregation
  - Collects information from many sites
  - Understands RSS
  - Has an HTML screen-scraping module
  - Can parse PDF files
- Many sources
  - News sites
  - Blogs
  - News aggregators
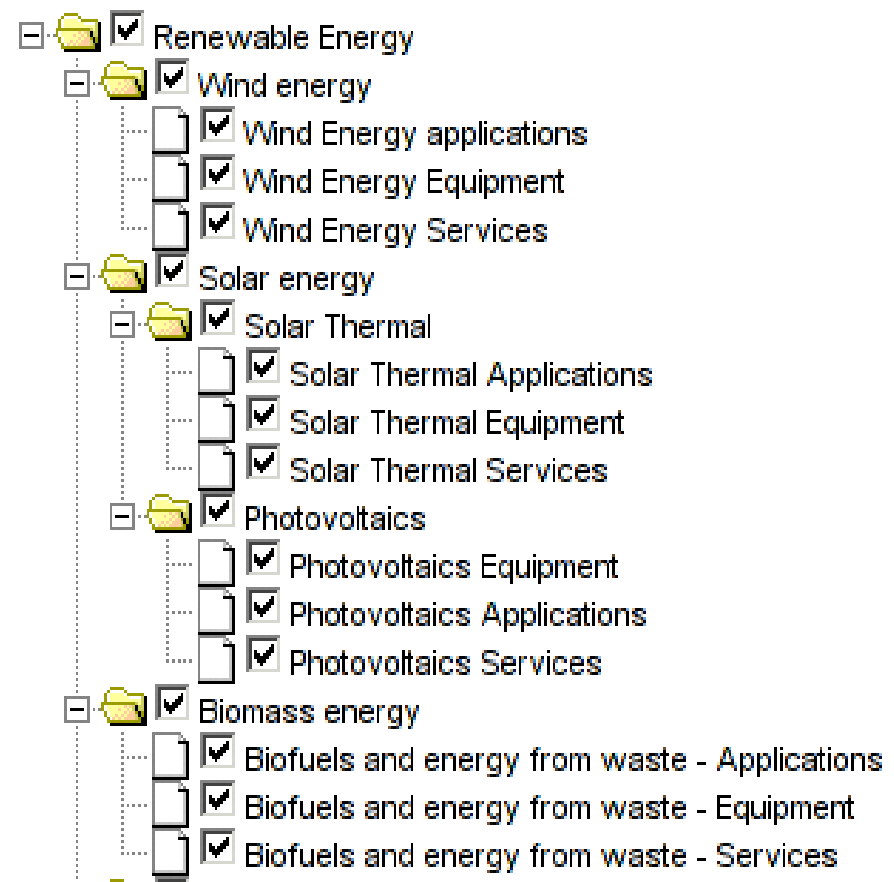  - Government portals
  - and more

# Total Articles extracted

- Spike due to added extractors

# Interlude: Ontology

- Domain experts define a ontology with the concepts of the problem domain

- Definition contains rules that allow automatic categorization to the ontology

# What does it do? Categorization!

- Matches a news article against the ontology
- Multiple matches are possible
- Relevance is computed for each match
- Multilingual
- Future goal:
  - improve system by automatic evaluation of user feedback

# Total Articles vs Categorized Articles

- Spike due to added extractors
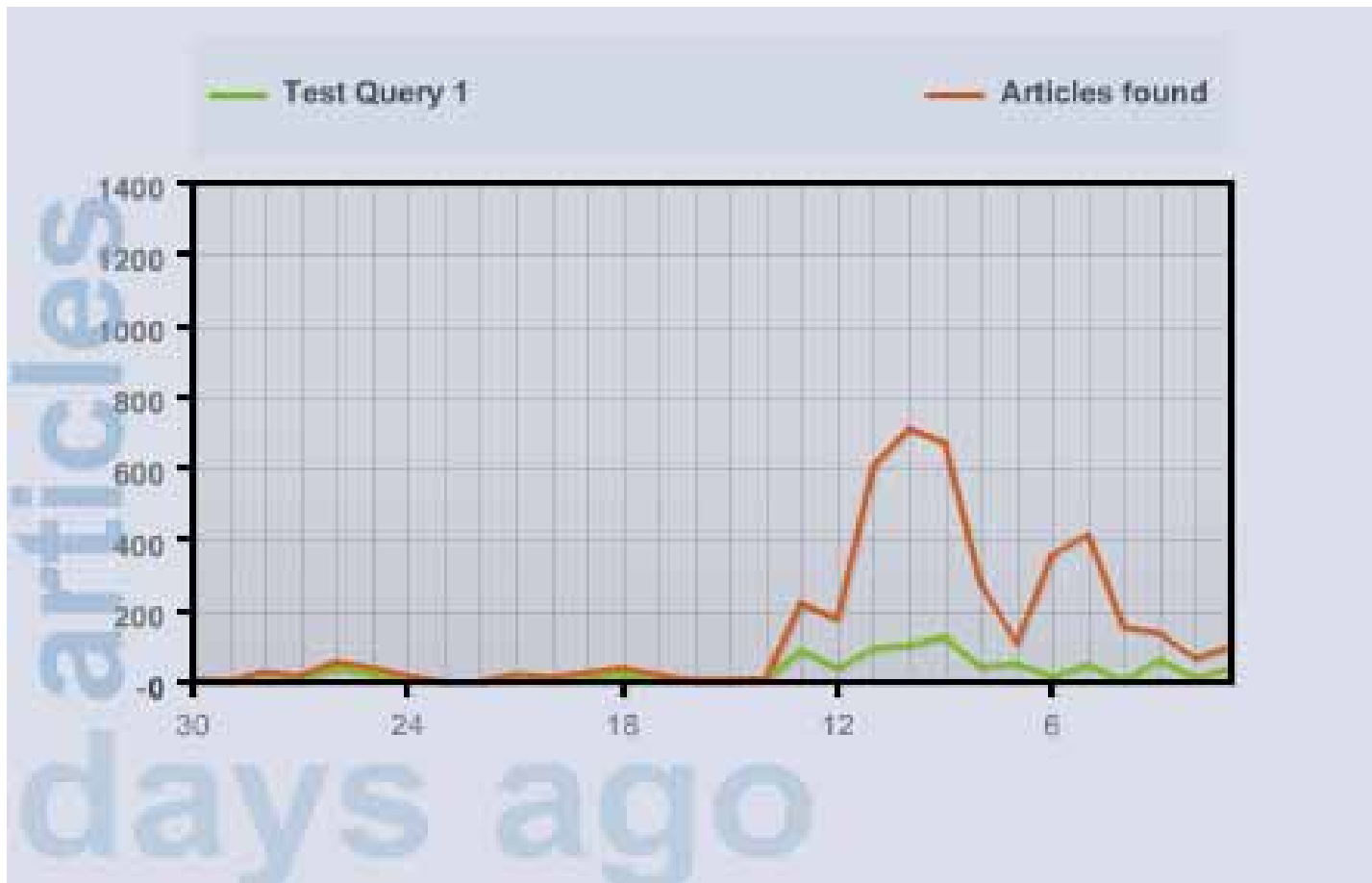
# What does it do? Notification!

- User matching
  - Users define queries using ontology concepts
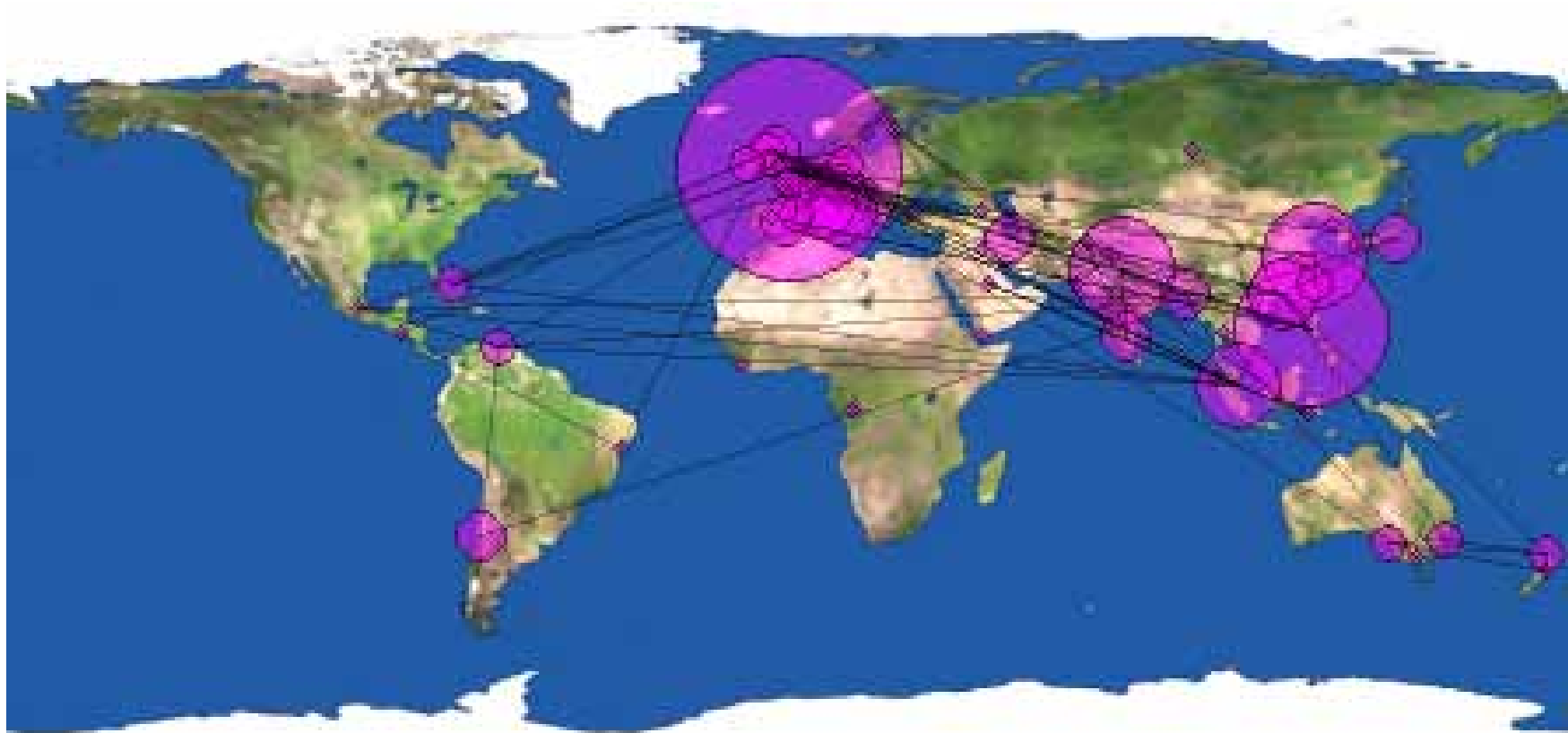  - News articles are matched against the users preferences
- User notification
  - Notification system sends email or SMS* when new articles match
  - Configurable notification periods
  - Multilingual
  - Can separate official from unofficial sources (like blogs)

# Bonus round:
# Geographical mapping

□ Looking for city names in the articles:

# Implementation

- Platform uses Java and FOSS frameworks
  - Implemented as a Servlet
    - Remote management, administration over the web
  - Uses Apache Turbine as the framework
    - Provides scheduling services, templating, access control, database abstraction using Apache Torque, mail templates
- Screen-scraping using XQuery
  - Optional pass using JTidy to convert to XML DOM
  - XQuery engine uses Saxon v8

# Future Work

- More accurate categorization
- More extraction rules
  - RSS sites need 5-15 man-minutes for extractor setup, verification and deployment
  - HTML sites need 15-120 man-minutes for extractor setup, verification and deployment
- More notification types
  - SMS is under development
  - Jabber or other IM system is considered for immediate notification
- Automatic user feedback evaluation

# Renscout: some conclusions

Environmental information aggregators may support both horizontal and vertical information categorization

EI services may be advanced when an related ontology has been developed

EI workflow analysis may provide new insights to emerging business models

# Part B:

"Keen for "green""
Or how to support SMEs when adopting IPP

eco
sme s

services for
green products
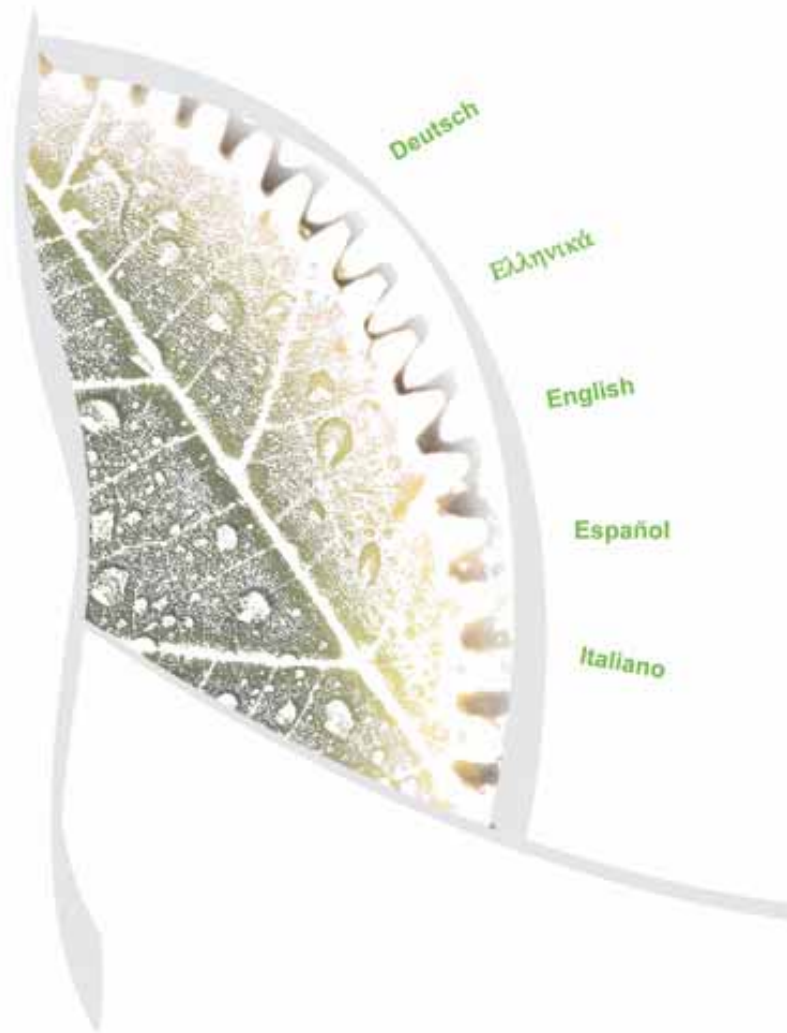
Project financed
by the European Commission

Deutsch

Ελληνικά

English

Español

Italiano

[ copyright ]   [ disclaimer]   [ about us ]

**A one-stop shop website to address the difficulties that SMEs
are likely to face when adopting IPP**

# IPP Context

□ **Integrated Product Policy, IPP, aims to**:

- ■ promote the demand and offer of "greener" products through **life-cycle approaches**, **environmental management tools** and **eco-labelling**

- ■ involve all the actors through **dissemination of environmental information** along the value chain

- ■ allocate responsibility by concept as "Extended Producer Responsibility"

# What is LCA?

☐ **Environmental Life-Cycle Assessment (LCA) is a quantitative methodology:**

- ■ to identify and evaluate environmental burdens associated with the life cycles of products and services in a "cradle-to-grave" approach
- ■ used as common basis in different IPP tools

# Our contribution: HSD

Development of a number of modules-applications, including

- news,

- events,

- consultancies,

- a documents file manager,

- an eco-products list,

- a newsletter,

- a mail notification service, and

- a contacts and links section,

on the basis of predefined functional specifications

| Deutsch | | | | |
| Ελληνικά | | | | |
| **English** | **eco** **sme**s | | | Site Map |
| Español | | | | |
| Italiano | services for green products | | | |
| News | Events | Eco-products | Consulting | Newsletter |
| Documents | Glossary | F.A.Q. | Links | Contact us |

You are in: Home > Info (1/1)                    Search  [ Advanced ]

Java classes !!!

# EcoSMEs: some conclusions

- Open Source an ideal, robust and productive software development solution

- Software engineering principles should **always** be followed

- Environmental Information portals, and related services, infrastructures and business activities can be developed under a multilingual platform

- Suitable for B2B communications

- Ideal platform for supporting guidance towards adaptation of regulations like the ones for environment, quality and safety, concerning the business sector and for collecting and distributing related know-how

# Conclusions

□ There is a need for environmental information management and dissemination services, developed as system modules, that would allow for implementing a homogenized, service-based, user perspective of heterogeneous data

□ Flexible architectures should be combined with open source software resources, thus enhancing the application domain of developed modules

# Thank you!