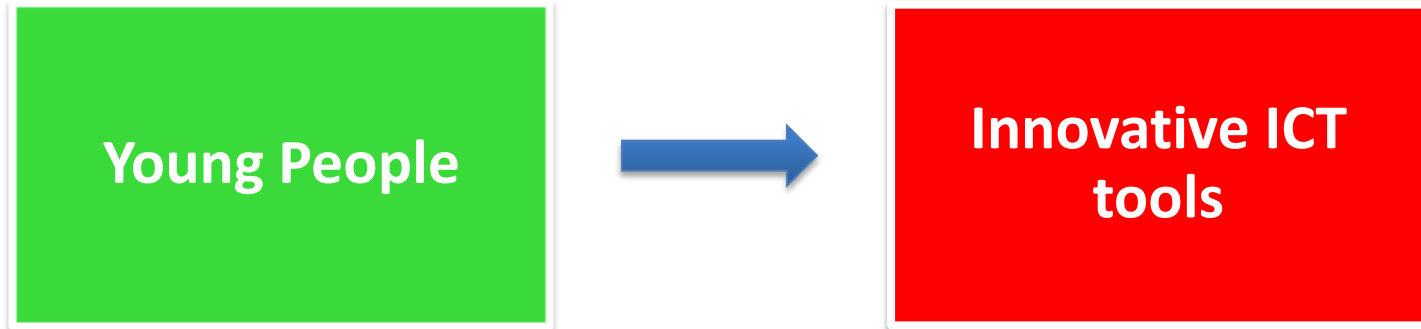


# The WebValley Project

how to involve smart young people  
in interdisciplinary science  
(and in the math behind)

2001-2011

# WebValley Concept



- **WebValley** is the FBK summer school for dissemination of interdisciplinary scientific research
- **The WebValley formula**, since 2001, is to create a team of enthusiast and motivated high school students (18 y) tutored by experienced researchers. The project activities are developed mostly working in groups, in a high-tech lab located in a tiny Alpine village
- **The team accepts a challenge** by a scientist collaborator from Ecology, Biology or Social Sciences, and **develops in three weeks a new web-based prototype for data analysis and management.**

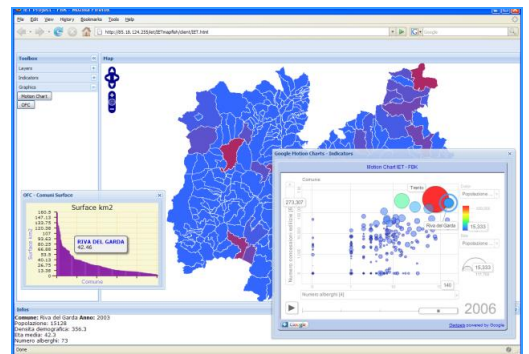
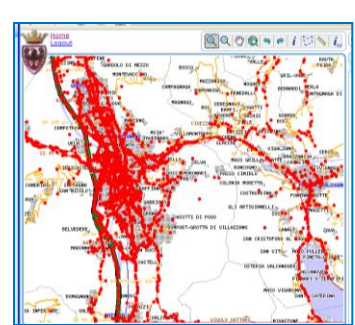
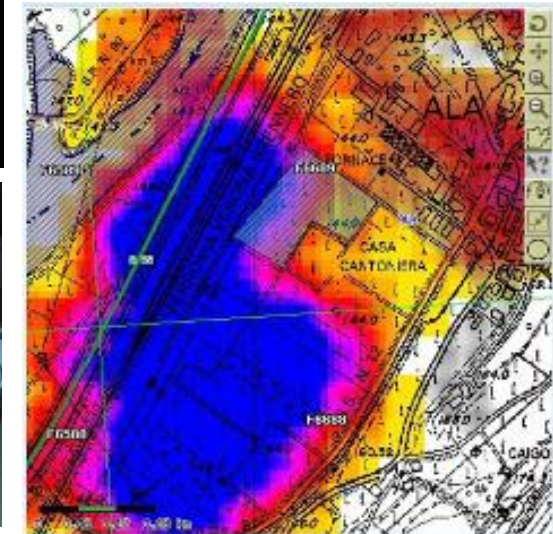
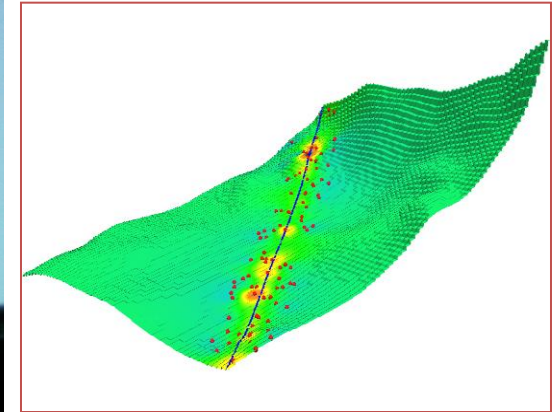
# Examples

- **2008: Dynamic graphs** for scientific and public awareness of socio-economic progress indicators
- **2009: Data sonification methods** for identification of trends and novelty patterns in complex time series
- **2010: A Web platform for downscaling of climate change indicators** → **2011: How to understand change?**
- **Challenged by:** INTERSOS, OECD, 2010 -2011 - Envirochange, UNEP, MUSE TN
- **Algorithms, scientific computing, databases, GPGPU computing, Web-based prototypes, public presentation.**

**WebGIS on interactive SMART Board:** high resolution imageries (Google Earth) are projected to geo-locate facilities and other elements of refugee/IDP camps. Digitalized objects and census data are used by web statistical analysis to highlight sectoral gaps.



WebGIS Tools for Humanitarian Response (with Intersos, 2007)



# Project Vision

## BASIC NOTIONS

1. Encourage smart students to be entrepreneurs in science
2. Interdisciplinary
3. Transform internet into an innovation building environment
4. Develop team work, collaboration, fast-prototyping attitudes
5. Use sophisticated open source methods in an informal teaching environment
6. Propose challenging themes of ethical interest
7. Use high quality data from scientific or statistical institutions.
8. Learn to use standard formats

But also **learn from young people** how fast they are developing new skills and which is the potential for a new generation of scientists



Day 2: Tutorial by E. Giovannini OECD (LusernaLab, 2008)



Debate on progress definition with Samaah Abdallah of the New Economics Foundation (Lusernarhof, 2008)

# INSIDE THE BOX

**The Upscale Challenge:** New methods for modeling complex data at ultra-high throughput ( $10^6$  features,  $10^3$ - $10^4$  samples)

Science needs models, data services & web-interfaces

- **Scientific Computing**
- **Machine Learning**
- **Computational Pipelines for Reproducible research:**  
predictive biomarkers
- **Individual Based Epidemiologic Models:** virtual society
- **High Resolution Geospatial data:** climate change studies
- **Visualization**

ML

IBM

GIS

Reproducibility

HPC

Mobile Comp

Web  
Infrastructures



**Since 2001: more than 220 alumni**

# The new colleagues

**RESEARCH & STUDY:** 220 alumni are between 28 and 19 years old today.  
Many visited the FBK-IRST campus to:

- Continue working on their WebValley projects
- Develop new projects
- Carry out stage and thesis projects
- Work part time as “Junior Researcher” or “Scientific programmer”, contributing to national and international projects (currently 4 in MPBA)

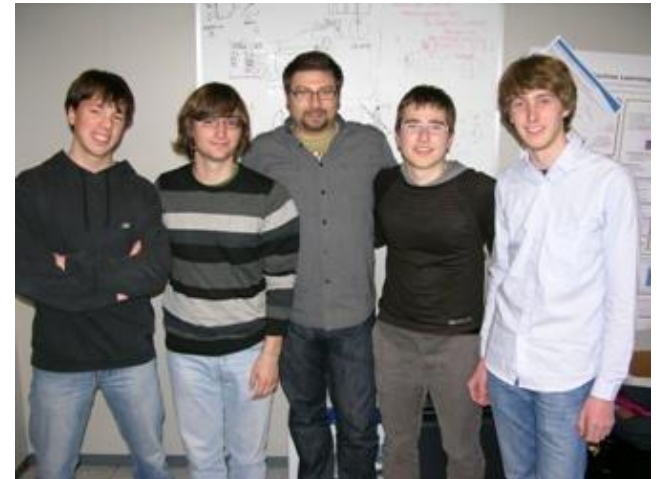


- **JUNIOR TUTORS:** Each year, 2-3 students from previous editions are recruited as tutors. A former student is now the on-site sysop of the WebValley lab



# Connecting to Schools

- **200 alumni** , ~ **30 reference teachers**
- **Open without restriction to all high schools in Trentino-AA**
- **WilmaStat:** pluriannual project with Marconi High School Rovereto for data collection tools for statistical survey using mobile devices, a central server and a web interface, funded by Fondaz. Caritro
- **Lichen:** biannual interdisciplinary project with ITG Pozzo (biology, GIS, topography) for bioindicator monitoring funded by Fondaz. Caritro
- **International prize "Junge Forscher gesucht!"**
  - Award 2006: "GIS methods for ecologic accessibility"
  - Award 2010: "A web-based platform for experimental design and time series analysis with GPGPU"
- **2010-2012: "Mobile Scientific Computing"** a project for Ist. Battisti Bolzano, with EURAC Bolzano: an introduction to Scientific Computing with Python and interdisciplinary applications



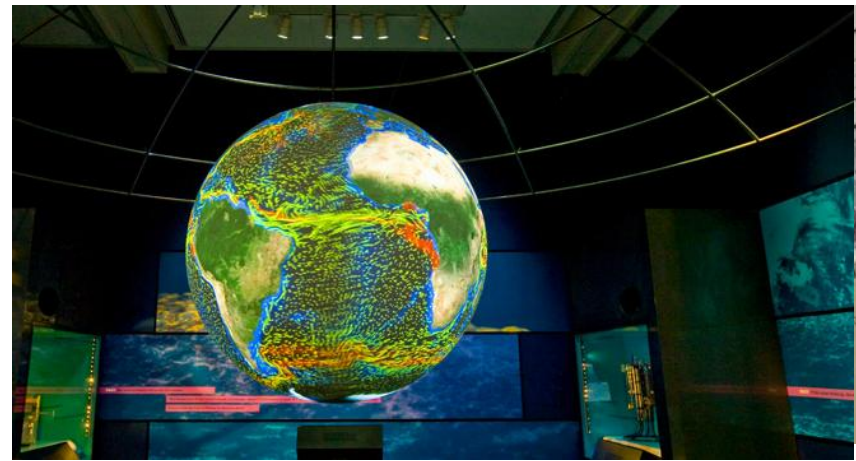
# The Climate Change Projects

- **2010: Climate Change!** Multi-scale models to combine and compare **global information with local data**
- The result: **GeoscalerHub**:
  - A **WebGIS platform** to compute and visualize local and global **climate change indicators**
  - **Datasets:** Prudence, WorldClim
  - Downscaling algorithms adapted to the Alpine system and validated with real high res. data
- **Technical collaborations:** UNEP, EURAC, ISTAT, spatial-ecology.org





**WebValley International 2011**  
(June 19 – July 09)



**The project theme of 2011** is developing a **Web-Kinect-GIS interface** to climate change data. Novel ways to interact with maps and complex environmental scenarios, including gesture and use of smartphones will be explored. A concept prototype exhibit will be developed for the new Trento Science museum (designed by Renzo Piano)

**Underlying vision:** innovation in understanding scientific data; Scientific reproducibility; improve awareness to climate change data, uncertainty and costs of extreme events

**In collaboration with:** international experts from: Global Biodiversity Information Facility (GBIF), Landcare Research NZ, spatial/ecology.net, Mach Foundation (EnviroChange and gene plasticity projects)



# New Partners



**WebValley International 2011:** 22 high school students from Italy and the USA, interested in biology, ecology, mathematics, informatics.

From a total of 103 candidates preselected by schools:

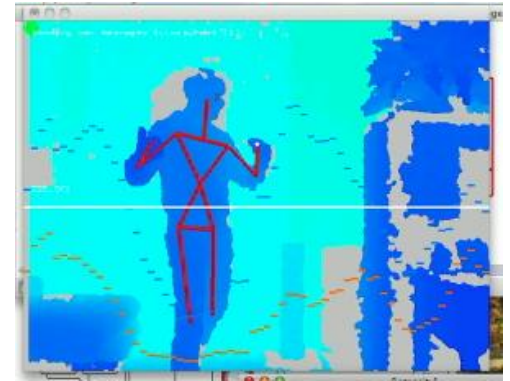
- 11 students from Trentino—AA
- 4 Italian extra-regional students (co-funded by Piano Nazionale Lauree Scientifiche- Mat/Stat areas and Rotary Fermo)
- **6 USA INTEL ISEF Finalists (sponsored by FBK Admin. Board Trust)**
- **1 USA** Philadelphia, North Penn High School, PA, USA



**WebValley 2011: event sponsored by the Italian Embassy in Wash. D.C. ,  
with the endorsement of the UNESCO Venice Office**



# Summary



Another type of “journey to co”:

- 1. After 11 years, now a replicable experiment**  
(through the alumni network)
- 2. Multi-task abilities, including the math behind**
- 3. ICT 4 Climate Change? New data patterns, high-throughput datasets and web interfaces, public awareness of scientific challenges to drive response**

*Need to invest in young people along this journey,  
WebValley is helping us much more than what we are giving.*

