

Transacqua, Primiero

June 17-July 7, 2012



2012 International Edition  
FIRST CALL ANNOUNCEMENT  
20 April 2012

<http://webvalley.fbk.eu>



## DATA & METADATA

From datasources into GH: also **Metadata**  
**definitions** (precise information about o  
generation, quality, availability)

- means of creation
- purpose of the data
- time and date of
- creator or author
- placement of  
where the data
- which standards us

## The 2012 International Edition

Fondazione Bruno Kessler (FBK) is glad to announce the organization of **WebValley 2012 - International in Primiero, Trentino (June 17-July 7, 2012)**. On-line applications: **Apr 24 - May 21**.

WebValley is the FBK summer school for dissemination of interdisciplinary research: **almost 250 students (17-18y old)** have attended the WebValley camps since its first edition in 2001. WebValley started as a regional initiative for high school students from Trentino Alto-Adige SudTirol, and it is now an opportunity for national and international students to experiment scientific research.

**Multi-scale science: the nanoWebGIS interface for molecular medicine data**, this is the title of the 2012 edition. The project will aim at sketching a new type of interface to big data in molecular biology. Labs are generating more and more massive amounts of imaging data at scales from tissue to cell aggregates and single cell environment scales that can be characterized by their spatial description and possibly dynamic evolution in time. The software shall offer on-line spatial exploration of data, from lab instruments or simulated environments of 2D/3D cellular dynamics. The challenge is to use for the first time the latest techs applied in the GIS over internet domain, capable to harmonize complex data and different scales. **The project shall enable the sharing between scientists of multi-scale studies, the overlay of models and real data, with an interaction based on Kinect and Android interfaces.** We aim to extend the tools we built in 2011 for the amazing Kinect controller adding an interaction with Smart WebTV displays to the newest GIS and WebGIS methods.

**Fellowships** will include full tuition, accommodation and travel costs. Thanks to cofunding by collaborating institutions, for the 2012 edition, **18 fellowships are available** for students from:

7 Trentino-AltoAdige/SüdTirol

4 National (co-funding : PLS - National Program for Mathematics and Science Education)

7 International (co-funding: FBK Trustees Board)

The **requirements** to participate are:

- High School student (for Italy: 4th year completed)
- Good knowledge of English
- Enthusiasm in science and new technologies
- Above-average school records
- 2 letters: 1 Student Motivation letter and 1 Teacher's Recommendation letter



## The Programme

### Welcome to the Lab

Resources (1)  
Team Building (2)  
The Challenge (1)

### Basics & Tools

Web2.0 collaborative tools (1.5)  
The Open Source paradigms (2)  
Intellectual properties (2)

### Computer Science Background

Linux Operating System (3)  
Intro to programming with Python (4)  
Object Oriented Programming (2)  
Web Technologies: HTML/CSS/JS (3)  
Virtualization and Cloud Computing (1.5)  
Scientific Python (3)

### Statistical Background

Basics of Statistics with R (2)  
Interactive Data Visualization (1)  
Geostatistics (1.5)  
Machine Learning (1)

### New Interfaces

3D Sensors (Kinect, TOF, ..) Lab (2)  
Body-patterns and interaction (1)  
Mobile Personal Interfaces Lab (2)

### Biological Background

Synthetic Biology: the spatial patterns and emergence of 'Life in cell-like systems' (2)  
Immune system -cells, tissues and organs (1)  
Microbes (1)  
Host-pathogen interactions (1)  
TB as an example (1)

### Mathematical Modeling for Biology

Differential equation models (1-2)  
Individual/agent based (1-2)  
Multi-scale multi-compartmental models (1-2)

### Databases & Web

Science, Big Data, and Reproducibility (1)  
Intro to Databases (2)  
Intro to GeoDatabases (1.5)  
OpenLayer, ExtJS and GeoServer (1.5)

### Geospatial Computing

Intro to GRASS GIS and QGIS: (4)  
Geographic data and cartography (1.5)  
WebGIS and applications (2)

### Multi-scale analyses in the environment:

Urban ecology: GIS Apps and Analyses (2)  
Analysis of spatial/temporal scales (1)  
Intracellular processes and structures (1-2)

### Teamwork

Lab work, discussions and special topics presentations (70)  
Excursion and Leisure Time (50)  
Final Presentation (10)

### Lab opening times: from 9 to 24

See course material for 2011 at  
<http://webvalley.fbk.eu/lectures>



## A Summer School since 2001

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### THE AIM

The school aims to **introduce students to interdisciplinary research by combining a scientific challenge and new technologies**, favoring the participation of female and male students in projects and innovation. The WebValley Lab will provide computing resources and devices (e.g. , Kinect, Android smartphones, WebTV) to test new ways of exploring data patterns. Students joining the school work in a lively and interactive atmosphere together with a group of researchers from the Bruno Kessler Foundation and selected experts, also interacting through teleconference with other labs. The 2012 project will have the support of international experts in mathematics of biological systems, molecular and computational biology.

### THE FORMULA

- **Create a team of enthusiastic and motivated high school students (18 y) tutored by researchers.**
- **The team accepts a challenge** by a collaborating scientist from Ecology, Biology or Social Sciences and develops in **three weeks** a new web-based prototype for data analysis and management. In 2012, the project will be commissioned directly by FBK and Kirschner Lab (Univ Michigan).
- Students are introduced to **Open Source** software solutions (scientific programming, web interfaces, database, GIS and data analysis); they discuss, design and develop the new system interacting with scientists. They learn to select tools, organize their own workplan, and respond with a new solution to a problem of ethical interest. A working prototype web solution and technical results are presented at the end of the three week period.
- **The project activities are developed mostly in teamwork** as in a true research environment, that is informal and of high quality in resources, competence and organization. Each student can differently contribute to project with ideas, software code or data preparation, design of new web interfaces, project presentation.
- **The location:** the school is held in a **high-tech lab located in a small Alpine village**, to demonstrate that web access may support new types of innovative actions also in remote areas, combining new technologies and high-quality of life in a natural environment.
- **Lab is open all day**, but group activities and leisure time are also part of the three weeks.

## THE GOALS

1. Encourage smart students to be entrepreneurs in science
2. Interdisciplinarity
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

***For the sponsoring organizations: learn from young people, how fast they are developing new skills and which is the potential for a new generation of scientists.***

Highlights, video and articles about the WebValley initiative can be found at:

<http://webvalley.fbk.eu/about>





## Location

### THE PRIMIERO VALLEY

The Primiero valley is situated on the Southern side of the Alps, Italy.

We are in Trentino, in the middle of the Dolomites mountain region.



### TRANSACQUA

A cozy country from rural origins that in recent decades has been gradually transformed into a pleasant and sunny resort, with wide green spaces and numerous walks.

### THE ENVIRONMENT

#### Natural Park of Paneveggio

From 35 years the Park protects a large area (over 190 sq km) characterized by three distinct environments: the Dolomite Group of the Pale di San Martino, the forest Paneveggio and part of the chain of porphyry Lagorai. The extraordinary diversity of substrates shapes the landscape and climate of the Park gives the characters of high biodiversity value and natural beauty.

#### Pale of San Martino

Peaks, Pinnacles, and Precipices: these are the “Pale of San Martino” and “Lagorai Chain”. Most of the territory is represented by what is considered the most spectacular feature of the Park: the imposing Dolomitic complex of Pale di San Martino, a big sedimentary plateau at 2600 meters of altitude, witnessing the ancient presence of tropical seas and coral reefs of 250 million years ago.

more info at <http://www.sanmartino.com>



## Fondazione Bruno Kessler

Over 350 researchers, 220 between students working on their thesis, doctorate students and visiting scientists combined; 8 international Research Centers; 7 laboratories, including a Micro-technologies laboratory fully equipped for the production of silicon devices ; 11 between spin-offs and start-ups combined; a library specialized in historical and philosophical-theological sciences with over 250.000 volumes. These are the numbers of the Fondazione Bruno Kessler (FBK), which carries out research activities in the fields of Information Technology, Materials and Microsystems, Nuclear Physics, Historical Italian-German Studies and Religious Sciences. By means of its partnerships FBK also works in the fields of International Relations, European Economic Institutions, Conflicts resolution, Communication and Public Policies. <http://www.fbk.eu>



### The Predictive Models for Biomedicine and Environment Research Unit (MPBA)

The core group organizing the Summer School is a team of MPBA researchers and WebValley alumni from former editions. MPBA's scientific challenge is itself interdisciplinary: we develop models and computational tools for big data linking together human and environmental health. Methods have to deal with complex data patterns from next-gen sequencing, global health and environmental maps. Up to millions of features or samples are used and still reproducibility must be supported. MPBA Applications with strong ethical impact which are deployed by a mix of open source scientific computing, machine learning, geospatial technologies and web solutions. MPBA is a research unit of the FBK Center for Information Technology.

<http://mpba.fbk.eu>



## SPECIAL THANKS TO

Provincia Autonoma di Trento

Provincia Autonoma di Bolzano-SüdTirol

FBK Board of Directors

MIUR: National Program for Mathematics and Science Education (PLS)

US Society for Science—INTEL ISEF

Museo Tridentino di Scienze Naturali

Comune di Transacqua

Comunità di Valle del Primiero

ACSM SpA

Istituto Comprensivo del Primiero

Trentino Network

EduTech & Computer Learning SRL

Fondazione Mach

Center for Integrative Biology, UniTN

Italian Embassy, Washington DC

Credits for confocal micrograph image  
Stephanie Fraley/JHU

FBK > < Eventi

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