



2016 International Edition
S. Lorenzo Dorsino (Trentino)
June 19 - July 9, 2016

Call for Participants



The 2016 International Edition

Fondazione Bruno Kessler (FBK) is glad to announce the organization of **WebValley 2016 - International in San Lorenzo Dorsino, Trentino (June 19 - July 09, 2016)**. The online call for applications will be open **Apr 19 - May 31**.

WebValley is the FBK summer school for data science and interdisciplinary research: **300 students (17-19y 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 SüdTirol, and it is now grown as an opportunity for national and international students alike.

Join the WebValley team in Summer 2016 and help building **new predictive analytics solutions for environmental health and food safety/quality from portable spectrometer data**. We will also explore DIY Open Hardware, because a coming wave of data will arrive from very low-cost portable devices, adopted by scientists as well as citizens. And, speaking of data, free software and open hardware perfectly match with open data. More in general, we aim at developing a **novel web platform to support reproducible research with portable labware**. Labware technology develops rapidly, with a wealth of applications to nutrition and environmental monitoring. Machine learning methods will be the key to extract patterns and estimates of food safety and quality, fruit ripeness, and much more. Students will test and even build new portable devices, as well as the principles of scientific reproducibility. **We expect to develop an open source working prototype and explore predictive modeling** (e.g. by deep learning). Methods will be evaluated on original data of real interest, but also tested in outdoor activities. Experts in Data Science, Open Hardware, Open Data, and specialist web developers will team up with the students.

For the 2016 edition, up to **16 seats will be available**, sponsored by FBK, the FBK Trustees Board, and partner organizations. **Full (including travel) and partial fellowships will be offered** covering full tuition, accommodation, leisure time activities, and local travel costs. The team will include students from Trentino, nationals and internationals.

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 Program

Welcome to the Lab (4 hs)

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

Basics & Tools (5)

Web2.0 collaborative tools (2)
 The Open Source paradigms (2)
 Intellectual properties (1)

Computer Science Background (14)

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

Data Science Methods (8)

Basics of Statistics with R (4)
 Interactive Data Visualization (2)
 Machine Learning (2)

Bio/Ecoinformatics (6)

R & Python tools (4)
 Predictive pipelines in Bio/Ecoinformatics (2)

Background (8)

A primer on Spectroscopy
 Chemical Analysis of Fruit
 Fruit Maturity and Quality
 Spectrometry: Data Processing

Predictive Biomarkers (6)

Feature discovery
 Predictive Models for Environment
 Basics of network theory
 Network visualization

Databases & Web (6)

Science, Big Data, and Reproducibility
 Intro to Databases, Django, JSON,
 and advanced JavaScript
 Standards for Data Sharing

DIY Portable Spectroscopy (8)

The Public Lab spectrometer
 Overview of the Spectral Workbench
 Building a portable spectrometer
 Machine learning for spectral analysis
 Case studies

Teamwork

Lab work, project brainstorming
 and special topic presentations (70)

Excursion and Leisure Time (50)

Final Presentation (10)

Lab opening times: from 9 to 24

Special 2016 event in Storo (TN): Hackday on
 Open Hardware for environmental health and
 food quality



A Summer School since 2001

THE AIM

The school aims to **introduce students to interdisciplinary research by combining an identified scientific challenge with new technologies**. The school strongly encourages the participation of all genders and various backgrounds. The WebValley Lab provides computing resources and devices to test new ways of exploring the principles of data science. Students joining the school work in a lively and interactive environment together with a group of researchers from the Bruno Kessler Foundation and selected experts, also interacting through teleconference with other labs. The 2016 project will have the support of international experts in machine learning (from academic and industry R&D), spectrometry, bio/ecoinformatics, big data, and open hardware.

THE FORMULA

- **Create a team of enthusiastic and motivated high school students (17-18 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 relation to a problem of ethical interest. **In 2016, the data science project will be commissioned by CAVIT, one of the major wine producers in Italy and by the UNESCO Biosphere Reserve Ledro Alps and Judicaria (Man & Biosphere Programme).**
- Students are introduced to **Open Source** software tools (scientific programming, web-mobile interfaces, GIS, databases, data analysis and visualization); they discuss, design and develop the new system interacting with scientists. They learn to select tools, organize their own work plan, and respond with a new solution. 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 the project with ideas, software code or data preparation, design of new web interfaces, and 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, thus 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 week course.

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. Expose to challenging research themes of strong ethical interest
7. Using high quality data from scientific or statistical institutions
8. Promote the adoption of standard formats and sharing data policies

For the organizers: learn from young people which are the new skills of our future colleagues.

See the website for highlights, video and articles about the WebValley initiative.



Location

FROM THE DOLOMITES TO THE GARDA LAKE

(<http://www.visitacomano.it>)

In 2016, the WebValley School will be held in S. Lorenzo Dorsino (Western Trentino). Only 30 km separate the 3173 meters of the Cima Tosa glacier, the highest elevation of the Brenta Dolomites, from the 70 meters of the waters of Lake Garda, the largest Italian lake: here the nature offers a wealth of natural environments and landscapes in an unique Alpine ecosystem.

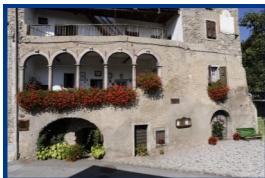
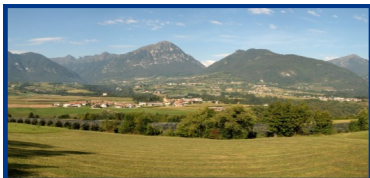


SAN LORENZO DORSINO

At the entrance of the beautiful Val d'Ambiez and close to the Comano Terme Spa, San Lorenzo Dorsino (800 masl) is the gateway to the Adamello-Brenta Natural Park. The lab will be installed in S. Lorenzo, a rural village stretched out on a vast natural balcony under the imposing walls of the Brenta Dolomites (UNESCO World Heritage Site), offering summer and winter sport opportunities. Originally of a medioeval structure, S. Lorenzo Dorsino is featured into the list of the most beautiful villages in Italy. It also offers a modern sport center.

THE BIOSPHERE: AN EXTRAORDINARY NATURAL AND HUMAN HISTORY HERITAGE

San Lorenzo Dorsino lies within the Comano Salus Valley, the only Trentino Alto Adige area in the "UNESCO Biosphere Reserve". The Reserve includes five million trees that produce 10,000 pounds of oxygen, and a total of 17,000 hectares of green space — of which 12,300 of woodland and 4,700 of pasture — with 26 million kWh of clean energy annually produced from renewable sources. Human presence dates back to VII M BC, with unique heritage sites such as the Neolithic Palafitte Museum in Fiaavè and the Stenico Castle.



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 Microtechnologies laboratory fully equipped for the production of silicon devices ; 11 between spin-offs and start-ups; 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 is a data science lab: Its scientific challenge is interdisciplinary, developing models and computational tools for big data analytics for human and environmental health. Methods have to deal with complex data patterns, from next-gen sequencing to large organization data assets and environmental maps. Up to millions of features or samples are used and still reproducibility must be supported. MPBA projects have strong ethical impact and are deployed by a mix of open source scientific computing, machine learning, geospatial technologies and web solutions. Applications for retail and digital industry are also developed. MPBA is a research unit of the FBK ICT Center, in its Complex Data Analytics Research Line.



SPECIAL THANKS TO

Provincia Autonoma di Trento

FBK Board of Directors

Trentino Network

US Society for Science - INTEL ISEF

CAVIT

Comune di Storo

CEDiS - Consorzio Elettrico di Storo

Comune di S. Lorenzo-Dorsino

Comune di Bondone

Public Lab

Comunità delle Giudicarie

APT Terme di Comano-Dolomiti di Brenta

UNESCO Biosphere Reserve Ledro Alps and Judicaria

FBK > < Eventi*MPBA

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