



Unite Innovators

Interdisciplinary
teams of
handpicked
individuals chosen
for their
field-leading
expertise and
innovative minds
combine
humanitarian
questions with stateof-the-art science,
cutting-edge
technology and
endless fantasy.

Impact Future

The fusion of today's real life problems analysis and a vision of scientific evolution of the next decades forces us to develop concepts and solutions for the future - hungry to use our expertise in challenges in new fields.

Act Today

Why not?
There are no
excuses - there is no
better place than
here - no better
time than now nobody more
creative than you.
If you just want to!

THE Port Association Geneva, Switzerland http://www.theport.ch



"Interdisciplinary teams of hand selected participants working together in the fields of:



Contents

| Advisory Board | 4 |
|----------------------|----|
| Introductory Message | 5 |
| In Numbers | 6 |
| Team Blindstore | 8 |
| Team CaSa | 10 |
| Team Nostro | 12 |
| Team SmartDog | 14 |
| Team Kool & the Gang | 16 |
| Team Muons | 18 |
| Different | 20 |
| Powered by | 21 |
| Inspiration | 22 |



Advisory Board

Ariane Koek

CERN • Director and creator of Arts@CERN programmes

Barbara Warmbein

DESY • Linear Collider communication and LHC communication for Germany

Ben Segal

Honorary CERN-IT staff member • Citizen Web Science projects, seminars and hackfests within and outside CERN

Cornelius Bubenzer

Skyguide • Digital Media & Publications Manager

David Galbraith

Tech entrepreneur, former architect, now designer of digital things - including RSS, Yelp, 'pinning'

Neal Hartman

Berkeley Lab • Director and President at CinéGlobe Film Festival

Robin M. Coupland

ICRC • Field Surgeon and Medical Adviser

Sara Sekkenes

United Nations Development Program • Adviser, Conflict Prevention and Recovery

Message by the President

"The success of the event was only possible because of the joint effort of an inspiring team."



The Port experienced an amazing and productive 2014.

Our idea of running a humanitarian and technology related hackathon began as a vague idea. We were inspired by UN organization members. This idea developed into a seven month journey, culminating in our event that took place in early November at CERN.

Twelve entrepreneurs kicked off a very ambitious project with the founding of THE Port Association in May 2014. As our time line took shape, we had our first advisory board meeting in July. By August our website finalized and fliers advertising our event were created. We were attracting participants, shaping our topics and expanding our team. We were extremely pleased when our hackathon became a CERN 60th anniversary event. In September, we wrapped up the final participant and topic selection at our second advisory board meeting. In October, our participants met their teammates and coaches and were given their topics. They also brainstormed about potential solutions, gearing up towards our 60-hour hackathon event.

Starting with a warm-up day on October 30, our participants met their teams face to face and learned more about CERN and its experiments. Markus Nordberg, Manager of the IdeasSquare at CERN, opened our hackathon with his warm and encouraging words.

Day One of our three day event, was intense and full of excitement. The teams discussed their proposals worked out in their preparation time. Field experts lent their expertise to allow close adaptation to real needs. And the participants explored the full potential of the IdeaSquare, the CERN venue, and they were inspired to ascertain various ideas, set-ups and directions.

Encouraged by feedback from experts, the teams began day two of the hackathon building and evolving their prototypes.

Teams then presented their findings to each other to gain further input, keeping up cross-team discussions.

Gearing up towards their final presentations, the teams used day three of THE Port hackathon to finalize their solutions and test their prototypes.

Sunday evening, our participants shared their eye-opening results with live demos and videos, and we all witnessed their dedication to solving humanitarian issues.

The great success of THE Port hackathon event and the stunning results were made possible with the help of an inspiring organizational team as well as our supporters, partners and friends. Thank you all for your assistance and commitment.

Looking forward to an amazing 2015 with another THE Port hackathon

Ines Knäpper

Michael Kagan Secretary

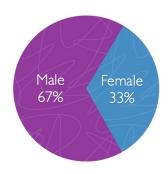




THE Port In Numbers

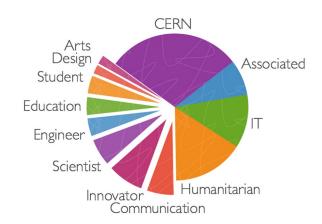


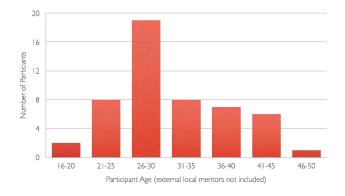
6 inter-disciplinary teams with about 10 members each had 6 weeks of preparation time with video-conference meetings and a 60 hour final hackathon to build working prototypes and tangable solutions for real-life humanitarian problems.



We foster innovation and creativity by 'colliding' diverse approaches and ideas in inter-disciplinary teams. Our aim is to balance the teams in expertise, age, culture and gender to reach optimal diversity and the full potential to look at tasks from multiple perspectives. We would like to thank Geneviève Guinot and Fabiola Gianotti for their support to reach 33% female participation.

About 30% of the participants are currently working at CERN and an additional 8% are associated by having previously worked or studied at CERN. 12% are working in IT sector and 16% at humanitarian organisations. The remaining third are working in Communication, Innovation, Science, Engeneering, Education, Design, Arts or are still students.





Most of our participants have at least three years of professional work experience after their academic education. About a quarter are in the 2nd half of their PhD or have been selected because they demonstrated extraordinary creative or innovative capabilities. The age span reaches from 17 years to 46 years with external local mentors not included.

International 35 participants

23 local mentors 28 nationalities



Organised by THE Port Association, hosted by **CERN** IdeaSquare and with partners from other non-governmental organisations, a three-day problem solving workshop hackathon devoted to humanitarian, social and public interest topics.



A private information retrieval data store

Terrain elevation determination for refugee camps



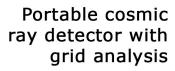


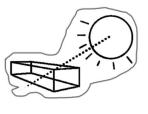
The conflict zone humanitarian demarcation certificate

Tracking and demarcation system for dogs in rescue and de-mining operations























Blindstore provides an online lookup service which returns the correct answer without ever knowing what the question was. The protocol guarantees that the server can't know which record the client requested. The client still only receives the record they requested.

Schematic showing the communication processes and paths within blindstore



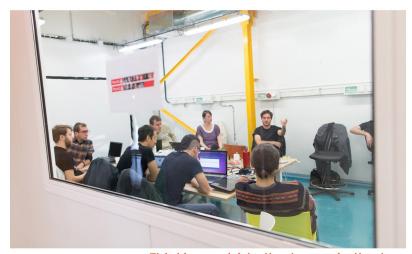
Discussing possible use cases of the blindstore concept in the mid-term presenation







Discussing after lunch about the main message and communication strategy for the final presentation

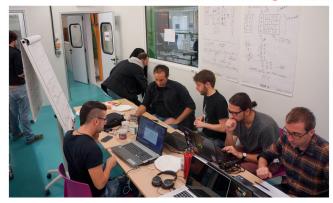


Thinking outside the box ... in the box

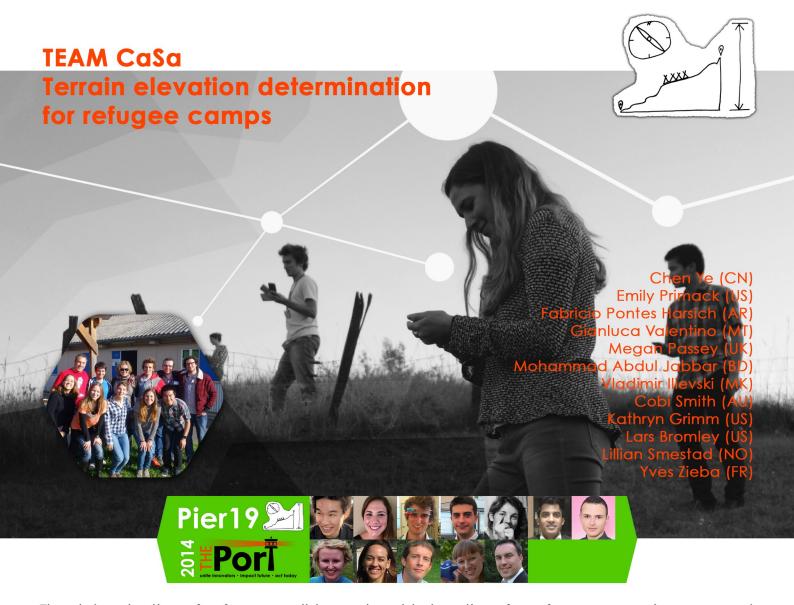
Improving the performence of the blindstore algorithms



Explanation of the Blindstore encryption method with the help of a magic trick at the final presentation







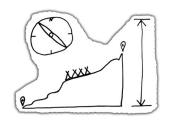
The determination of safe, accessible, and usable locations for refugee camps is paramount to the success of the camp. While viable locations can be investigated with field surveys by persons in the field or with the rather costly use of satellite technology, it is vital to have a precise understanding of the elevation of the terrain to ensure the camps will be free from natural dangers such as flooding.

After the hackathon added functionality of collected elevation data visualization as heat map



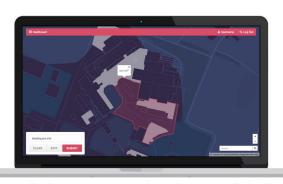


CaSa mobile phone application allows the collection, transfer and display of barometric data for decentralized topographic mapping





Video discussion with participants of the HCOMP 2014 Conference on Human Computation & Crowdsourcing in Pittsburgh, USA



Refugee camp planning user interface

Infographic ilustrating the data collection and analysis of terrain elevation for refugee



Code development and live demonstration of the CaSa web and mobile phone application at the final presentation



1. Get maps

use the app to download a base map on to the phone



2. Collect data

smartphones to collect data on the ground



3. Send data

collected data is uploaded on to a web server



4. Download map data

downloaded data can be used to make maps

Field test of the CaSa mobile phone application tor decentralized topographic mapping at the CERN Point1 site

camps





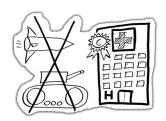
Mis-identification of possible military targets is a major source of collateral damage and leaves no safe place for escapees to go. Hospitals and other humanitarian institutions could benefit vastly from being safely tagged as such by a certificate that can not be copied or mis-placed and therefore be safer from bombing if it can be trusted more.

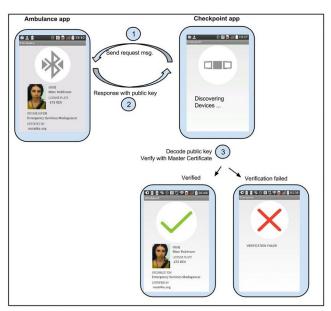


Live demonstration of the Nostro light beacon demarcation system and mobile phone verification application



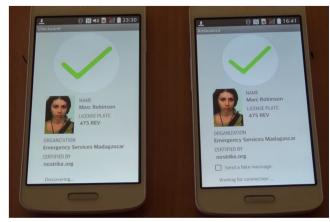
Prototype of a virtual crowd-sourced demarcation platform, which aims at providing verified information on humanitarian buildings such as their nature and location





Website diagram explaining the data transmission and verification procedure behind the ambulance mobile passport

Planning, hardware assembly and software implementation of the light beacon demarcation systems for humanitarian buildings



Screenshot from a youtube video showing with the developed mobile phone application, how humanitarian personnel in an ambulance can reliably assert its identity by means of a trustable authentication mechanism





Introduction to the NOSTRO project in a youtube video showcasing the mobile passport for ambulances





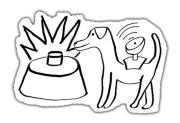
One of the most sensitive methods to locate land mines uses special trained search dogs. A few molecules of the explosive itself can be detected by a trained dog's nose, which makes this method independent of the mine housing many other measurements are based on. A tracking and steering systems can help to improve the efficiency and thoroughness of the search. The same concept can be also adapted to rescue searches.

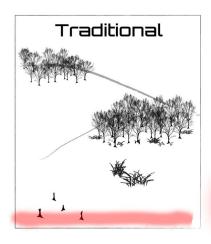


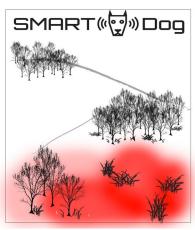
Assembly of 'fast prototyping' electronics components to mobile tracking, communication and demarcation system for demining dogs

3D printing of parts for the Smart Dog demarcation beacon release system









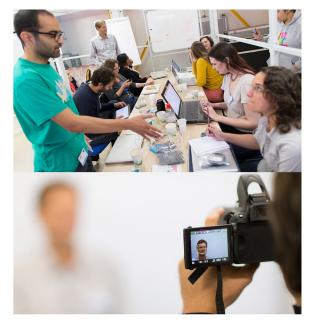
Screenshot of a video animation that explains the possibility of a 10 times faster land release compared to traditionally used techniques.

'Viking' is testing the Smart Dog system including, audio and video transmission, heart rate, position and orientation monitoring as well as a beacon drop system



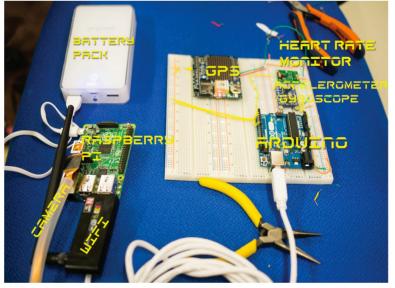


Live demonstration of the Smart Dog system with the help of expert team member 'Vicking'



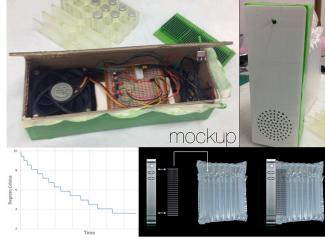
Interview with field expert Havard Bach from Norwegian People's Aid and specifications discussion in the team

Fast prototyping electronics components used to build the Smart Dog demonstrator - corresponding professional high precision versions of these sensors were identified for a second prototype





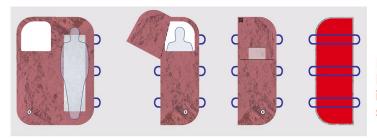
For many humanitarian and social projects, fridges are necessary - e.g. to cool medication or vaccinations. Locally organizing or transporting fridges to refugee camps is expensive due to their size and weight - loading them with other goods is not really practical and time-consuming. An inflatable fridge with a compact cooling unit using innovative insulation technology could improve the flexibility and availability of fridges in field operations.



Inflatable thermoelectric fridge prototype using high current battery pack and 3D printed casing

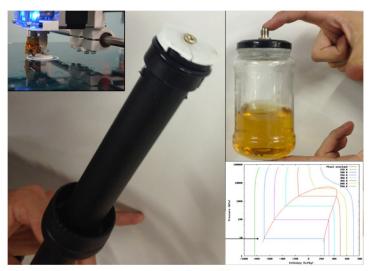


Live demonstration of a next generation body bag prototype featuring vacuum sealing, superabsorbent polymer and improved thermal isolation

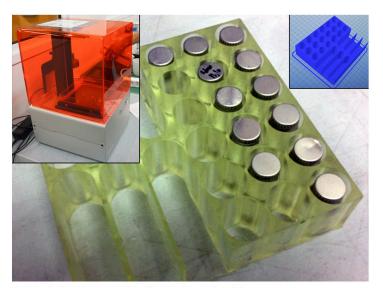




Functional view of a new generation body bag that simplifies the identification process and chemicals to start a mummification process.



Ethanol pressure vs. enthalpy diagram, a 3D printed pump modification and the sealed refrigerant container for a 'Whisky and Bicycle Pump Fridge'

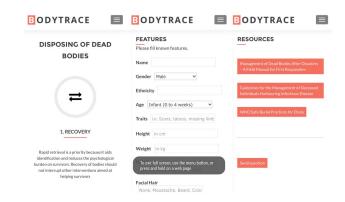


3D printed vaccination dose holder implementing different extraction strategies to reduce heat exchange

Use of a circular saw to extract the compressor from a common consumer fridge hermetically sealed compressor



CERN fire brigade and Pier56 team are working on the 'Better Body Bag' prototype that also minimizes possible contact with a dead body

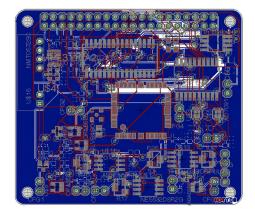


BODYTRACE - a mobile phone application to assist with the identification, management and recovery of victims during disasters





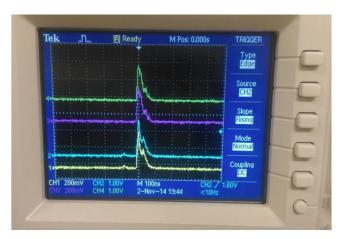
We produced a cheap and simple detector for cosmic rays, based on the Raspberry Pi computer platform. The detector is based on a plastic scintillator and Silicon photomultiplier tube combination, connected to a custom PCB combining all the necessary electronics functions (power supply, input stage, amplification, pulse shaping, trigger and an analogue digital converter), with a software stack capable of storing and analysing the collected data. We came up with a detector design which makes the collection, measurement and analysis of cosmic rays accessible and affordable to students, educators and science enthusiasts worldwide.



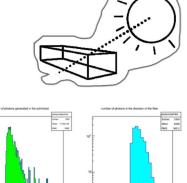
Layout of the printed circuit board designed by the PierX1 team in the preparation phase

Raspberry Pi Hat loaded with surface mounted devices (SMD) during the hackathon





Signals generated by the cosmic ray detector shown on an oscilloscope as part of the live demo in the PierX1 container

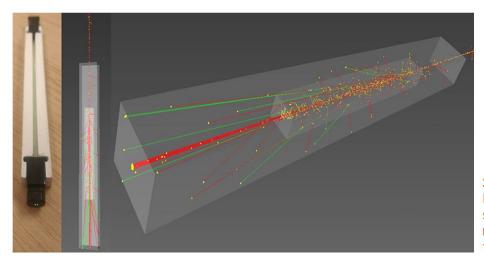


The contract of photons are in the and of SPM2

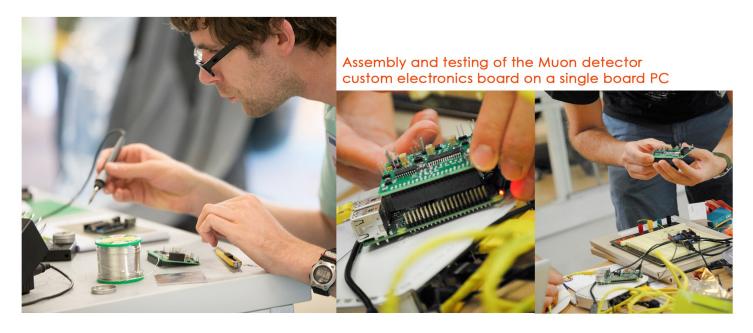
Institute of photons promoted in the scription

The contract of photons are in the contract of the contract of photons are in the contract of the contract of

Distributions of energy deposit, number of photons and electrons, as well as analogue digital converter (ADC) counts in the detector from simulated data



Simulation of a cosmic muon hitting the scintillator detector with semiconductor photo multiplier readout (see left) produced during the hackathon





what makes us Different



- 58 participants of 28 different nationalities, from private companies, academia and NGOs, formed 6 inter-disciplinary teams, to tackle a variety of modern humanitarian challenges with high technology.
- A rigorous interview process to encourage motivated participants.
- A conscious effort to balance the inter-disciplinary teams in expertise and diversity.
- Encouraging participants to step out of their comfort zone and transfer their expertise to new fields.
- Fostering the exchange of ideas between teams.
- A six week intensive research phase leading up to the final weekend.









(a) 🐁 unitar

































Special thanks to:

Giovanni Anelli, Ignacio Aviles Santillana, Manoel Barros Marin, William Bell, Olga Beltramello, Maurizio Bona, Alex Brown, Aurore Bui, Julian Calo, Ariella Cattai, Anna Cook, Robin Coupland, Antonella Del Rosso, Michael Doser, Jacques-Herve Fichet, Jonathan Forman, Joseph Gaylord, Fabiola Gianotti, James Gillies, François Grey, Erich Griesmayer, Genevieve Guinot, Kate Kahle, Rolf Landua, Sebastian Lopienski, Claudia Marcelloni, Rosaria Marraffino, Stephanie Münstermann, Marzio Nessi, Vetle Nilsen, Markus Nordberg, André-Pierre Olivier, Jan Peters, James Purvis, Tarun Sarwal, Sascha Schmeling, Regina Sipos, Felix Staehli, Charlotte Thompson, Harri Toivonen, Emmanuel Tsesemelis and the CERN Fire brigade.

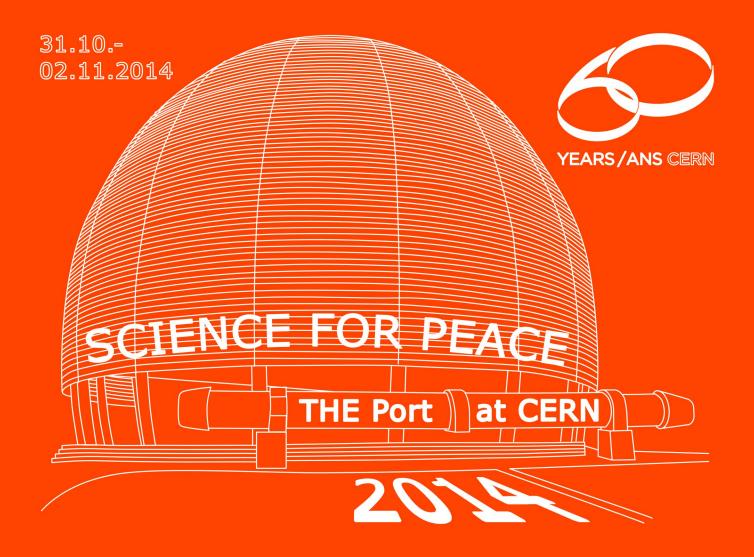
powered by Inspiration



Our Members:

Andrey Loginov, Bilge Demirköz, Branislav Ristic, Bruno Silva De Sousa, Cecile Lapoire, Clement Helsens, Cristina Olivotto, Daniel Dobos, Hansdieter Schweiger, Hugo Day, Ines Knäpper, Iulia Pascu, Jens Dopke, Jörg Stelzer, Juliet Primo, Joao Pequenao, Joona Kurikka, Karola Dette, Karolos Potamianos, Laura Jeanty, Marylin Marx, Michael Kagan, Michael Leyton, Oliver Keller, Patricia Montalvo, Pierre Freyermuth, Ruben Fernandez Morcillo, Sergio Grancagnolo, Stephan Petit, Sylvain Kaufman, Tomoko Muranaka & Tuuli Utriainen.







www.theport.ch

© 2014 THE Port Association, a non-profit association under Article 60 of the Swiss civil code. All Rights Reserved.

THE Port does not officially represent CERN in any way although a majority of its members are either working or have worked at CERN in the past.

All communication / activities by its members represents their private initiatives in their spare time whether or not they refer to CERN directly or indirectly.