Science and Technology for Development: the Role of CERN

CSTD

June 5, 2013

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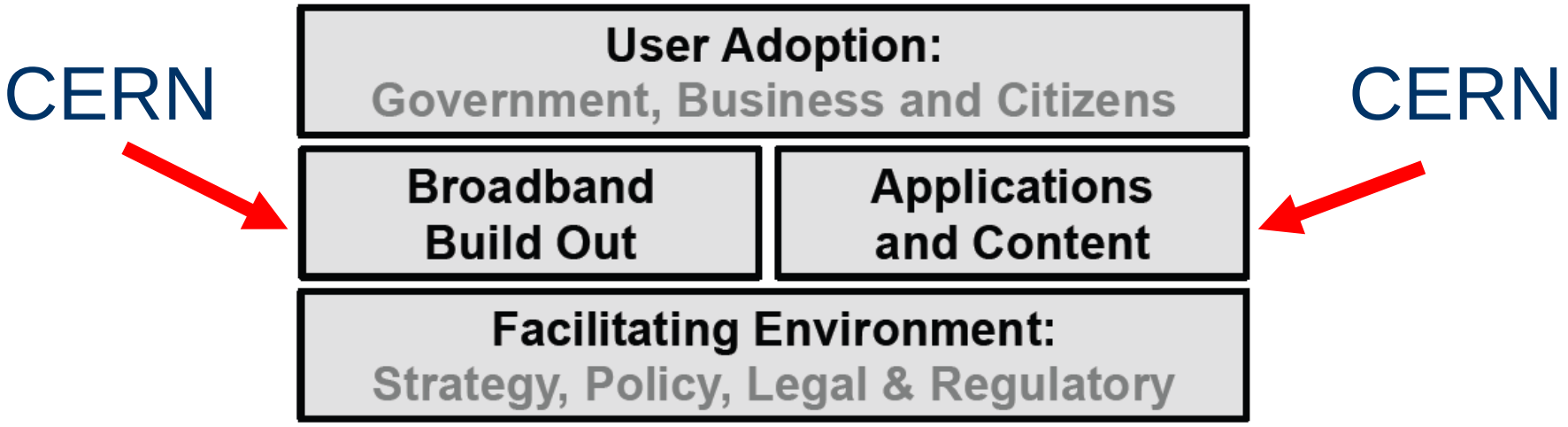
CERN

The Broader Digital Ecosystem

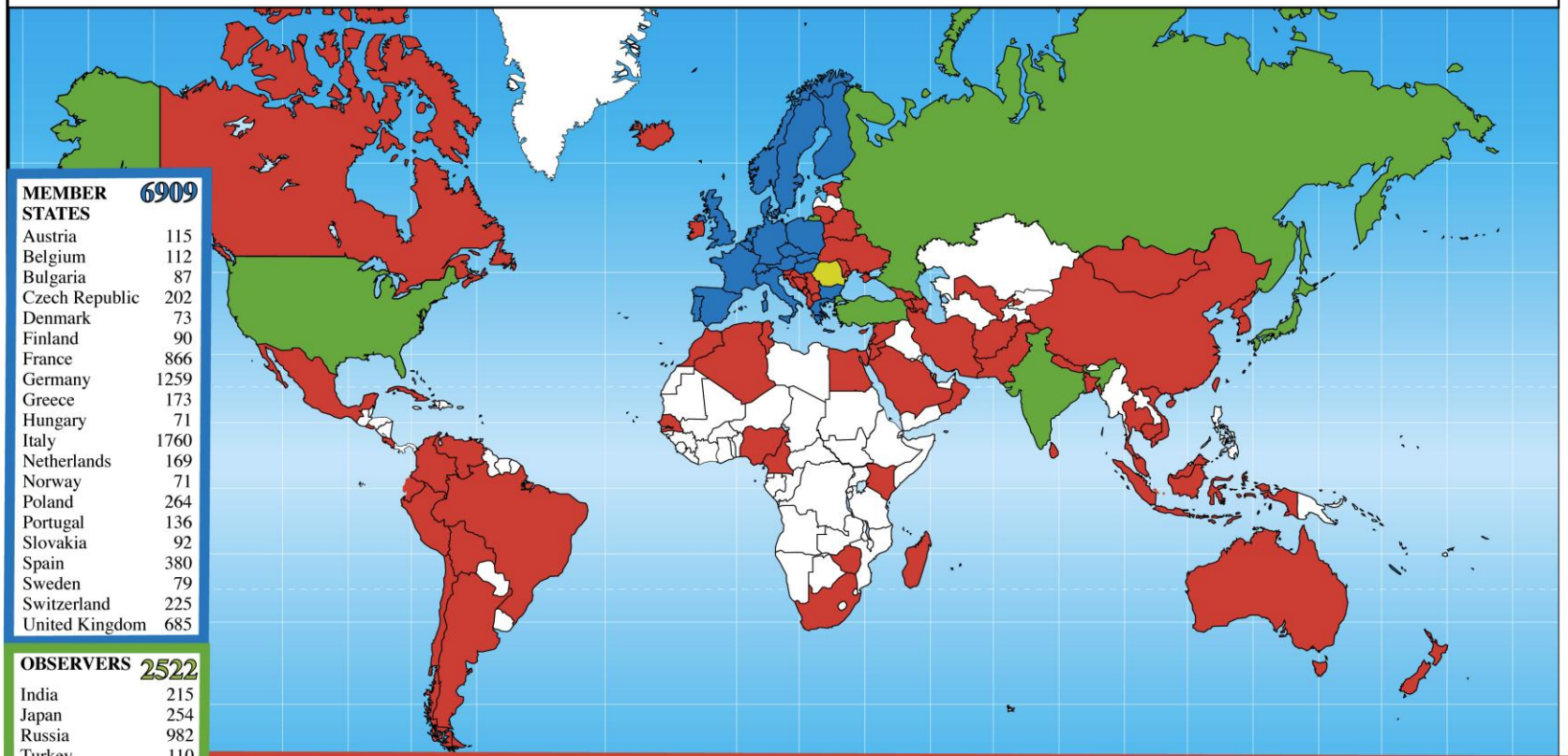


What we have to offer

- A global network of scientists/engineers
- A primary training ground
- An extended suite of **open access software**
- A consolidated expertise in leading edge solutions on IT
- Our keen interest to bridge among research and society at large

CERN in Numbers

Distribution of All CERN Users by Nationality on 4 April 2012



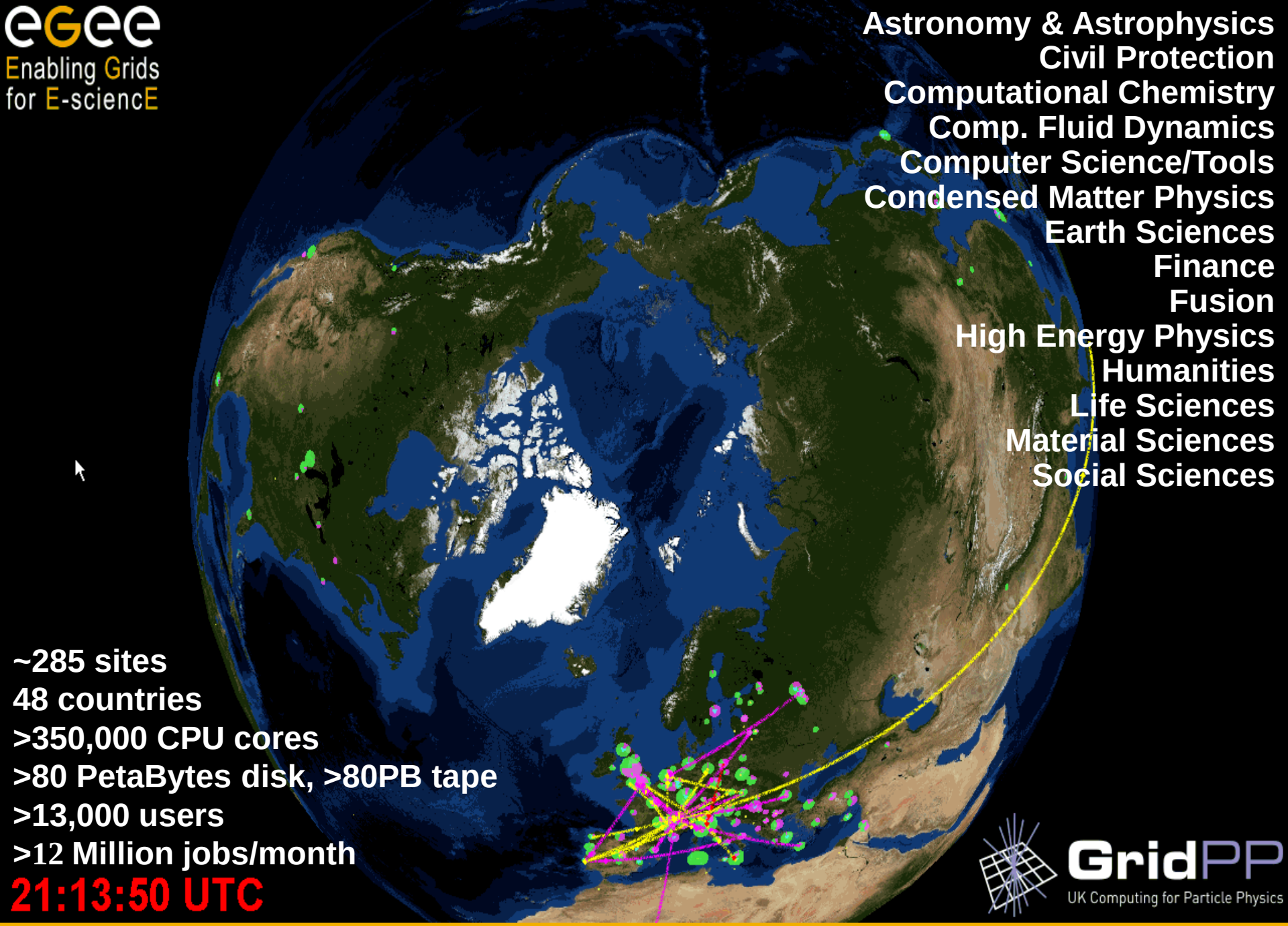
MEMBER STATES	6909
Austria	115
Belgium	112
Bulgaria	87
Czech Republic	202
Denmark	73
Finland	90
France	866
Germany	1259
Greece	173
Hungary	71
Italy	1760
Netherlands	169
Norway	71
Poland	264
Portugal	136
Slovakia	92
Spain	380
Sweden	79
Switzerland	225
United Kingdom	685

OBSERVERS	2522
India	215
Japan	254
Russia	982
Turkey	110
USA	961

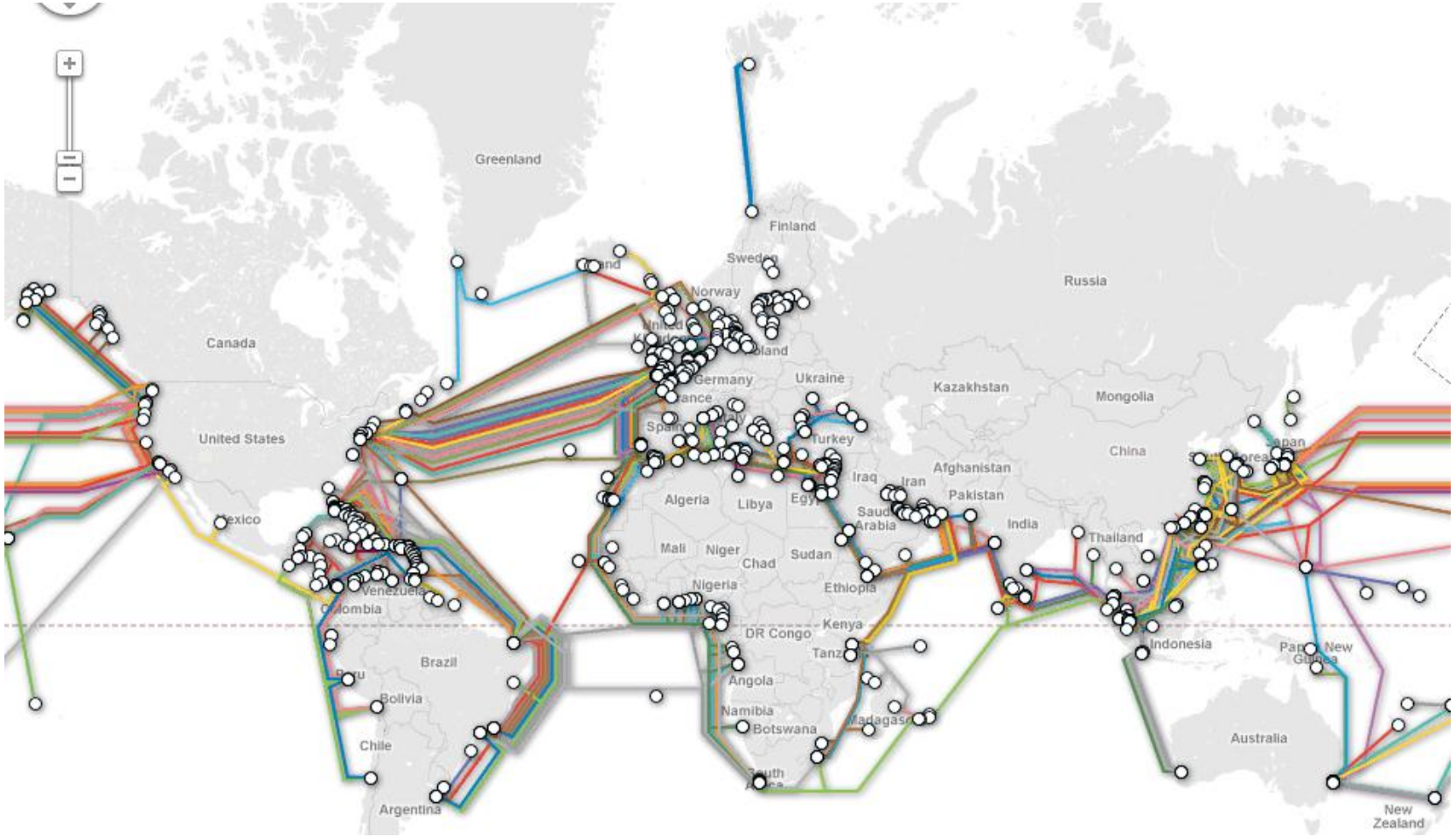
CANDIDATE FOR ACCESSION	
Romania	117

ASSOCIATE MEMBERS IN THE PRE-STAGE TO MEMBERSHIP	
Israel	67
Serbia	39

OTHERS													
Afghanistan	1	Bosnia & Herzegovina	2	Cuba	6	Ireland	23	Mexico	63	Peru	5	Tunisia	6
Albania	3	Brazil	98	Cyprus	14	Jordan	2	Moldova	1	Qatar	1	Ukraine	46
Algeria	11	Cambodia	1	Ecuador	2	Kenya	1	Mongolia	1	San Marino	1	Uzbekistan	2
Argentina	16	Cameroon	2	Egypt	9	Korea, D.P.R.	1	Montenegro	2	Saudi Arabia	3	Venezuela	10
Armenia	21	Canada	141	El Salvador	1	Korea Rep.	119	Morocco	13	Senegal	1	Viet Nam	10
Australia	23	Chile	6	Estonia	15	Lebanon	11	Nepal	3	Slovenia	43	Zimbabwe	2
Azerbaijan	6	China	270	Georgia	31	Lithuania	17	New Zealand	8	South Africa	16		
Bangladesh	2	China (Tapei)	48	Hong Kong	1	Luxembourg	3	Nigeria	1	Sri Lanka	6		
Belarus	41	Colombia	29	Iceland	4	Madagascar	3	Oman	1	Syria	1	**1353**	
Bolivia	2	Costa Rica	2	Indonesia	2	Malaysia	7	Pakistan	44	Thailand	7		
		Croatia	30	Iran	21	Malta	2	Palestine (O.T.).	3	T.F.Y.R.O.M.	3		


Enabling Grids for E-sciencE
Astronomy & Astrophysics
Civil Protection
Computational Chemistry
Comp. Fluid Dynamics
Computer Science/Tools
Condensed Matter Physics
Earth Sciences
Finance
Fusion
High Energy Physics
Humanities
Life Sciences
Material Sciences
Social Sciences
~285 sites
48 countries
>350,000 CPU cores
>80 PetaBytes disk, >80PB tape
>13,000 users
>12 Million jobs/month
21:13:50 UTC
GridPP
UK Computing for Particle Physics

The global infrastructure is being put in place



How is the information flowing?

Credit: FreePhoto

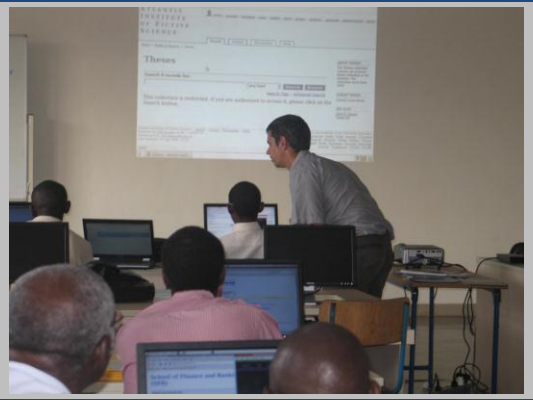
A one way flux does “only” require a good internet (which is important)

A real exchange of information requires digital libraries **on both sides**

Exchange of research results **must** go in all directions

- The print era had its natural limitations
- There is no reason to carry any of these limitations forward to the online era
- Today scientist expect to **exchange information** in all directions; North-South, South-North, South-South and North-North

The CERN-UNESCO School on Digital Libraries



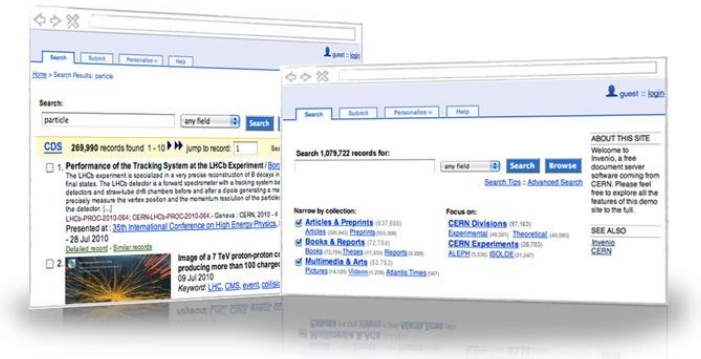
- Improve the visibility of African research
- Capacity building / knowledge and technology transfer
- Establishing contacts with African institutions

1st school: KIST, Kigali, Rwanda, September 2009
2nd school: CNRST, Rabat, Morocco, November 2010
3rd school: CNDST, Dakar, Senegal, November 2011
4th school: KNUST, Kumasi, Ghana, *in preparation for 2013*

Invenio, the CERN tool for DL

Invenio is a open source software suite enabling you to run your own digital library or document repository on the web. The technology offered by the software covers all aspects of digital library management from document ingestion through classification, indexing, and curation to dissemination.

Invenio is the tool used for LHC publications workflow approval at CERN.

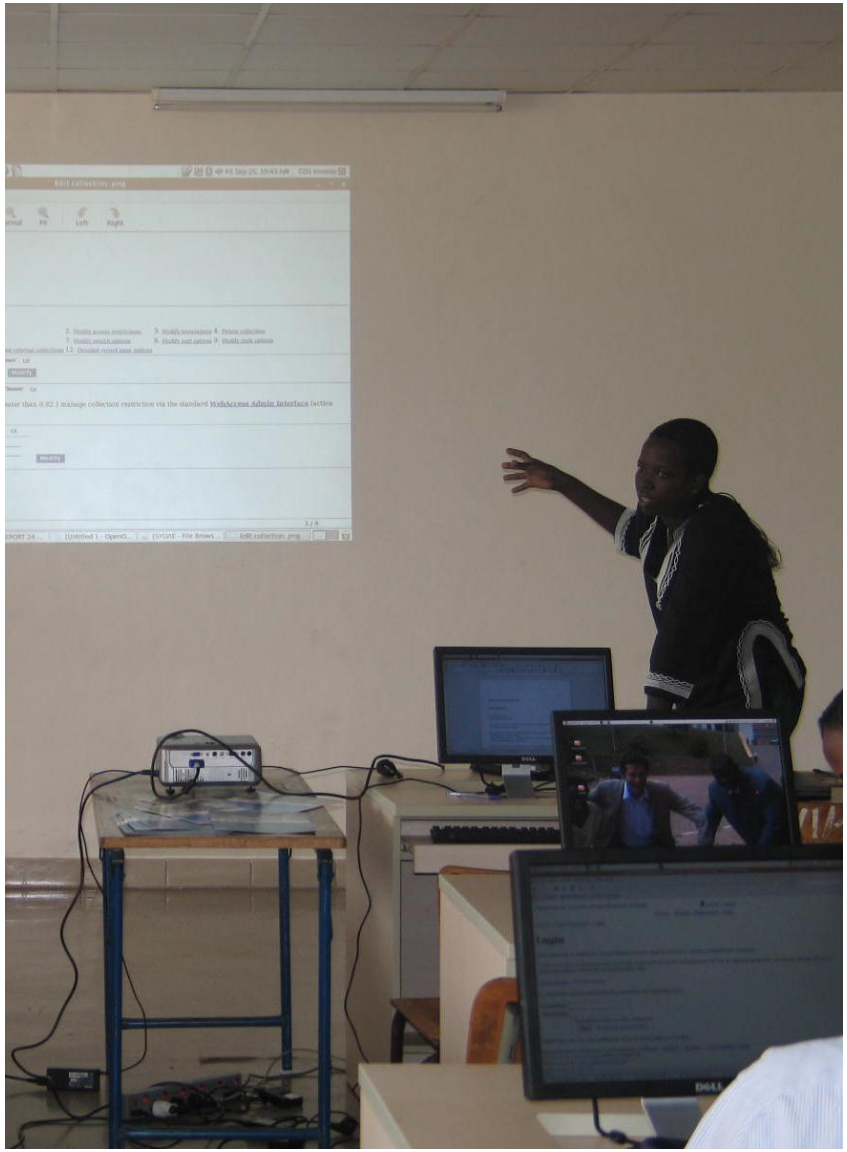


UNESCO & CERN have sponsored digital library schools in Africa (Rwanda 2009, Morocco 2010, Senegal 2011)

CERN has donated (WLCG Tier-0) computers to Africa (Morocco, Ghana, Egypt soon).

First achievements

- First installations in place
- Sign of multipliers
- International coverage
  - ✓Benin (3 participants)
  - ✓Burkina Faso (4)
  - ✓Cameroon (4)
  - ✓Ethiopia (1)
  - ✓Ghana (1)
  - ✓Guinea-Bissau (3)
  - ✓Guinea-Conakry (1)
  - ✓Ivory Coast (3)
  - ✓Mali (5)
  - ✓Mauritania (1)
  - ✓**Morocco (15)**
  - ✓Mozambique (1)
  - ✓**Rwanda (30)**
  - ✓**Senegal (23)**
  - ✓Tunisian Republic (3)



CERN and UNESCO are reaching out
Seeking new partners to sustain the series of schools

An obvious first goal:

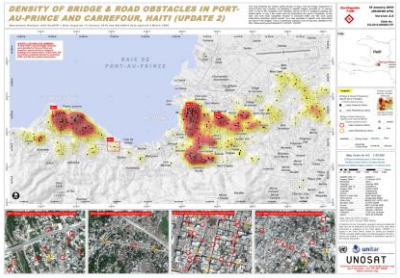
join efforts to make all African theses available Open Access via digital libraries

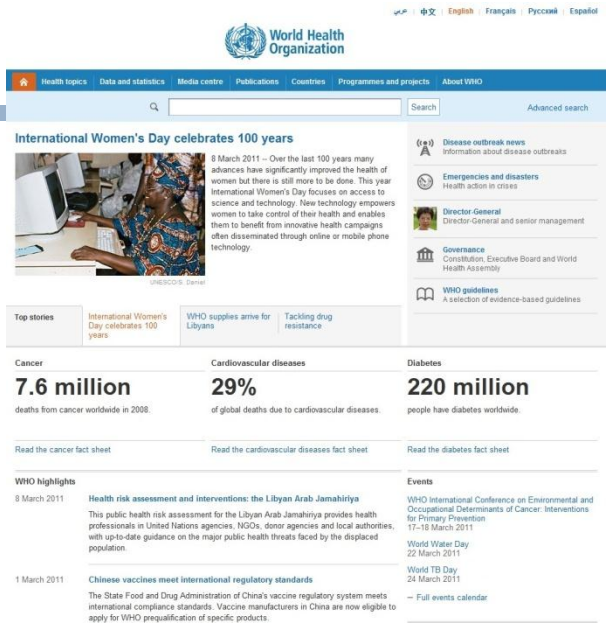
The infrastructure is mostly in place, the required technology exists

it is mainly a question of developing policy and capacity building!

Did you know...?

WHO is connected via CERN to the Commodity Internet





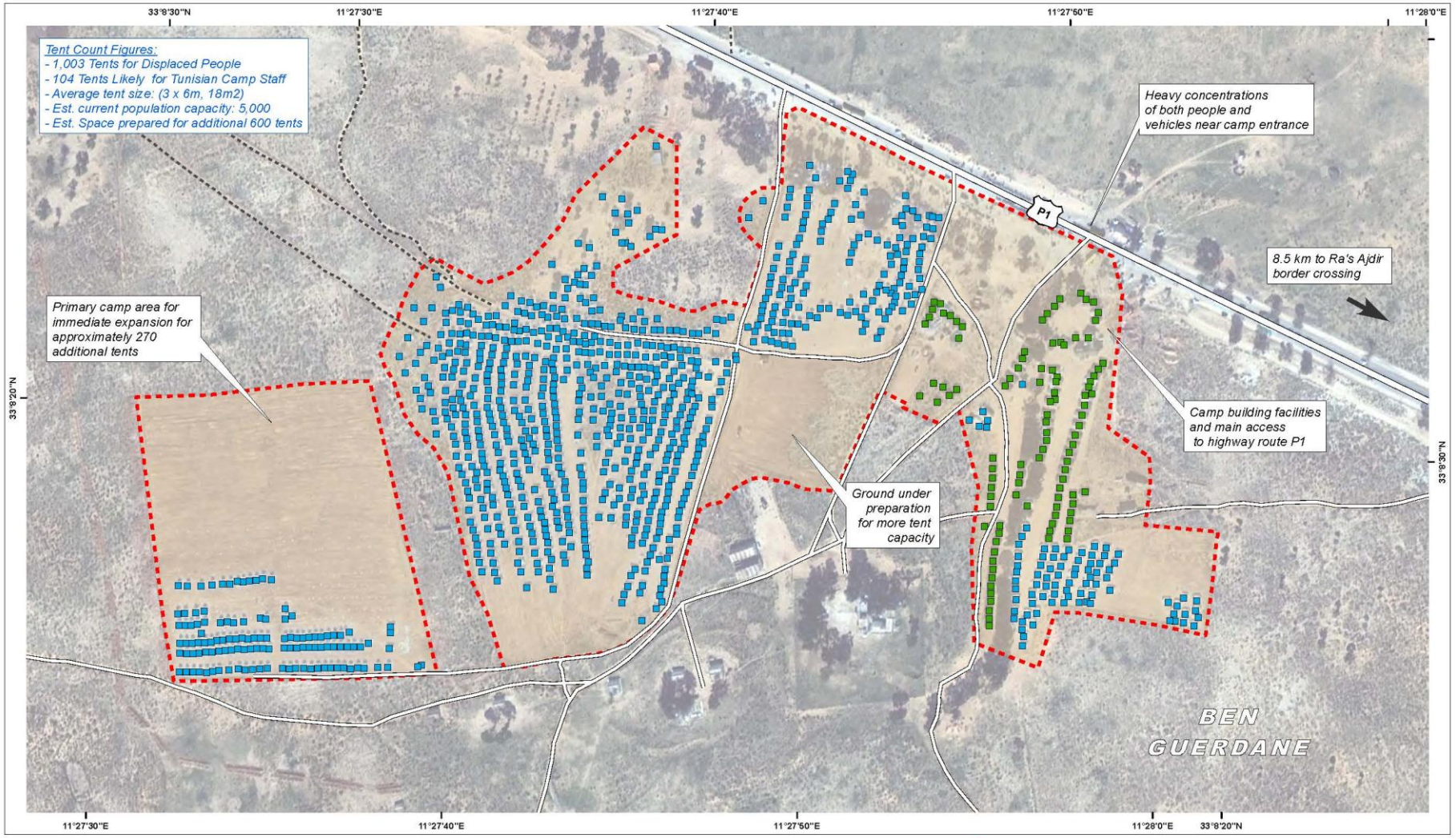
UNOSAT staff and servers hosted at CERN

unitar United Nations Institute for Training and Research UNOSAT

Transitional Camp Analysis: 03 March 2011
Tent Count, Camp Boundaries and Expansion Areas

Civil Conflict

Production Date: 04/03/2011
GLIDE Code: OT-2011-000025-LBY
UNOSAT Activation: CE20110220LBY



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24/7 hotline: +41 76 487 4998
www.unitar.org/unosat

Map Scale for A4: 1:4,000

50 25 0 50 100 Meters

Note: Map has been rotated 20 degrees from North to improve map visualization

The depiction and use of boundaries, geographic names and related data shown here are not warranted to be error-free nor do they imply official endorsement or acceptance by the United Nations. UNOSAT is a program of the United Nations Institute for Training and Research (UNITAR), providing satellite imagery and related geographic information, research and analysis to UN humanitarian & development agencies & their implementing partners.

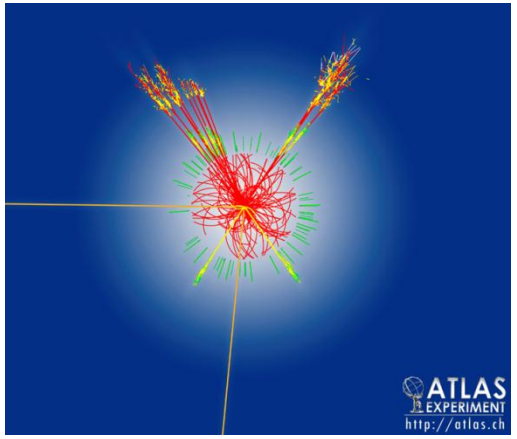
Transitional Camp Extent

Transitional Camp Tent by Type:
- Likely Tents for Displaced People
- Likely Tunisian Authority Tent

Functional Road Class
- Highway
- Tertiary
- Trail

Collaboration: Citizen Cyberscience Centre

- **Philosophy:** promote web-based citizen participation in science projects as an appropriate low cost technology for scientists in the developing world.
- **Partners:** CERN, UN Institute for Training and Research, University of Geneva
- **Technology:** open source platforms for internet-based distributed collaboration
- **Projects:**
  - **Computing for Clean Water** optimizing nanotube based water filters by large scale simulation on volunteer PCs
  - **AfricaMap** volunteer thinking to generate maps of regions of Africa from satellite images, with UNOSAT
  - **LHC@home** new volunteer project for public participation in LHC collision simulations, using VM technology



In conclusion

- Large research infrastructure can play a significant role in facilitating development through the spread of IT based solutions, by providing:
  - Tools
  - Training
  - Demonstrator projects
- ….but it is clear: **we are a tool, not the solution**

In order to have sustainable solutions, we will need

- Coordination
- Flexibility
- Visionary global policies

Thank you!