TOWARD A CERN VIRTUAL VISIT SERVICE

SHARING SCIENTIFIC DISCOVERY GLOBALLY

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WHAT IS A VIRTUAL VISIT?

- A live conversation, in the participants' preferred language, connecting the public (typically classrooms) with scientists at their experimental sites
- Required Components
  - Videoconference
  - Captivating, Relevant Location
  - Informative Researcher and Inquisitive Audience
- Potential Add-Ons
  - Simultaneous Webcast
  - Recording
  - Virtual Walk-Through of Detector and/or Site


Guide for Operators
SELECT THE VIDEO SOURCE
SELECT THE COMPUTER SOURCE

WHO GIVES VIRTUAL VISITS?

- CERN and the LHC Experiments
  - CERN EDU has been connecting with remote classrooms for decades (project-based)
  - ATLAS built dedicated system at Point 1 in 2010, using equipment from First Physics
  - CMS built remote system in 2011 to bring audiences underground
  - ALICE used laptop underground and control room since 2013 and is now developing a dedicated system
  - LHCb installed a dedicated system in 2011 in the control room; new control room has a dedicated system, also underground, for Dedicated Masterclass sessions
  - CCC has installed temporary systems for major events, since 2012
  - Computing Centre looking into staged installation (beginning with camera integrated into visits)
- Outside CERN (that I know of)
  - Fermilab looking into it
  - LIGO, IceCube in connection with CERN

CERN (2000)

LHCb

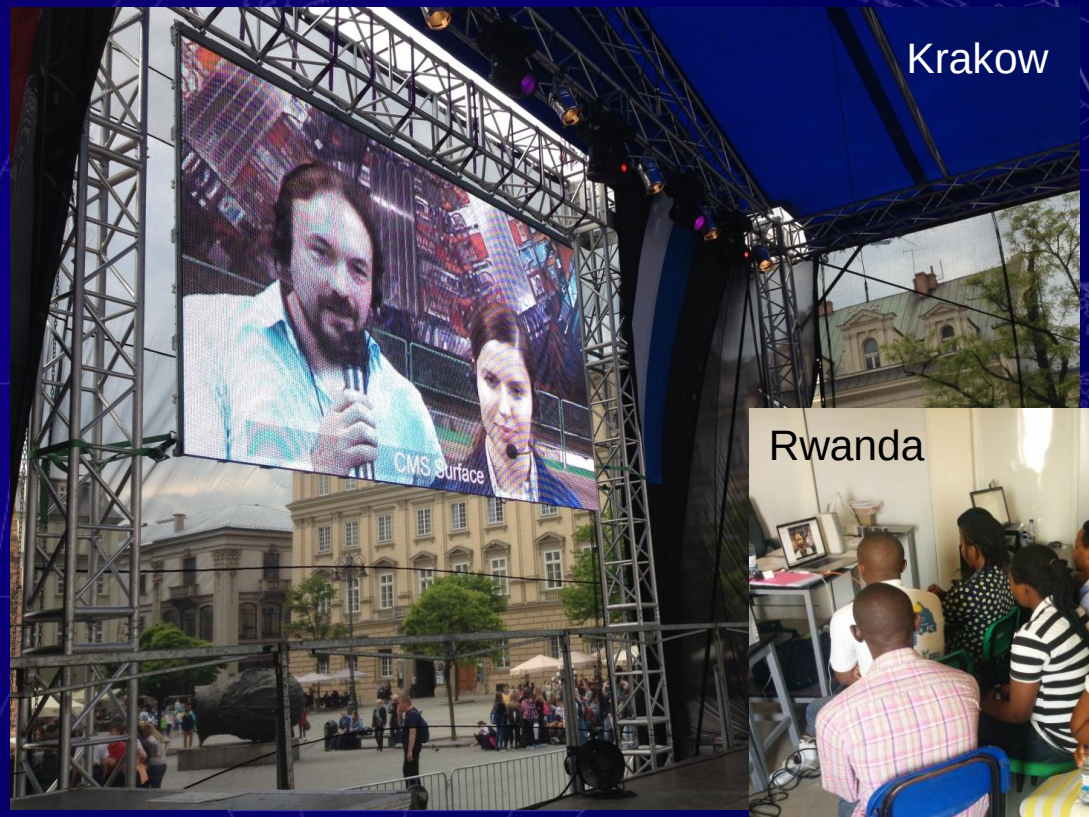
CMS

ALICE

LIGO

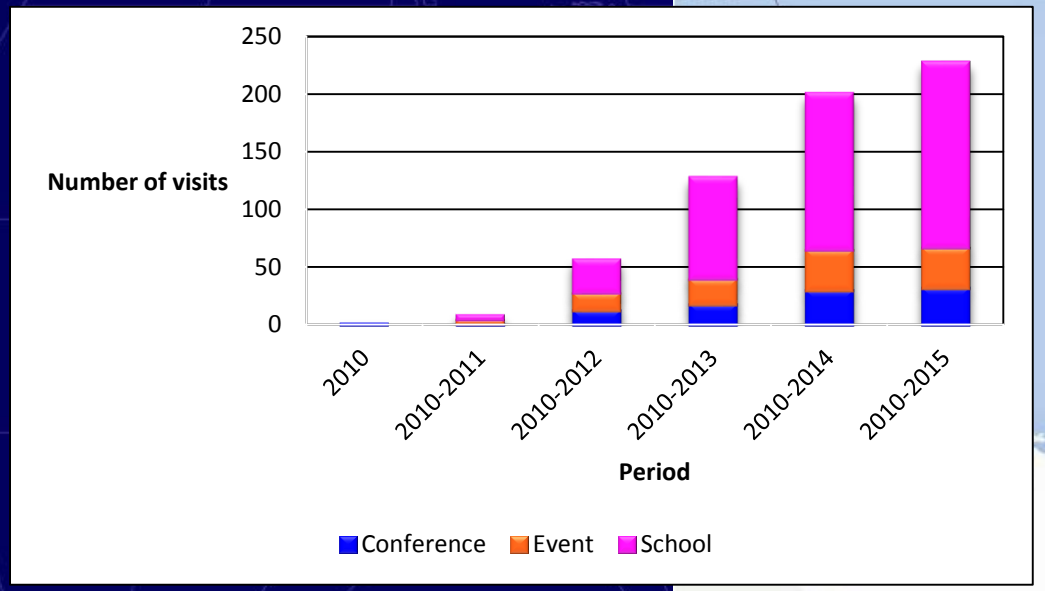
WHO ARE THE VIRTUAL VISITORS?

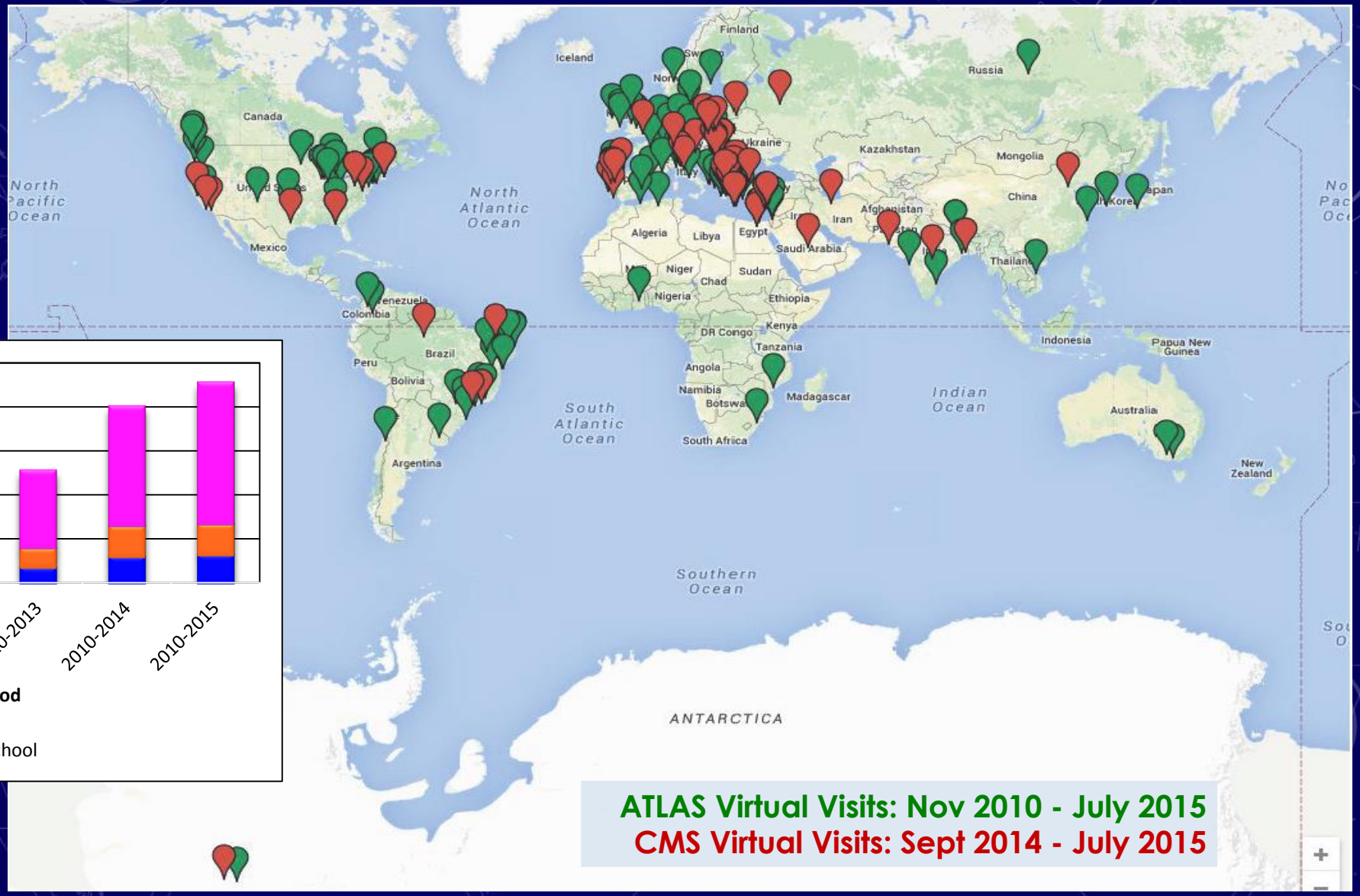
- Target Audiences
  - Classrooms & Masterclasses
  - Teacher Groups
  - Public Events, Open Days
  - Policy Makers
- Example Statistics
  - CMS: 15,800 participants in 2 years
  - ATLAS: >300 visits since 2010
  - 7 Continents



Krakow


Rwanda


Number of visits
250
200
150
100
50
0
2010
2010-2011
2010-2012
2010-2013
2010-2014
2010-2015
Period
Conference
Event
School


Finland
Iceland
Russia
Canada
Ukraine
Kazakhstan
Mongolia
China
North Pacific Ocean
North Atlantic Ocean
Mexico
Algeria
Libya
Egypt
Iran
Saudi Arabia
Niger
Chad
Sudan
Nigeria
Ethiopia
Venezuela
Colombia
Kenya
DR Congo
Tanzania
Indonesia
Papua New Guinea
Brazil
Peru
Bolivia
Angola
Namibia
Botswana
Madagascar
South Atlantic Ocean
Indian Ocean
Australia
South Africa
Argentina
New Zealand
Southern Ocean
ANTARCTICA
ATLAS Virtual Visits: Nov 2010 - July 2015
CMS Virtual Visits: Sept 2014 - July 2015

WHY DO WE BOTHER?

"Nurturing curious minds is one of CERN's goals, and education and training are among our core missions."

- Fabiola Gianotti, CERN DG

- Primary Virtual Visit Goals
  - Reach audiences that would not normally have a chance to come to CERN
  - Promote dialogue between scientists and the public
  - Train our scientists to communicate

→ Often the first step towards further involvement

*…You might not have been able to see it during the tour, but my students were **very excited**. And during my presentation to them the day before the tour and after the tour, they asked the most **insightful questions**…*

*This has created quite a lot of excitement and I hope that we can keep this momentum with the **master classes** offered at the University of Cape Town as well as entry into the **Beamline 4 Schools** competition.*

Itumeleng Molefi (science teacher, Carnarvon, South Africa)

*This way of **gaining knowledge** is way **more attractive** and interesting, because it let us gather information **directly from CERN workers** on how one of the most important laboratories in Europe works.*

13-year-old student from Poland

*What **surprised me** today is the fact that I didn't know the people were trying to find the answer about **how the universe was made**. I have always thought about that.*

11-year-old student from Los Angeles CA, USA

CURRENT STEP-BY-STEP PROCEDURES

(NOT ALL PRACTICED BY ALL EXPERIMENTS)

1. Receive Visit Request / Booking
2. Explain Technical Requirements
3. Select Date
4. Identify Guide
5. Identify Operator
6. Schedule Test
7. Build Web Page (webcast / recording)
8. Put Visit on Indico Agenda
9. Communicate Upcoming Visit
10. Visit: Start Vidyo, Webcast, Recording
11. Visit: Operate Cameras
12. Visit: Push Content
13. Visit: Engage in Dialogue
14. Visit: Close Systems
15. Edit and Publish Recording
16. Send Link of Recording, Souvenirs
17. Request Feedback, Evaluation
18. Collect Best Comments from Visitors
19. Collect Best Q&A Clips

WHY DEVELOP A CERN-WIDE SYSTEM?

- Common Infrastructure, Operations, Services
  - But each experiment handled separately
- Non-Optimal Usage of Human Resources
  - Scientists acting as operators, administrators
- Limited Guide Pool
  - Could benefit from training, incentives
- Limited Visibility
  - Could help to alleviate CERN Visit requests if known by public
- Limited Scalability
- Could Use Infrastructure for Special Events, Periodic Communications

GUIDANCE FROM EXISTING MODELS

- CERN Visits Service
  - Common Operations (Booking, Infrastructure, Services, etc.)
  - Trained, Paid Guides
  - Partnership with Experiments
- CERN IT CDA Videoconference Agreements
  - Similar, but Independent Infrastructure, Common Service
  - Bi-Lateral Agreements with Experiments
    - Experiments pay for infrastructure (installed and maintained by IT)
    - IT provides services

SUGGESTED REQUIREMENTS

- Technical Infrastructure
  - Robust, High Quality Videoconferencing with Recording Capability (a la existing conference rooms)
  - Wireless Microphones, Remote Cameras, Mixers (as requested)
  - Simultaneous Public Webcast including Remote & Local Views, Sound, Material
  - Compatibility with PC or Phone-Based Systems (Skype, Google Hangout, etc.)
    - Key for communication events or programs
- Technical Support
  - Installation / Periodic Testing / Maintenance of Installations
  - Tests with Remote Sites
  - Start / Stop of Equipment (Normally Remotely)
  - Recording, Editing, Publication to CDS

SUGGESTED REQUIREMENTS (2)

- Guide Organisation
  - Communication Training Similar to Physical Visit Guides
  - Site-Specific Training
  - Recognition / Compensation for Contributions
- Common Booking Form
  - On Public Web Pages, near Physical Visit booking
  - Specify experiment (or no preference), visit date, testing date, technical requirements, contact info
  - Information flow: **Form → Virtual Visit Service → Experiment & Technical Service → Guides & Technicians**
- Web Interface
  - Host Webcast, Recording, Related Material for Each Visit (Potential for Educational Platform)
  - Maintain Visitor Statistics and Feedback

HOW TO SHARE THE EFFORT

- Experiments (Locations):
  - Provide Monetary Resources for Equipment & Maintenance (Bi-Lateral MoU)
  - Provide Guides
  - Coordinate with CERN Service for Usage of Sites (a la current Visits Service agreements)
- IT-CDA:
  - Install, Maintain, Operate Equipment
  - Host Required Services and Provides Support (a la current Collaborative Tool agreements)
- IR-ECO
  - Develop and Maintain Web Interface and Booking System
  - Train, Coordinate, and Compensate Guides
  - Edit and Publish Visit Recordings
  - Follow-Up and Statistics

SUMMARY

- Independent Virtual Visit programs run by the LHC experiments have successfully hosted hundreds of sites (thousands of visitors) from around the world for several years
- Potential demand is beyond our capabilities
- We propose developing a CERN-wide system that would:
  - Facilitate booking through the CERN Public site
  - Move operations from scientists to technical experts, as requested by experiments
  - Provide guide training and compensation, similar to the existing Visits Service
  - Develop a permanent infrastructure for public communication
- We believe the resources required are modest and easily shared
- We believe the potential for gain in terms of audience reach is too important to ignore

REFERENCES

LHC Public Sites and Virtual Visit Portals	
ATLAS Public	http://atlas.cern
ATLAS Virtual Visits	http://cern.ch/atlas-virtual-visits
CMS Public	http://cms.web.cern.ch
CMS Virtual Visits	http://cms.web.cern.ch/content/virtual-visits
ALICE Public	http://aliceinfo.cern.ch/Public/Welcome.html
LHCb Public	http://lhcb-public.web.cern.ch
Publications on Virtual Visits	
EPS-HEP 2015	http://pos.sissa.it/archive/conferences/234/349/EPS-HEP2015_349.pdf
ICHEP 2014	http://dx.doi.org/10.1016/j.nuclphysbps.2015.09.465
CHEP 2013	http://iopscience.iop.org/article/10.1088/1742-6596/396/6/062008/meta
CERN Bulletin	https://cds.cern.ch/journal/CERNBulletin/2012/16/News%20Articles/1439942
ALICE Matters	http://alicematters.web.cern.ch/?q=ALICE_virtualvisit
CMS Blog	http://cylindricalonion.web.cern.ch/blog/201411/cms-open-virtual-visits-your-school-science-festival-or-exhibition-centre