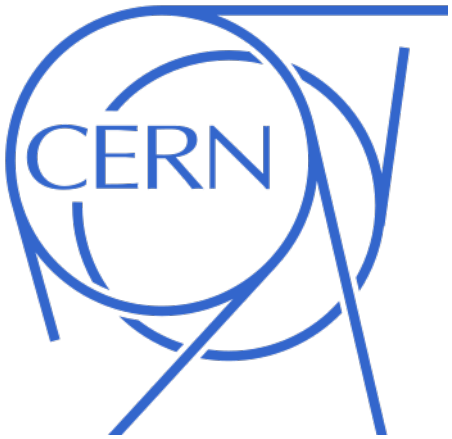

CERN-US Relations:
Past, Present & Future from a CERN Perspective

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(updated from a presentation at USLUO 2011 @ ANL)

The post-SSC era

- The demise of the SSC in 1993 and the approval of the LHC in 1994 catalyzed an unprecedented shift of paradigm in CERN-US co-operation:
  - Massive migration of US-based physicists to the LHC
  - Commensurate US investment in LHC Grid computing
  - Significant participation in accelerator R&D, construction of components, and LHC commissioning
  - Co-operation regulated by tripartite CERN-DOE-NSF agreements
- CERN is grateful to DOE and NSF for their sustained support of the US LHC community

US contributions to LHC machine

- Mainly in area of superconducting magnet technology:
  - Production and test of SC cable
  - Inner triplet magnets
  - Beam separation dipoles
  - Cryogenic and power feed boxes
  - and more …
- Coordinated by ANL, BNL and Fermilab
- Total value US$ 200 million
- Substantial contributions to LHC commissioning

US contributions to LHC detectors

Nearly 100 US universities and national laboratories have made substantial and invaluable contributions to the LHC experiments

Detector	Universities	National Labs	Participants
ALICE	8	3	75
ATLAS	40	4	~ 700
CMS	47	2	~ 800
LHCb	2		~ 25
TOTEM	2		3
Total	91	6	≈ 1600

Statistics from www.uslhc.us

Financial participation in experiments

DOE and NSF have supported (and continue to support) a financial participation in the LHC detectors ≈ commensurate with the number of participating scientists

Detector	CORE construction	2011 M&O (Cat. A)
ALICE	10 MCHF (6%)	0.4 MCHF (8%)
ATLAS	88 MCHF (16%)	3.9 MCHF (21%)
CMS	120 MCHF (23%)	4.7 MCHF (33%)
Total	218 MCHF (18%)	9.0 MCHF (24%)

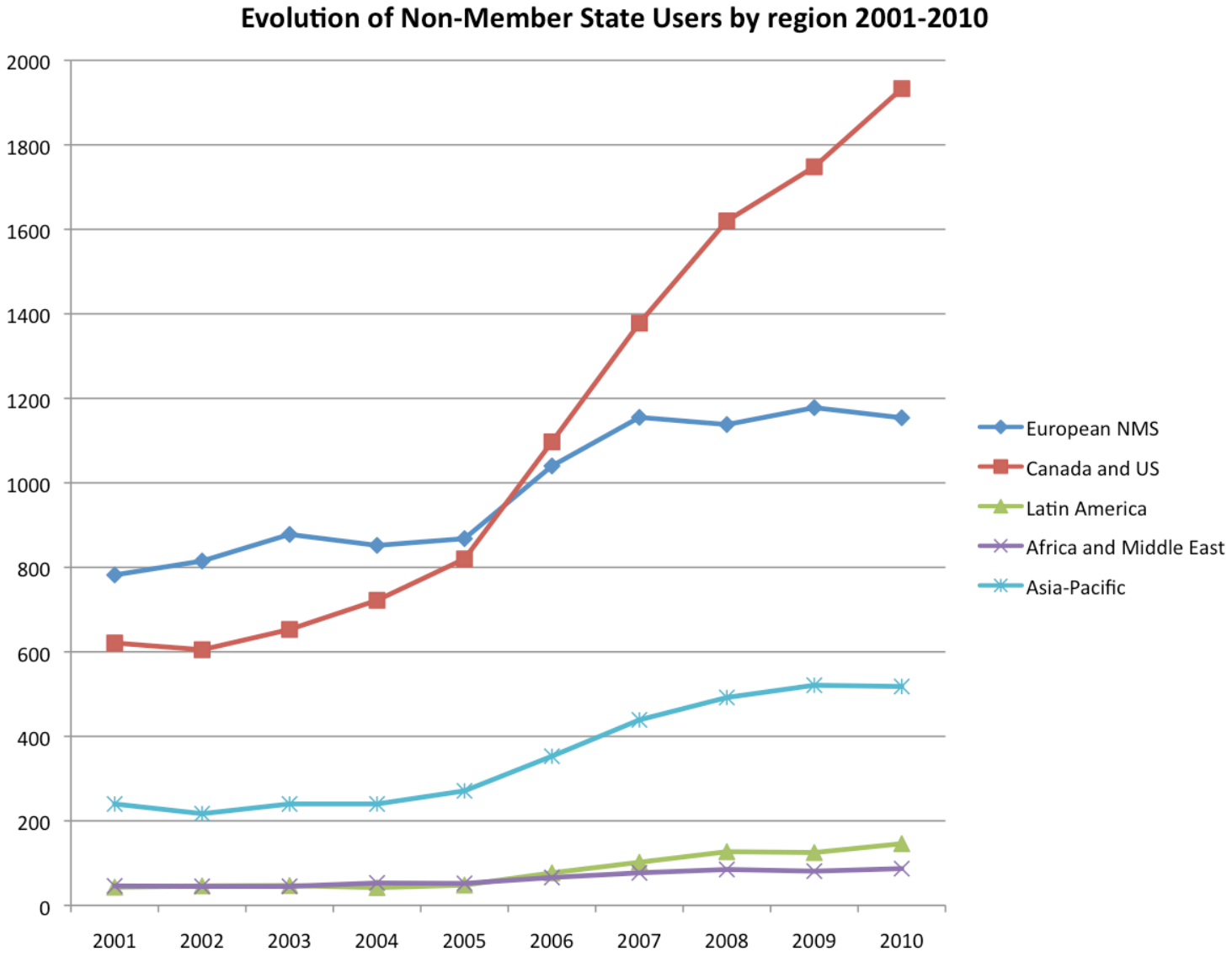
CERN RRB statistics

The near future: LHC upgrades…

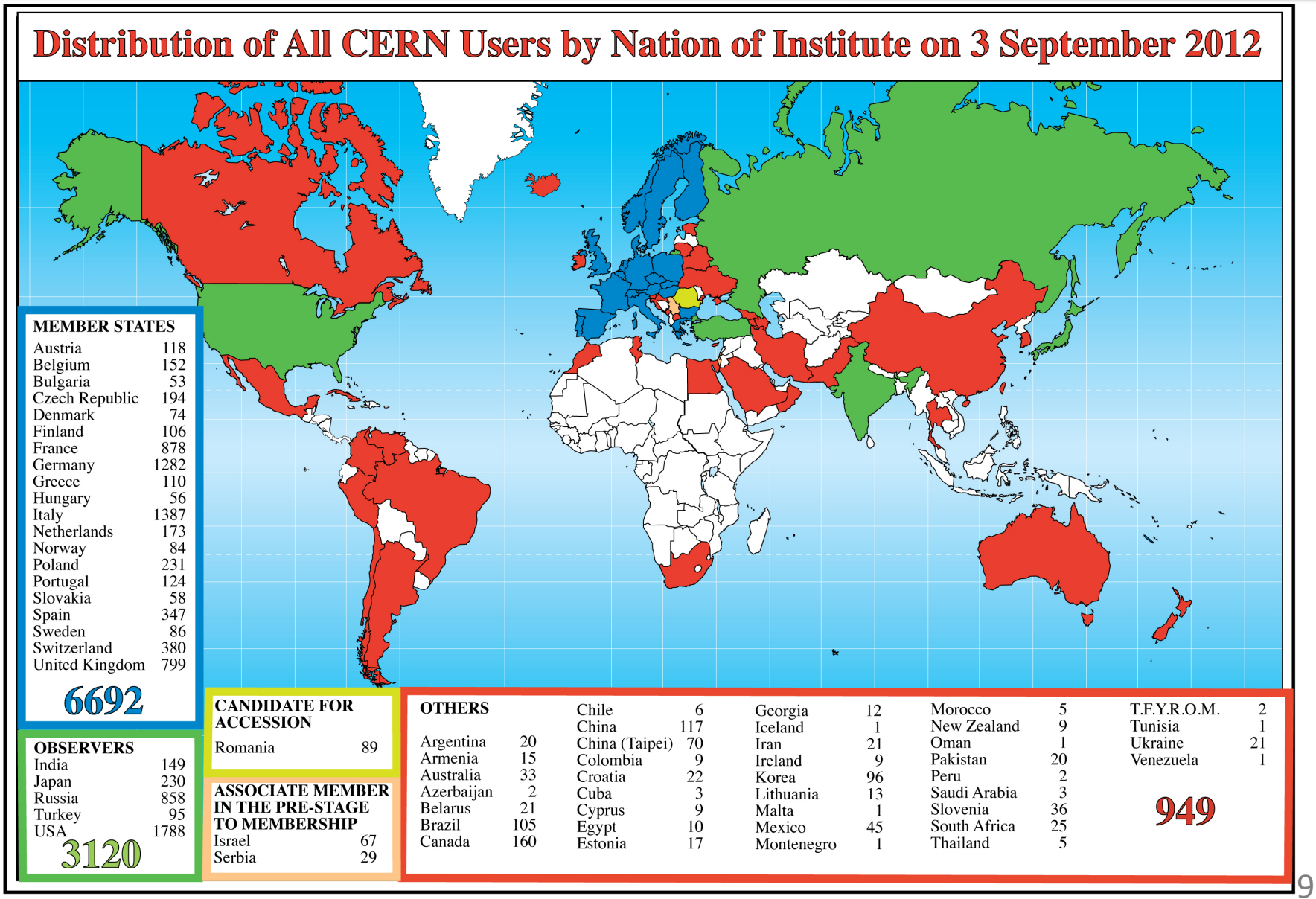
- Significant US investments in accelerator upgrades through
  - USLARP (post-NbTi technologies, accelerator physics and commissioning) – Fermilab a key player!
  - Planned participation in FP7 EuCARD high luminosity project
- CERN welcomes a participation in detector and Grid computing upgrades commensurate with the size of the US community

… to continue a successful collaboration

Non-Member State Users



CERN Users by Institute



Today's formal framework

- US have Observer status at CERN
  - *Status quo* – to be phased out under new membership policy
- CERN-DOE-NSF Co-operation agreement on LHC activities (ICA-US-0058)
  - Signed December 8, 1997 for 20 years duration
  - Thereafter, automatic renewal on annual basis unless terminated by either party
  - Protocols on accelerator co-operation (all expired) and on co-operation on ATLAS and CMS detectors (P026/LHC, concluded December 19, 1997 for 20 y)
- MoUs for experiments and Grid computing

Where do we stand?

- From a European perspective, the unprecedented Non-Member State participation in the LHC, spearheaded by the US, has brought about substantial scientific, technical *and* political benefits
- Helped to establish CERN firmly as world's leading center at the high energy frontier, in the perception of governments, funding agencies, and of the taxpayer

Where do we go from here?

- The LHC has convincingly demonstrated the potential of US-CERN collaboration, and is widely perceived as a paradigm of successful US-Europe collaboration on megascience projects
- To take this collaboration to the next-higher level, and to fully exploit its potential to the benefit of both partners, CERN welcomes an enhanced *institutional* participation of the US, in the framework of CERN's new membership policy (aka 'Geographical Enlargement')

A bit of history

- For > 50 years, the CERN Council has repeatedly *interpreted* the 1953 Convention as restricting membership to European states
- In response to the strong global participation in the LHC – and in anticipation of the post-LHC era – the Council in 2010 approved the most significant shift in CERN's membership policy thus far, opening CERN fully to non-European states (CERN/2918/Rev.)

Dimensions of enlargement

- Full Membership open to non-European states
- Associate Membership – in two flavours:
  - Pre-stage to full membership: compulsory transition period on the way to full membership (2–5 years)
  - Regular ('steady state') Associate Membership
- Instrument of International Co-operation Agreements (ICAs) to be maintained
  - ≈ 45 ICAs currently in force
- Observer status to be phased out for states
  - US presently one of 5+2 observers
  - New states will not be admitted – number expected to decrease
  - To be maintained for International Organizations (presently UNESCO, EU)

Associate Membership

A simplified view of the 'steady state' scheme:

- Obligations
  - Annual contribution to CERN budget corresponding to ≥ 10% of 'theoretical' full Membership contribution (minimum 1 MCHF/year)
- Benefits
  - Representation in CERN Council (no voting rights)
  - Access to employment and education programmes (excluding tenured positions)
  - Access to industrial contracts

New CERN-US Co-operation Agreement

- CERN acknowledges that prospects for an (Associate) Membership of the US and the associated timeline are difficult to forecast today
- Therefore CERN, DOE and NSF have agreed to work on a new Co-operation Agreement, to replace present ICA expiring in 2017
  - Renewal of present ICA is *not* an option because funding exhausted
- CERN proposes an open-ended umbrella agreement
  - First draft examined by DOE legal services

New Co-operation Agreement (II)

- Under an umbrella agreement, specific collaboration projects are implemented through Protocols
  - Enhanced flexibility
  - Focus on scientific and technical aspects
- In case the US would join as AM, Co-operation Agreement would be replaced by Association Agreement
- Protocols etc. could continue under (bilateral) Association Agreement

Looking beyond the US borders

- Israel, Cyprus, Serbia, Turkey and Slovenia applied for (full) membership in 2008-2009
  - Will have to go through Pre-stage Associate Membership
  - Negotiations completed with Israel and Serbia: Associate Members (AMs) since October 2011/January 2012
  - Cyprus signed on October 5, 2012 – waiting for ratification
  - Expect others to join as AMs in 2013/2014
- Brazil and Ukraine applied in 2012
- In discussion with several other countries
  - Good progress with India, Russia, ….
  - The Canadian community, on various roadmaps, has issued a strong recommendation for Canada to join CERN as AM

Conclusions

- The US-CERN partnership in building and operating the LHC has become a solid backbone of a successful scientific and technological collaboration of unprecedented, global dimension
- CERN wants this partnership to continue and to expand, while strengthening at the same time the institutional links with the US