LHC Computing Grid Project

PEB - 23 November 2001

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CERN - IT Division

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Status & News

The LHC Computing Grid Project

Two phases

Phase 1 – 2002–04

- Development and prototyping
- Approved by CERN Council 20 September 2001

Phase 2 – 2005–07

- Installation and operation of the full world-wide initial production Grid
- Costs (materials + staff) included in the LHC cost to completion estimates

Funding of Phase 1 at CERN

Funding for R&D activities at CERN during 2002-2004
partly through special contributions from member and associate states -

- Austria, Belgium, Bulgaria, Czech Republic, France, Germany, Greece, Hungary, Israel, Italy, Spain, Switzerland, United Kingdom

- Industrial funding - CERN openlab
  Intel, Enterasys, KPNQwest

- European Union - Datagrid, DataTag
  further possibilities (FP6)

- Funded so far - all of the personnel,
  ~40% of the materials

Member State Contributions to Phase 1 at CERN

Member States	Person-years/y for ~ 3y	Cash/y	total	Comments
Austria	3-4 PhD students/comp. eng	-	~3*(3-4Student stipends)	
Belgium			~ 0.8 MCHF	∝ contribution, P+M
Bulgaria	Few fte	-		
Czech Rep.	Few fte	-		
France	4-5 fte, cooperants	-		Tier 1 in Lyon
Germany	8-11 fte	-		Tier 1 in K'ruhe,
Greece	~0.2 MCHF equiv.	~0.3 MCHF		∝ contribution, P+M
Hungary	Project associasse(s)			
Italy	20-25 fte	3.0 MCHF		Tier 1,∝ contribution, P+M
Spain	3-5 fte	0.6 MCHF in 2003/4		Tier 2
Switzerland	3 fte ?			Tier 2
United-Kingdom	~30 fte	~3 MCHF	~18 MCHF	Tier 1
CERN	10 fte	2.0 MCHF		
EU			~5 MEuro	Mostly P, some M

Industries		2.5+2.5+2.5 MCHF		CERN openlab, in kind

Proposed	> 80 fte	> 10 MCHF		
Total needed	50 fte	29.5 MCHF		

Hans Hoffmann - Presentation to Council 20 September 2001

Status of Funding Agreements

Country	Status of agreement
France	Initial discussion – few systems programmers; few computer scientists; ~10 coopérants
Germany	Recruitment of ~10 systems staff planned – 2 years at CERN, 1 year in Karslruhe; first materials funding agreed (DM 5M)
Hungary	Agreement prepared, in signature – short term visitors
Israel	Agreement in preparation – 1-2 engineers
Italy	Agreement in preparation; recruitment process started – ~15 people as CERN fellows; few senior people; associated materials funding (CHF 120K per person)
Switzerland	Agreement in preparation – 3 3-year people (networking; 2 applications)
United Kingdom	Funding provided through GridPP project (but less than the CHF 18M in Hans's presentation); first recruitment in process (interviews early December) for 15 3-year people; first materials funding agreed £300K.
Other countries	Establishing formal contacts

Further possible contributions

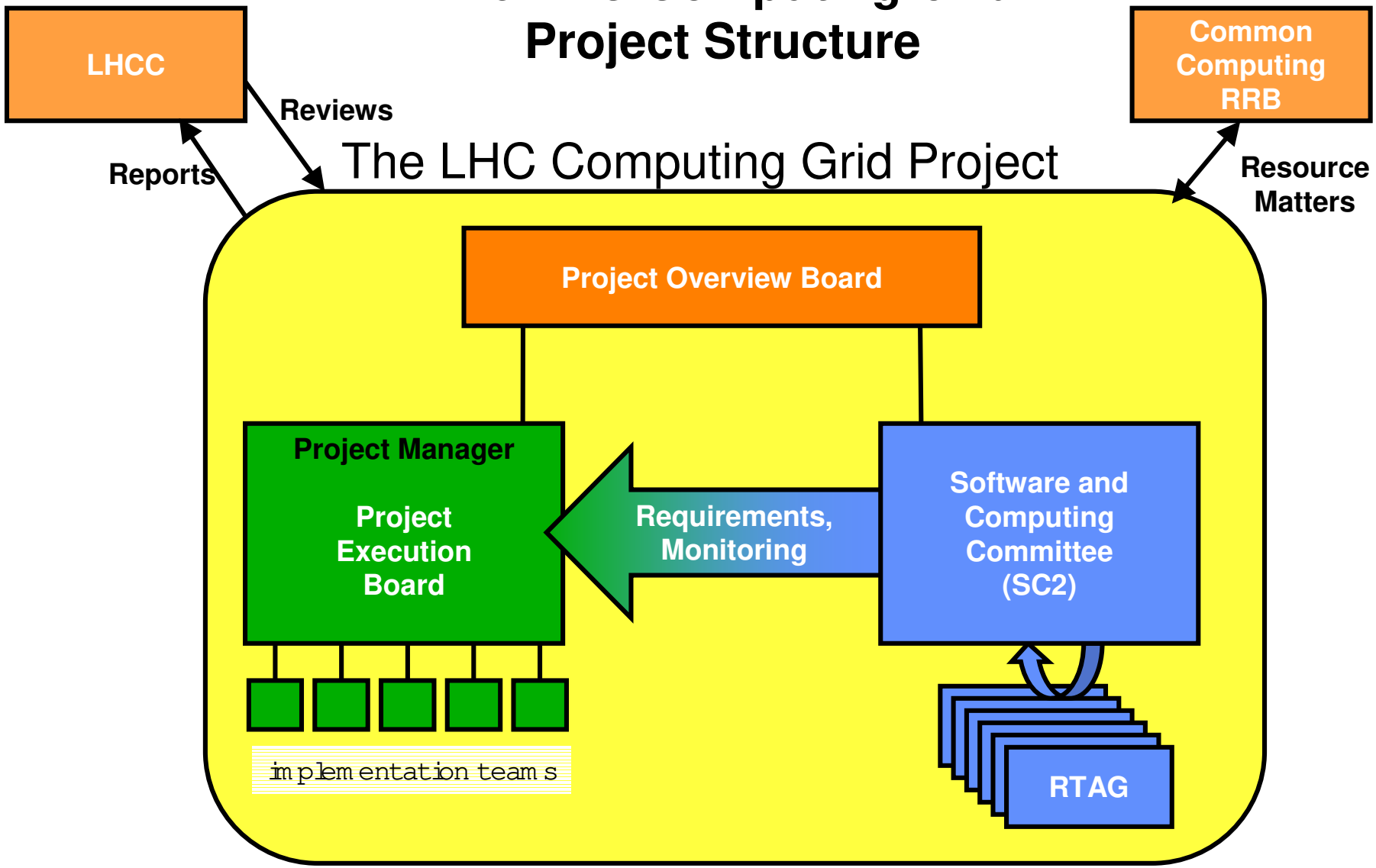
- Canada – proposal for funding being made (R. Sobie)
- India – as part of negotiation for observer status

Other news

- LHCC status report
- SC2 meeting being scheduled by Matthias – early December
- Hans proposes Workshop for February
- No news of POB, appointment of Regional Representatives to POB, SC2
- ……

Role, Membership of the PEB

The LHC Computing Grid Project Structure



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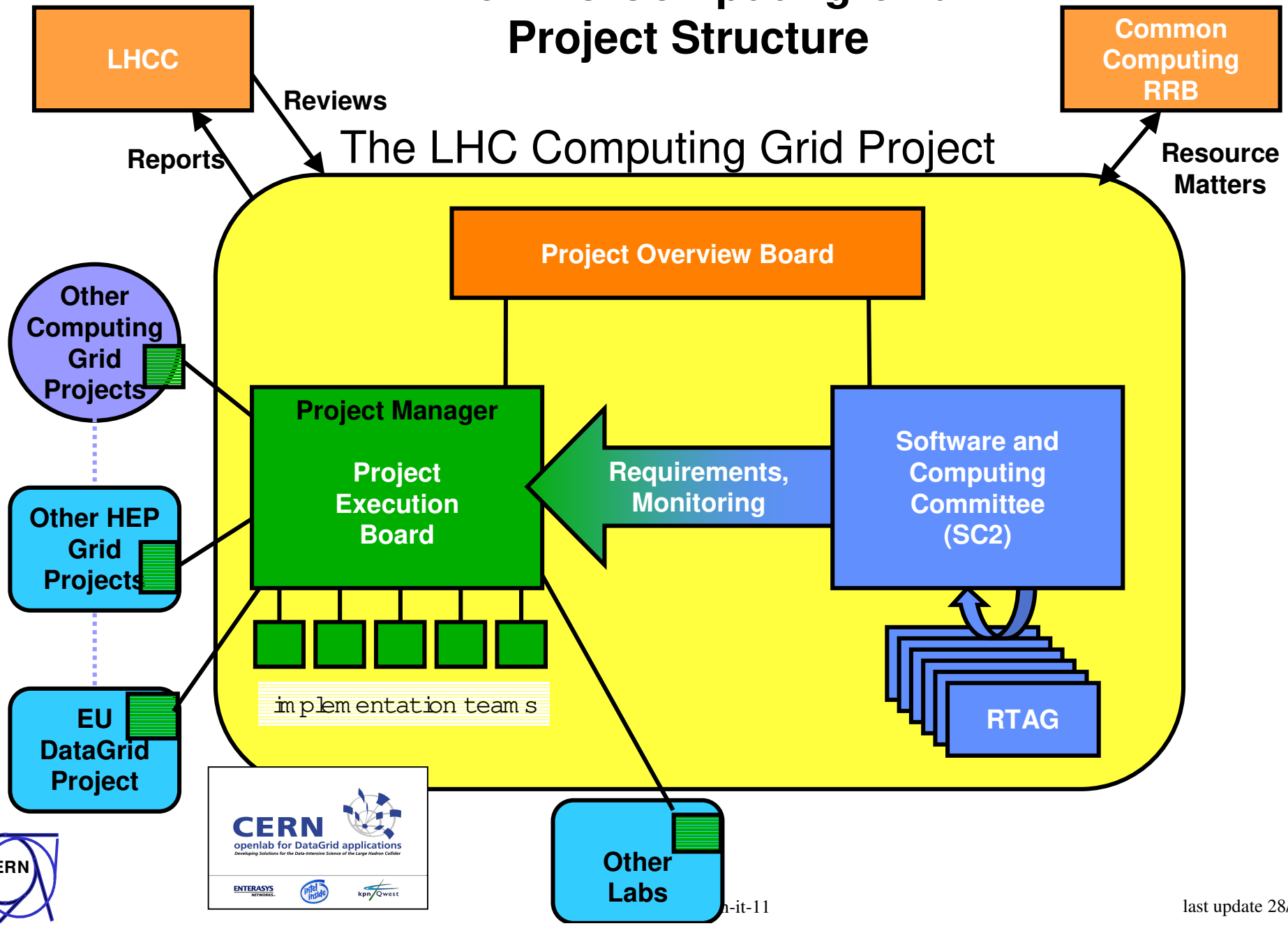
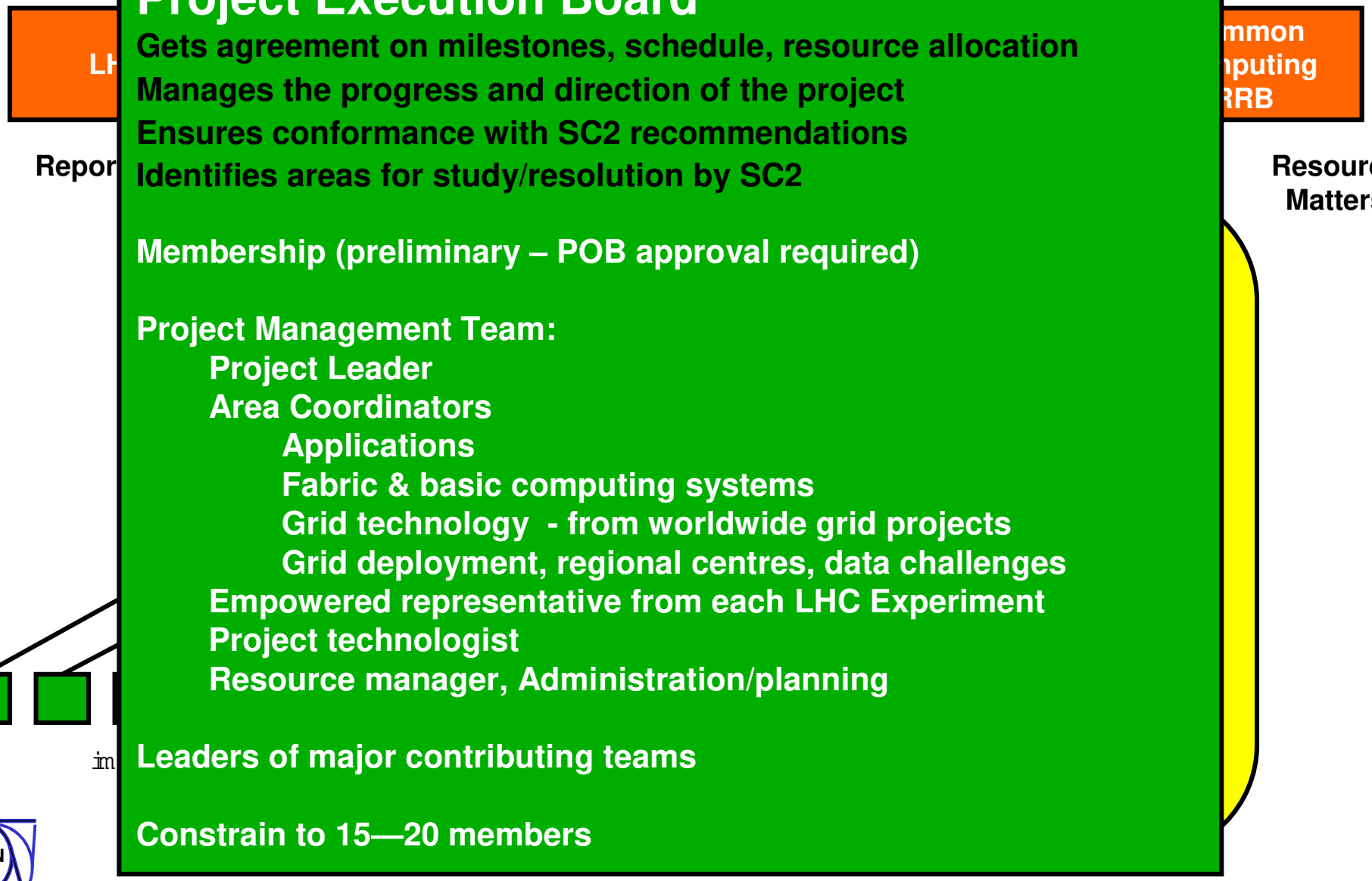


The LHC Computing Grid
Project Structure



Project Execution Board

Gets agreement on milestones, schedule, resource allocation

Manages the progress and direction of the project

Ensures conformance with SC2 recommendations

Identifies areas for study/resolution by SC2

Membership (preliminary – POB approval required)

Project Management Team:

- Project Leader
- Area Coordinators
  - Applications
  - Fabric & basic computing systems
  - Grid technology - from worldwide grid projects
  - Grid deployment, regional centres, data challenges
- Empowered representative from each LHC Experiment
- Project technologist
- Resource manager, Administration/planning

Leaders of major contributing teams

Constrain to 15—20 members

Project Management

- Exploit the base organisation –
  - at CERN, in the labs and universities
  - Minimise special-purpose teams
- Ensure that decisions are taken by the appropriate professionals – with the long-term responsibility
- Project management
  - defining & agreeing goals
  - monitoring progress
  - ensuring resources
  - coordinating with the principal partners
  - eliciting solutions
  - communication, style & culture
- Full involvement of and commitment from project members (experiments, resource owners) during planning
- Flexibile & pragmatic

Build a Project Management Team

Day-to-day management of the project

- defining goals, schedules, milestones
- communication
- identifying and resolving problems
- getting decisions made

- Project Leader
- Area Coordinators
  - Computing Systems
  - Applications
  - Grid Technology
  - Deployment and Regional Centres
- **Empowered** Representatives of the LHC Collaborations – pro-active role in management of the project

- Supporting staff
  - Architect – computing model, analysis model, consistency, comprehension
  - Planning, Resource Manager

Project Execution Board

Agreement on milestones, schedule, resource allocation

Manage progress, direction

Ensure conformance with SC2 recommendations

Identify areas for study/resolution by SC2

Members – Principal participants in the project

- project management team (10-12 people)
  - includes LHC collaboration representatives
- leaders of the main teams working on the project from CERN, labs, other projects, ……
  - leaders of major contributing teams
  - proposed membership submitted to POB for endorsement

Try to limit to ~20 people

Monthly focused meetings

Experiment members

Board	*ALICE*	*ATLAS*	*CMS*	*LHCb*
POB	Jürgen Schukraft	Torsten Åkesson	MichelDella-Negra	Tatsuya Nakada
SC2	Federico Carminati Wisla Carena	Norman McCubbin Gilbert Poulard	David Stickland Paolo Capiluppi	Nicholas Brook John Harvey
PEB	Alberto Masoni	Gilbert Poulard	Lucas Taylor	Philippe Charpentier

PEB – other core members

- Computer Systems
  - Wolfgang von Rüden
- Grid Technology
  - Fabrizio Gagliardi
- Applications
  - under discussion
- Data challenges, Grid operation, Regional Centres
  - Discussing splitting the job into operation and high level RC policy issues
  - Some candidates under discussion
- Resource manager
  - Chris Eck
- Administration/Planning Officer
  - Miguel Marquina
- Technologist
  - under discussion

Working methods

- *setting goals & milestones*
- *buy-in from implementation teams*
- *tracking – schedule, resources*
- *reviews*

Work plan

The LHC Computing Grid Project

Goal -

Prepare and deploy the LHC computing environment

- applications tools, frameworks, environment
- computing system → services
  - cluster → fabric
  - collaborating computer centres → grid
  - CERN-centric analysis → global analysis environment
- foster collaboration, coherence of LHC computing centres

This is not yet another grid technology project -

it is a grid deployment project

The LHC Computing Grid Project

Phase 1 Goals –

- Prepare the LHC computing environment
  - provide the common tools and infrastructure for the physics application software
  - establish the technology for fabric, network and grid management
    - buy, borrow, or build
  - develop models for building the Phase 2 Grid
  - validate the technology and models by building progressively more complex Grid prototypes
  - maintain reasonable opportunities for the re-use of the results of the project in other fields

- Operate a series of data challenges for the experiments
  Deploy a 50% model* production GRID including the committed LHC Regional Centres

- Produce a Technical Design Report for the full LHC Computing Grid to be built in Phase 2 of the project

Areas of Work

Computing System

- Physics Data Management
- Fabric Management
- Physics Data Storage
- LAN Management
- Wide-area Networking
- Security
- Internet Services

Grid Technology

- Grid middleware
  - Scheduling
  - Data Management
  - Monitoring
  - Error Detection & Recovery
- Standard application services layer
- Inter-project coherence/compatibility

Applications Support & Coordination

- Application Software Infrastructure – libraries, tools
- Object persistency, data management tools, data models
- Common Frameworks – Simulation, Analysis, ..
- Adaptation of Physics Applications to Grid environment
- Grid tools, Portals

Grid Deployment

- Data Challenges
- Grid Operations
- Integration of the Grid & Physics Environments
- Network Planning
- Regional Centre Coordination
- Security & access policy

Practical stuff

- *Minutes*
- *Mailing lists*
- *Offices*
- *Video conferencing*
- *..*

- *Meeting frequency & timing*
- *Next meeting – 12 December pm?*

A O B

The LHC Computing Grid
Project Structure

LHCC

Common Computing

Project Overview Board

Chair: CERN Director for Scientific Computing
Secretary: CERN IT Division Leader

Membership:
Spokespersons of LHC experiments
CERN Director for Colliders

Representatives of countries/regions with Tier-1 center :
France, Germany, Italy, Japan, United Kingdom, United States of America

4 Representatives of countries/regions with Tier-2 center
from CERN Member States

In attendance:
Project Leader
SC2 Chairperson

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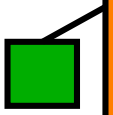

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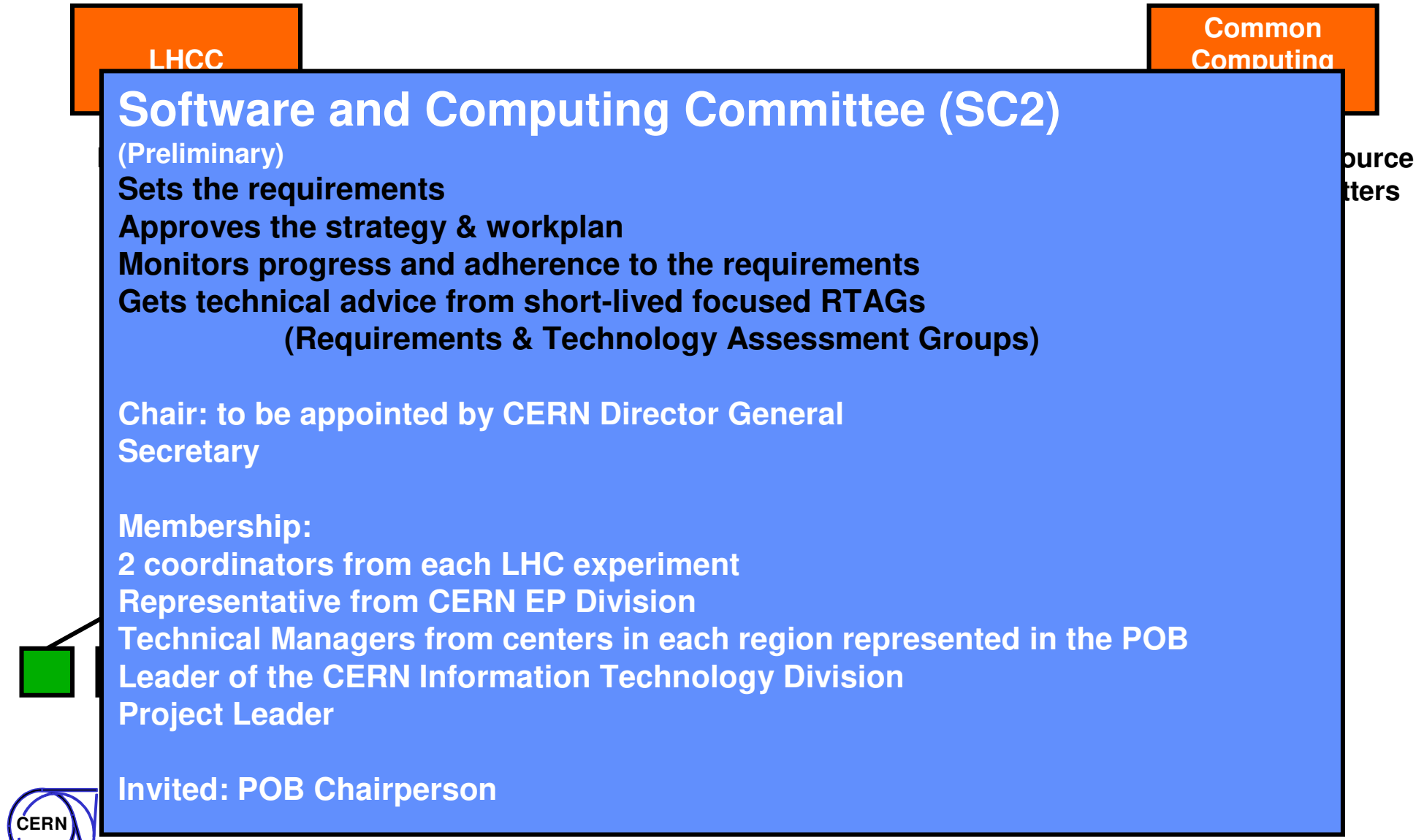

Summary of Milestones of Phase 1 of the LHC Computing Grid Project

Milestone	***Date***	***Goals***
Prototype I	Mar 2002	Performance and scalability testing of *components* of the computing fabric (clusters, disk storage, mass storage system, system installation, system monitoring) using straightforward physics applications. Testing of job scheduling and data replication software.
Prototype II	Mar 2003	Prototyping of the integrated local computing fabric, with emphasis on scaling, reliability and resilience to errors. Performance testing of LHC applications at about 50% final prototype scale. Distributed application models using Grid test beds.
Prototype III	Mar 2004	Testing of the full-scale LHC computing model with fabric management and grid management software for Tier-0 and Tier-1 centres, with some Tier-2 components. This is the prototype system that will be used to define the parameters for the acquisition of the initial LHC production system.
Production Prototype	Dec 2004	Model of the initial phase of the production services, including final selections of the software and hardware implementations, demonstrating appropriate reliability and performance characteristics.

Synchronised with DataGrid Prototypes