Minutes of LHC-CP Link Meeting 16

Subject	:	LHC Controls Project	
Date	:	11 September, 2001	
Place	:	936-Conference Room	
Participating Groups	:	EST-ISS	P. Martel,
		LHC-ACR	Ph. Gayet,
		LHC-ECR	no representative,
		LHC-IAS	apologies,
		LHC-ICP	F. Rodriguez-Mateos,
		LHC-MMS	no representative,
		LHC-MTA	L. Walckiers,
		LHC-VAC	I. Laugier,
		PS-CO	F. Di Maio,
		SL-AP	E. Wildner,
		SL-BI	no representative,
		SL-BT	E. Carlier,
		SL-CO	apologies,
		SL-HRF	no representative,
		SL-MR	R. Billen,
		SL-MS	P. Dahlen replacing G. Mugnai,
		SL-OP	apologies,
		SL-PO	Q. King,
		ST-MO	R. Bartholome replacing P. Solander.
Others	:	S. Chemli (EST-ISS), C. Delamare (EST-ISS), R. Lauckner (Chair), J. Poole (SL-MR), R. Saban (AC/TCP), M. Vanden Eynden (Core Team), M. Tyrrell (Alarm Sub-Project).	
Distribution	:	Via LHC-CP website: **http://cern.ch/lhc-cp** Notification via: **lhc-cp-info@cern.ch**	
Agenda	:	1. Matters arising from Previous Meeting	
		2. LHC-CP News	R. Lauckner
		3. Alarm System Requirements	M. Tyrrell
		4. Installation Databases	R. Saban
		5. AOB	

1. Matters arising from Previous Meeting

The planning for the controls requirements for QRL reception testing has progressed. Database activities have been included and final discussions for the Alarm system work are taking place with the project team. The LHC-CP planning is now available from the following folder: \\srv2_home\div_sl\di\lhc-cp-planning\

The launch of the work for the development of the logging facilities for LHC Controls will take place on 17th September.

Marc Vanden Eynden explained that the form of deliverables for LHC-CP work will be written reports for the future Front Ends recommendations and the project middleware.

2. LHC-CP News R. Lauckner

M. Lamont and T. Wijnands have set up a collaboration with EPFL to develop models of the global feedback systems. Dr. B. Srinivasan from EPFL is participating on modeling of global orbit correction.

Q. King and K. Kostro are jointly developing a project middleware prototype based on the CMW. This prototype is scheduled for completion at the end of October.

E. Sanchez from the ST/MO group has requested that certain LHC Equipment code (LHC-PM-QA-204.00) families be designated for official use. This concerns the system code C: controls and communications. She has proposed:

CC: Crate, connected to field buses

CF: Field bus, communication equipment below hosts

CH: Host computer, connected to control network

CI: Intercom and Public Address system

CN: Network control

CR: Radio, Wireless communication

CS: Slow Timing System

CT: Telephone, Cabled

CV: Video System

R. Saban pointed out that two families are already designated across systems:

CJ: boxes

CY: racks

He requested that project teams do not invent alternative naming schemes and encouraged the usage of functionality in the designation of names. R. Lauckner has asked the IT/CS, LHC-IAS and SL-CO groups to consider their requirements for equipment codes. Some feedback has been received. He requested any other group with naming requirements to contact him.

The schedule and main topics for the next LHC-CP meetings are:

9/10	Post Mortem, Industrial Components	Wenninger, Gayet
23/10	Back Ends, Slow Timing	Charrue, Beetham

3. Alarm System Requirements M. Tyrrell

M. Tyrrell recalled the mandate of the LHC Alarm Project. This covers the supply of Alarms to the PCR and the TCR but he is willing to provide an alarm service to other users. The TCR and the Firestation as well as the PCR use the CERN Alarm displays today.

The project team has prepared a questionnaire for users and potential users of the system in the LHC era. This is designed to collect their requirements and also to assess how global the scope of the new system should be.

He explained that the form was in 5 parts, this covered all aspects of the alarm service but respondents should only return the sections which are relevant to their activities. The survey included a part on concepts that is partly intended to introduce new users to some of the basics of the present system.

The form will be sent out in October, replies analysed in November and a User Requirements document published by the end of 2001.

A small number of people had been invited to comment on the document but the response had been poor.

R. Saban remarked that there is a need to protect the Alarm System from overload. The generation of alarms should be subjected to the approval of the end users in the PCR. R. Bartholome stressed the importance of alarm data quality for the TCR. His experience showed that data volumes can be reduced by a factor of 10 by user filtering.

M. Tyrrell agreed that this could be an area for concern. However experience has shown that the current system can handle over 50000 alarms/day without perturbing the fire brigade who are the most critical users. Filtering is achieved by restricting the use of the system for information concerning faults and not allowing normal status messages to be transmitted. Considerable success in reducing alarm displays has also been achieved by grouping alarms into categories. These are then used to select subjects of local interest to be displayed to the users. A good example of this is in the fire station where only INB level 3 alarms are reported.

R. Lauckner pointed out that the LHC control room will require alarms from systems across the CERN site.

4. Installation and Integration Database R. Saban

R. Saban presented some recent decisions concerning the management of data and activities concerned with the integration, installation and commissioning of the LHC. Much of the material had been presented at the TCC meeting of June 29th: http://lhc.web.cern.ch/lhc/tcc/tcc.htm . Integration is a study activity aimed at placing the components in the tunnel; the decisions cover the complete range of tunnel installation activities. Commissioning is considered as hardware and beam commissioning activities.

Reviewing the data associated with all this work he described the integration data as describing layout of components in the tunnel, a physical description of these components and the powering data describing connection of the power converters to the magnets. This data will be gathered from the currently diverse repositories and used to produce mechanical and conceptual layouts as well as MAD input. The data should provide a description of the LHC that can be used to produce a 3 dimensional model visualising the machine as the viewer traverses the tunnel. Calibration data and component construction information (MTF) will be added to complete the data required for installation.

The layout, equipment data and power data, required for integration, will be imported and managed in the new facility. Other information such as cabling and MTF will be managed externally and imported as required.

The work involves teams and responsibilities across the project. The Controls Project will be directly involved for the hardware commissioning.

Q. King asked how much of the software required is available commercially. C. Delamare stated that a structured description of the information to be managed is required to answer this question.

E. Wildner was concerned about data she requires for MAD input. This is currently obtained from P. Burla's description of magnet circuits and H. Prin's information on magnet parameters. R. Saban stressed that the layout reference will continue to be MAD.

R. Billen asked about the import and export functionality of the system. C. Chemli and R. Saban stressed that the work is in a very premature phase and is concentrated on importing existing information from other facilities. This is tedious for piping and cable tray information which is only recorded on paper. While MAD has been an important information source in the past the extra complexity of the LHC magnets makes it far more complicated to match a description of the magnets with the optics description.
R. Schmidt pointed out that equipment in the LHC is densely packed and current descriptions of equipment location imply that different elements are located in the same volume. An important goal of this work is to locate and eliminate these inconsistancies.

Louis Walckiers wanted to know how static this information will be. C. Delamare said that the information will not be static and version management is foreseen. R. Billen and J. Poole considered that the situation will be similar to LEP, very few changes in the arcs but activity in the straight sections. At LEP parallel future versions were available for study.

F. Rodriguez-Mateos expressed concern about the reliability of the information he will need to for the functioning of his systems. R. Saban explained that the responsibility will be divided between the project task force from EST/ISS, the equipment groups and AC/TCP. The task force will be responsible for the product and tools. He stressed that change management with respect to the baseline to be agreed with the equipment groups will be the responsibility of AC/TCP.

5. AOB

There was no further business.

Long Term Actions	**People**
Attach leaves to EDMS tree	All, M. Vanden Eynden
Establish Post Mortem sub-project	R. Lauckner
Clarify Middleware Services to be used by LHC-CP	Core Team

Reported by R. Lauckner

Integration

Access

Safety

Civil Works

General services, infrastructures & transport means

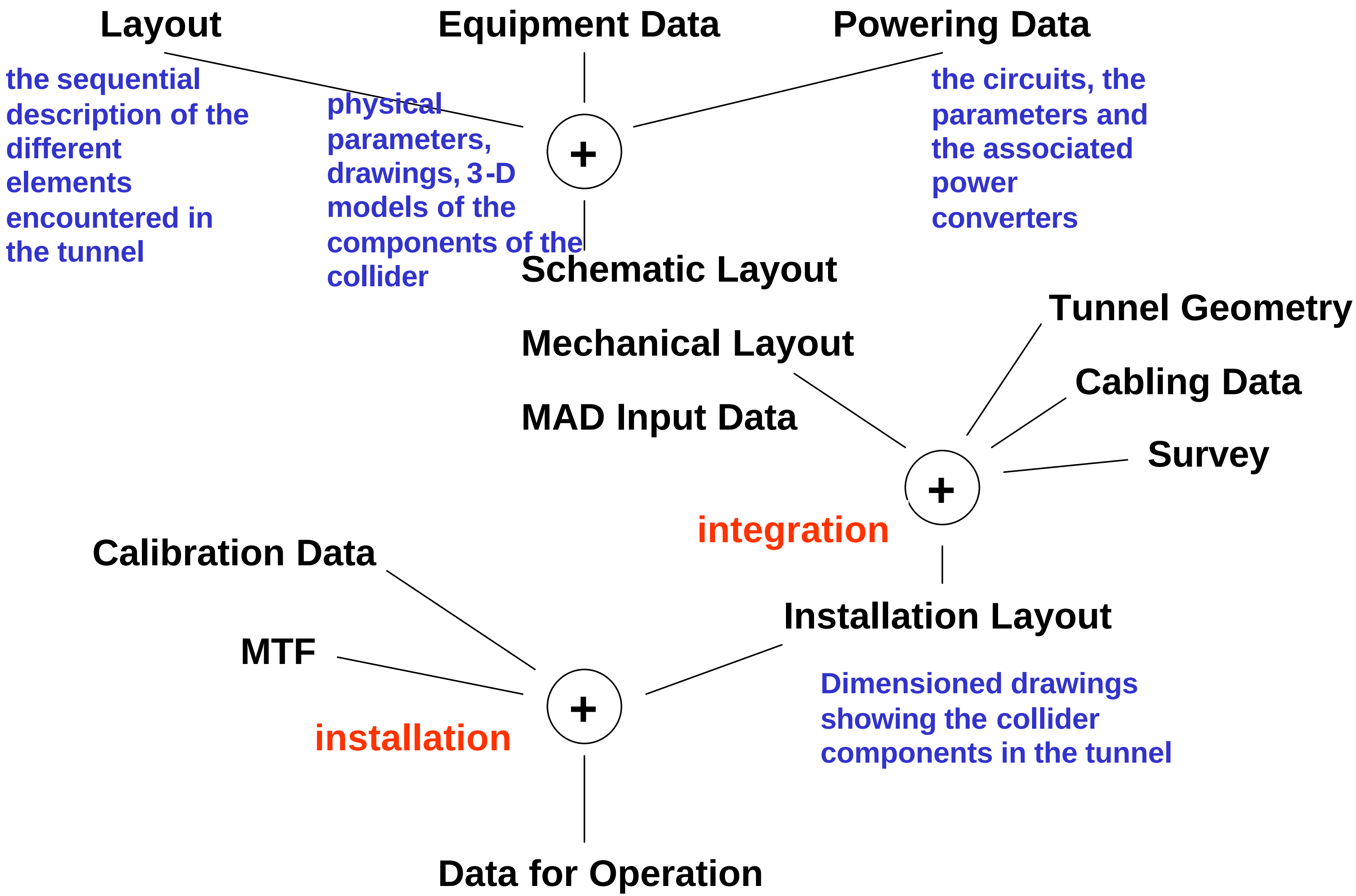
Cryogenics equipment

Magnets & interconnection

Hardware commissioning

Commissioning with beam

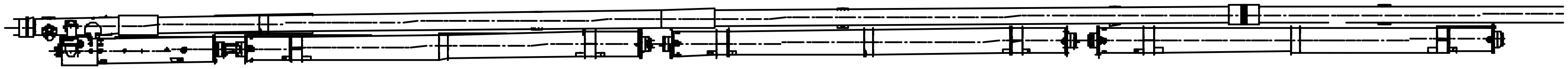
the data


Layout
Equipment Data
Powering Data
the sequential description of the different elements encountered in the tunnel
physical parameters, drawings, 3-D models of the components of the collider
the circuits, the parameters and the associated power converters
+
Schematic Layout
Mechanical Layout
MAD Input Data
Tunnel Geometry
Cabling Data
Survey
+
integration
Installation Layout
Dimensioned drawings showing the collider components in the tunnel
Calibration Data
MTF
installation
+
Data for Operation

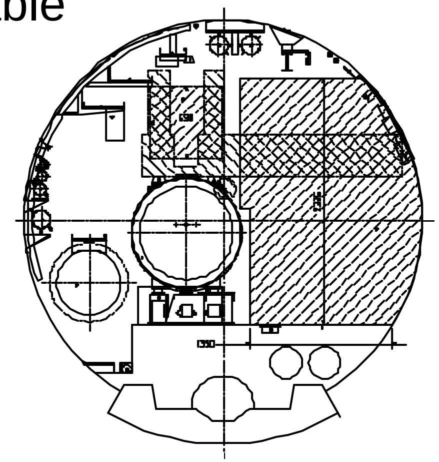
where are we today ?

layout inspired/generated by optics calculation
powering/circuit database
assembly (e.g. compound magnet) database
QRL layout database depending on manufacturer
cabling database
piping database
...

integrated repository of all this

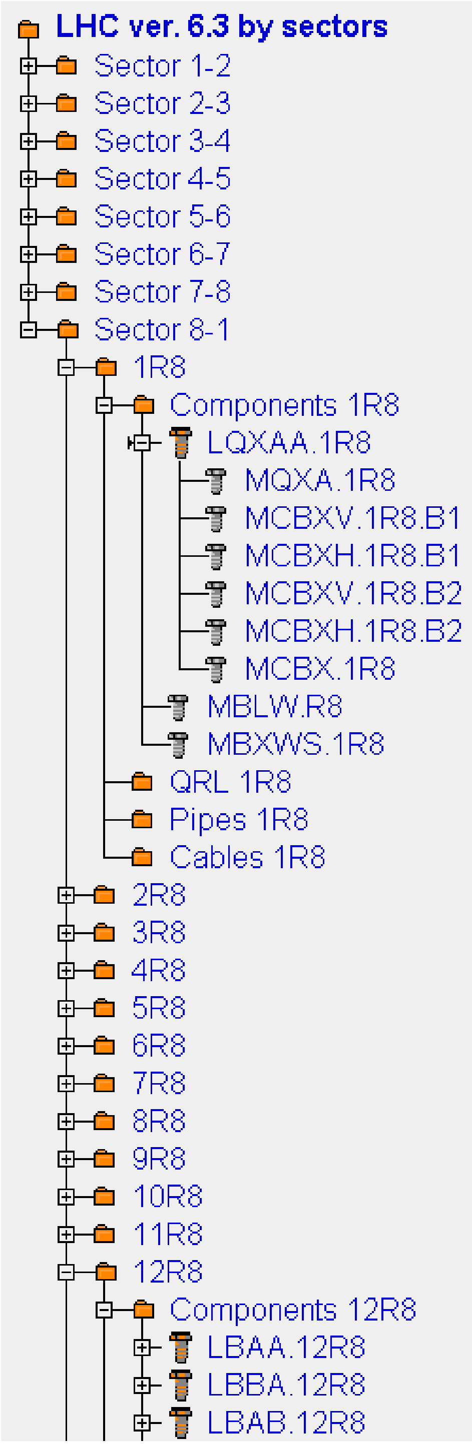


what cable
what pipe
what assembly
what electrical circuit
what cryogenic circuit



…and their parameters relevant for operation

navigating in the database



All the sectors

All the half cells in the sector

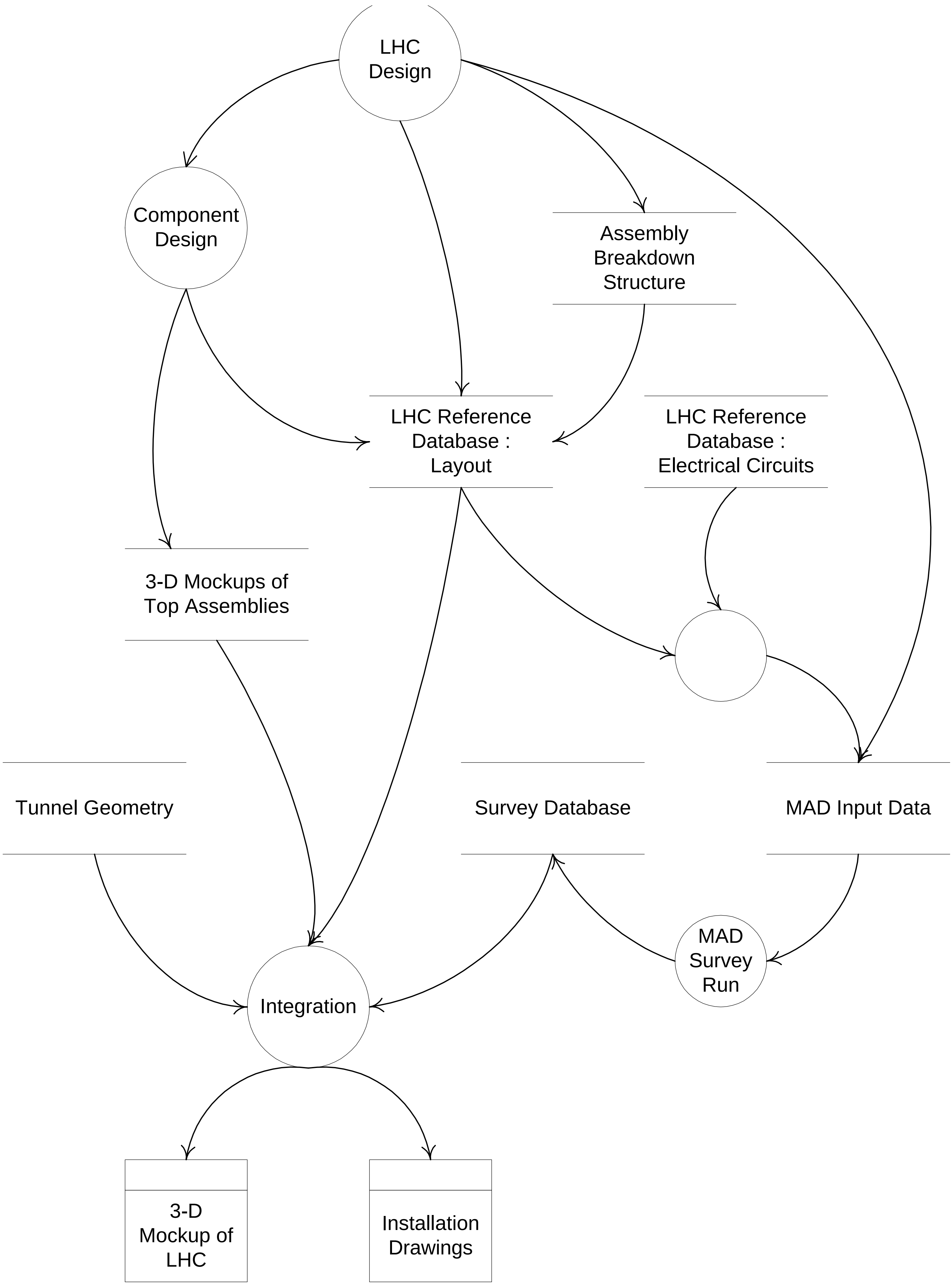
All the magnetic components in the half-cell

The QRL components in the half-cell

The cables in the half-cell

The pipes in the half-cell

… and their associated
data relevant for operation



Integration

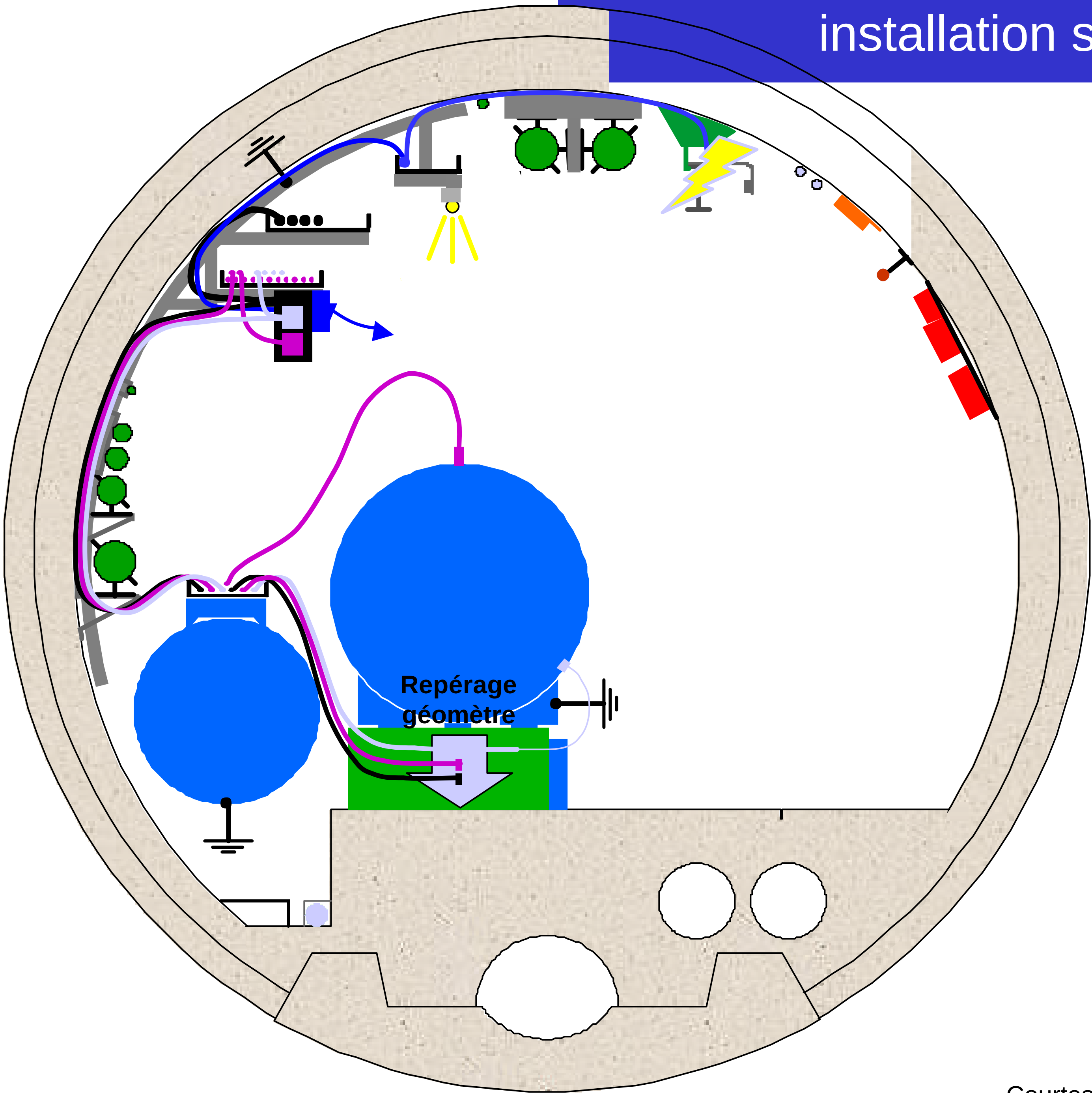
phases of construction / installation (1/2)

		Responsible Groups
1	civil works	ST-CE
2	cable ladders	ST-EL
	electrical & control cables	ST-EL
	optical fibres	ST-EL
	piping for fluids	ST-CV
	ventilation	ST-CV
	access	ST-AA
	metallic structures	EST-ME
	infrastructures / transport means	EST-ME ST-HM
	marking-up of the floor	EST-SU
	other preparatory work	SL-MR
3	QRL and cryogenic equipment	LHC-ACR
	control cables	ST-EL
	vacuum	LHC-VAC

phases of construction / installation (2/2)

Phase	Item	Responsible Groups
4a	jacks	LHC-CRI ??
	alignment	EST-SU
	transport	ST-HM
	components in the arc	LHC-CRI
	beam pipe interconnects	LHC-VAC
	components in the insertions	LHC-ICP ??
	warm magnets	SL-MS
	rf systems	SL-HRF
	transfer lines and injection	SL-BT
	extraction and beam dump systems	SL-BT
4b	electronics under the magnets	LHC-ACR, LHC-VAC, LHC-ICP SL-BI, SL-PO
	vacuum equipment	LHC-VAC
	power converters	SL-PO
	energy extraction system	LHC-ICP

installation sequence



Courtesy JC.Guillaume

1 define

the conditions required for each installation procedure

the sequence of installation of the individual systems

the condition which determines the end of installation of each system

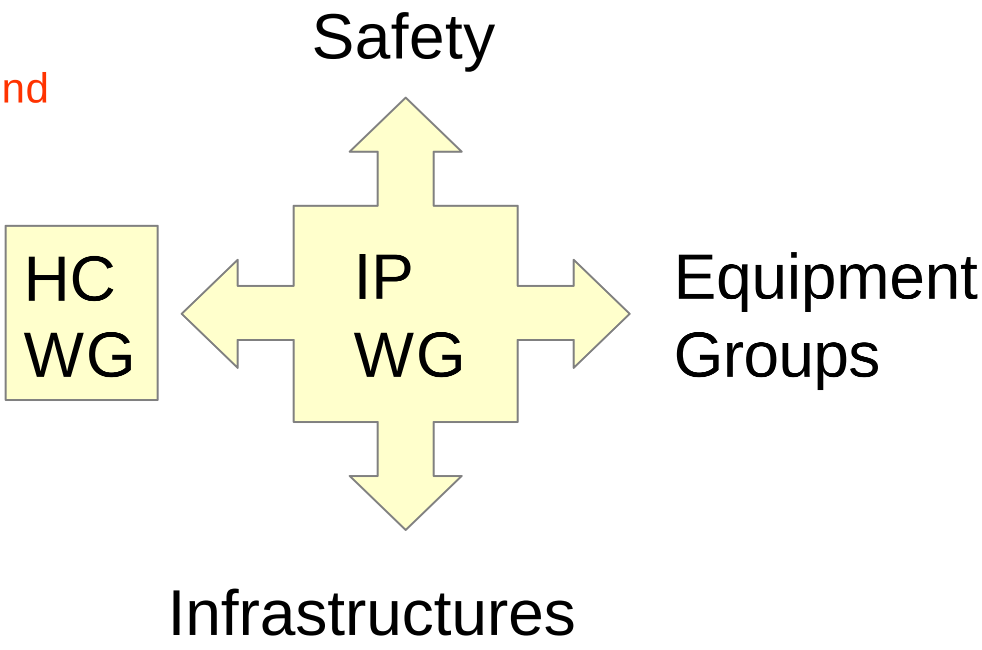
overall quality assurance

2 identify the required

infrastructure,

services and

systems



IP	Installation Preparation
HC	Hardware Commissioning

the actors in the tunnel

from
SL-MR

1 **underground work supervisor with overall responsibility for the sector**

- enforce safety
- verify that all the necessary technical conditions for a given step are satisfied
- ensure that all the installation steps are carried-out
  - as described in the Installation Work packages minimise deviations
  - in sequence evaluate the effect of rescheduling
- cope with unexpected situations
- manage space and environment
- report to management on the progress of the work

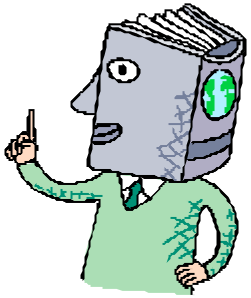
under the responsibility of the groups

2 **installation teams during QRL & machine installation**

- active on only one front of installation
- multi-disciplinary
- lead by an installation chief
  present in the tunnel full-time
  participating to
  installation/assembly work

3 **inspection team**

- controlling the quality of the installation
- covering all sectors



Establish a catalogue of all the non-conformities which can be generated during transport and assembly work.

$$\frac{\text{frequency} \times \text{detectability} \times \text{gravity}}{} = \text{severity}$$

Failure Mode Effect Analysis

Prepare simple instructions which are applicable when a non-conformity is detected after a test or an inspection

Set-up a panel of experts. It

- prepares and updates the catalogue and the simple instructions manual
- solves non-conformities missing in the catalogue
- disseminates information across installation fronts via the regular SOS meetings

1 define

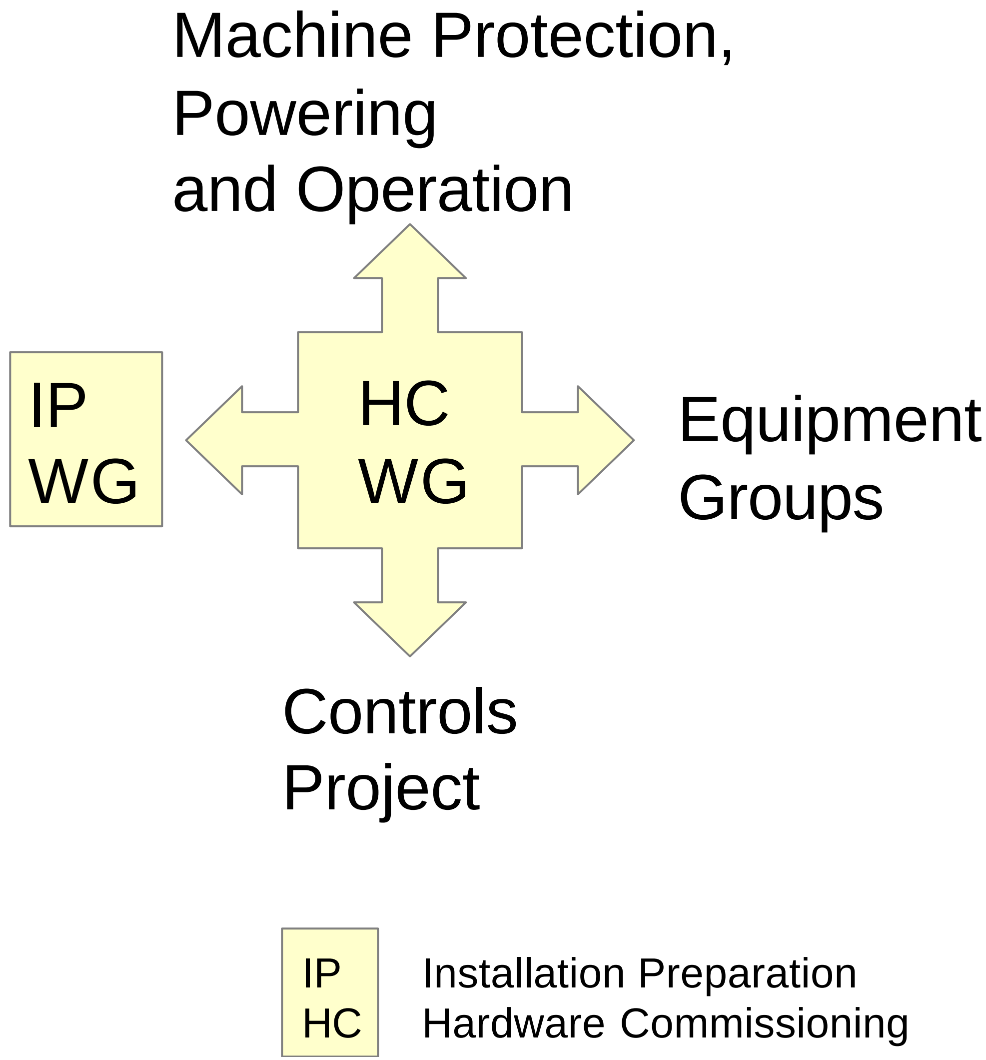
the conditions required for the commissioning of the individual systems

the conditions which determine when a system is commissioned

2 identify the required

human resources,
infrastructure,
services and
systems

3 comply with the boundary conditions defined by the project milestones



… in summary

the actors

the Equipment Groups and associated installation teams — **prepare the procedures and carry-out the work for the installation and quality control**

SL/MR — **safety, access, follow-up installation, site management**

AC/TCP — **co-ordination, follow-up**

the activities

Pits and Service Areas Integration
R. Valbuena

Powering Integration
P. Burla

Machine Integration
C. Hauviller

integration

preparation for the installation

Installation Preparation & Follow-up
P.Bonnal, M.Vitasse

preparation of the hardware commissioning

Hardware Commissioning
R.Saban