

An Experiment Safety System for LHCb Ideas and Concepts



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and
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Background



- JCoP Meeting (16 May 2001)
 - Agenda: Are There Grey Areas between AL3 and DCS ?
 - "From the subsequent discussion it indeed seems that there is a grey area here"
 - "it was felt that JCOP should understand better which experiment-specific solutions are being studied and what common features in connection with the Joint Controls could be envisaged. The suggestion to hear a talk about GSS, as a reminder to the areas covered by this system in the LEP era, was positively taken up. Wayne proposed to discuss the subject also in a future executive board meeting"

Background (cont'd)



- JCoP Meeting (30 May 2001)
 - Agenda GSS and its role as Detector Safety System for the LEP Experiments.
 - "From the resulting discussion it became quite obvious that solutions for the functionality covered by GSS at LEP have only partly been studied within the LHC experiments. There was general agreement of the need for such GSS-like functionality (which is now often referred to as DSS or "Detector Safety System".) A Common solution for this sort of problems for all experiments therefore was a suggestion that found interest"



Background (cont'd)



- JCOP Executive Board Meeting (02/08/01)
 - Plan of work
 - "Get a snap shot of the current status of the work being performed in each of the experiments in this area. Gather and document the requirements of the DSS... Produce a high-level implementation specification for the DSS. List any constraints on the DSS implementation" ..
 - "it was agreed that the scope presented at this meeting be refined by the working Group and presented to the Steering Group at the next meeting"

What was decided?



- DSS Working Group
 - Working Group
 - ~2 persons/experiment
 - ST
 - GSS
 - IT/CO
 - Steering Group
 - Controls coordinators
 - GLIMOS
 - Information to
 - Technical Coordinators
 - Experiment linkman
 - EP management
 - Time scale: 6 months -> End of March 2002
 - Interim report by Christmas

What has been done?



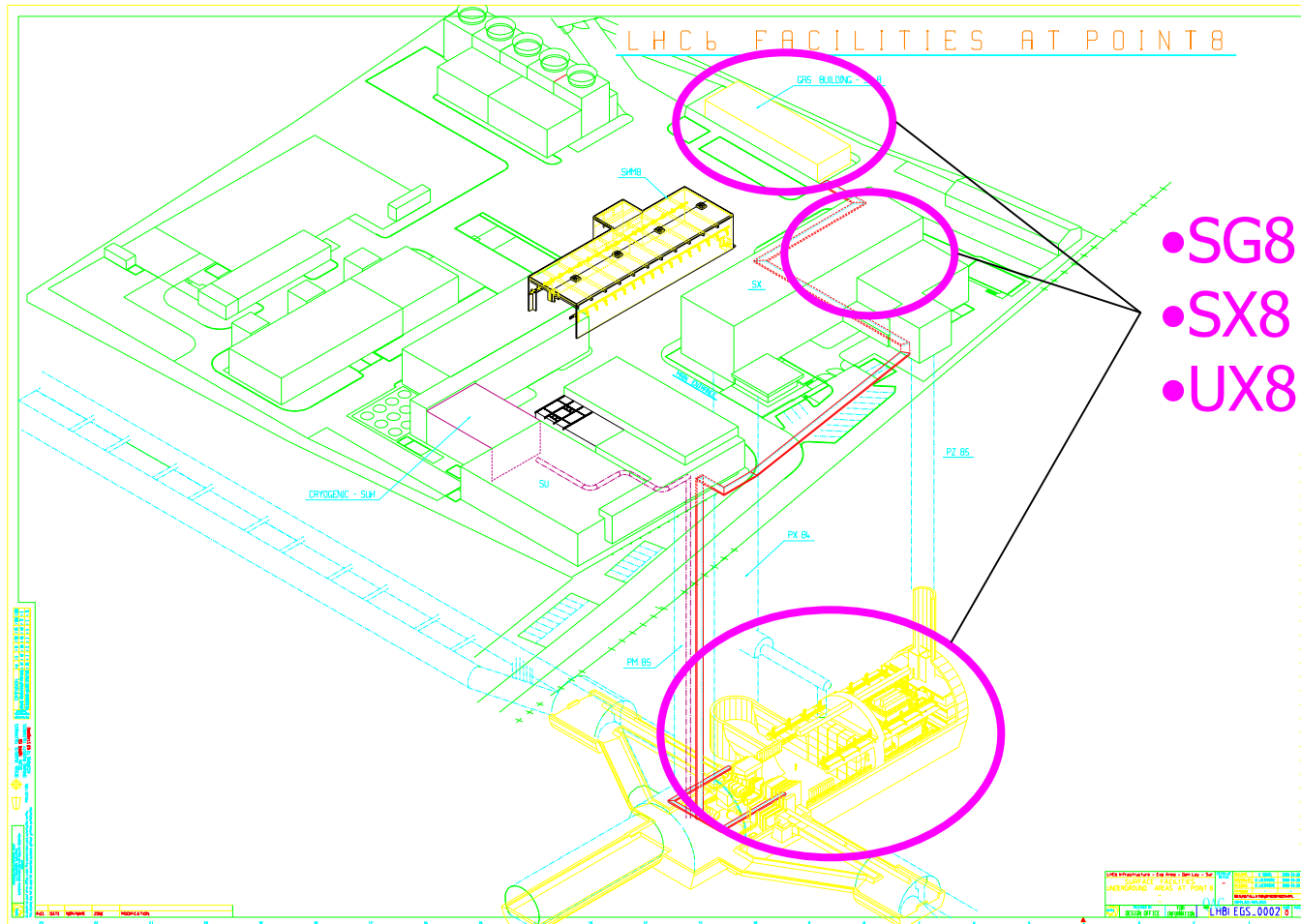
- Organisation
 - Web address: <http://itcowww.cern.ch/DSS/welcome.htm>
- Meetings & parallel
 - 5 WG meetings to gather info from experiments + discuss GSS PROs
* CONs
 - Subgroup to prepare a preliminary SCOPE proposal (3 meetings)
- 13/09: 1st Steering Group meeting
 - Presentation of the draft SCOPE proposal
 - Many questions, suggestions, modifications

LHCb Time Constraints



- January 2003 Magnet Installation
- May 2003 Magnet Measurements
- January 2004 Main Installations and
Commissioning
- December 2005 Complete Detector Ready

ESS Scope



Technical Board
17.09.2001

Ph. Gavillet and S. Schmeling

ESS Domains



- General
 - Supply Systems
 - ESS System
- Gas Building
- Experiment Hall
 - XCR
 - Labs
 - Hall
- Access Shafts
 - PZ, PX
- Underground
 - Counting Room Area
 - Counting Rooms
 - Detector Area
 - Detector

ESS Domain "UX Area I"



Location	Item	Level	Detection	Destination	Action
UX85 Counting Room Area					
	Smoke	1,2	ST/AA	CSAM, TCR, XCR	CSAM, TCR
		3	ST/AA	CSAM, TCR, XCR	CSAM, TCR
	Power - 48V - 230V	1,2	ST/EL	TCR, XCR	TCR
	Ventilation	1,2	ST/CV	CSAM, TCR, XCR	TCR, XCR
	Temperature	1,2	LHCb	XCR	XCR
	Humidity	1,2	ST/CV	TCR, XCR	TCR
	Radiation	1,2	TIS/RP	TCR, XCR	TIS/RP
		3	TIS/RP	CSAM, TCR, XCR	CSAM
	Water Flood (PZ)	1,2	ST/CV	TCR, XCR	TCR
		3	ST/CV	CSAM, TCR, XCR	CSAM
	Water Pumps (PZ)	1,2	ST/CV	TCR, XCR	TCR
Water Flood	1,2	ST/CV	TCR, XCR	TCR	
Counting Rooms					
	Smoke	1,2	ST/AA	CSAM, TCR, XCR	CSAM, TCR
		3	ST/AA	CSAM, TCR, XCR	CSAM, TCR
	Power - 48V - 230V	1,2	ST/EL	TCR, XCR	TCR
	Ventilation	1,2	ST/CV	CSAM, TCR, XCR	TCR, XCR
	Temperature	1,2	LHCb	XCR	XCR
	Air Conditioner	1,2	ST/CV	TCR, XCR	TCR
	UPS	1,2	ST/EL	TCR, XCR	TCR
	AUL	2	ST/EL?, LHCb?	TCR, XCR	XCR
	Racks - cooling agent - temperature - ventilation - power	1,2	EP/ESS	TCR, XCR	TCR, XCR

Aims of a Detector Safety System for LHC Experiments



- The main aims of DSS are
 - to protect the equipment
 - to prevent situations leading to Level 3 Alarms.
- DSS should therefore deal with alarm levels 1&2 as defined in IS37.
 - Nevertheless, the DSS may also take additional actions in case of a Level 3 Alarm.

DSS Requirements



- System
 - highly reliable
 - permanently operational independent from the DCS
 - integrated into the DCS
 - scalable
 - configurable
 - able to take actions
 - easy to use
 - accessible

DSS Requirements



■ System

more reliable than the DCS

- highly reliable
- permanently operational independent from the DCS
- integrated into the DCS
- scalable
- configurable
- able to take actions
- easy to use
- accessible

DSS Requirements



■ System

- highly reliable
- permanently operational independent from the DCS
- integrated into the DCS
- scalable
- configurable
- able to take actions
- easy to use
- accessible

- starting with the first sub-detector,
- until the end of the experiment,
- without significant downtime

DSS Requirements



■ System

- highly reliable
- permanently operational independent from the DCS
- integrated into the DCS
- scalable
- configurable
- able to take actions
- easy to use
- accessible

independent from the state of the controls system

DSS Requirements



■ System

- highly reliable
- permanently operational independent from the DCS
- integrated into the DCS
- scalable
- configurable
- able to take actions
- easy to use
- accessible

- same look&feel
- common infrastructure
- monitoring, logging, and presentation

DSS Requirements



■ System

- highly reliable
- permanently operational independent from the DCS
- integrated into the DCS
- scalable
- configurable
- able to take actions
- easy to use
- accessible

growing with the detector

DSS Requirements



■ System

- highly reliable
- permanently operational from the DCS
- integrated into the DCS
- scalable
- configurable
- able to take actions
- easy to use
- accessible

- changes in the system
- configuration containers (modes):
e.g. shutdown, maintenance, running

DSS Requirements



■ System

- highly reliable
- permanently operational independent from the DCS
- integrated into the DCS
- scalable
- configurable
- able to take actions
- easy to use
- accessible

- preventive actions
- protective actions
- informative actions

DSS Requirements



■ System

- highly reliable
- permanently operational independent from the DCS
- integrated into the DCS
- scalable
- configurable
- able to take actions
- easy to use
- accessible

for operators, e.g.

- shifters,
- GLIMOS/SLIMOS,
- maintenance staff,
- detector experts

DSS Requirements

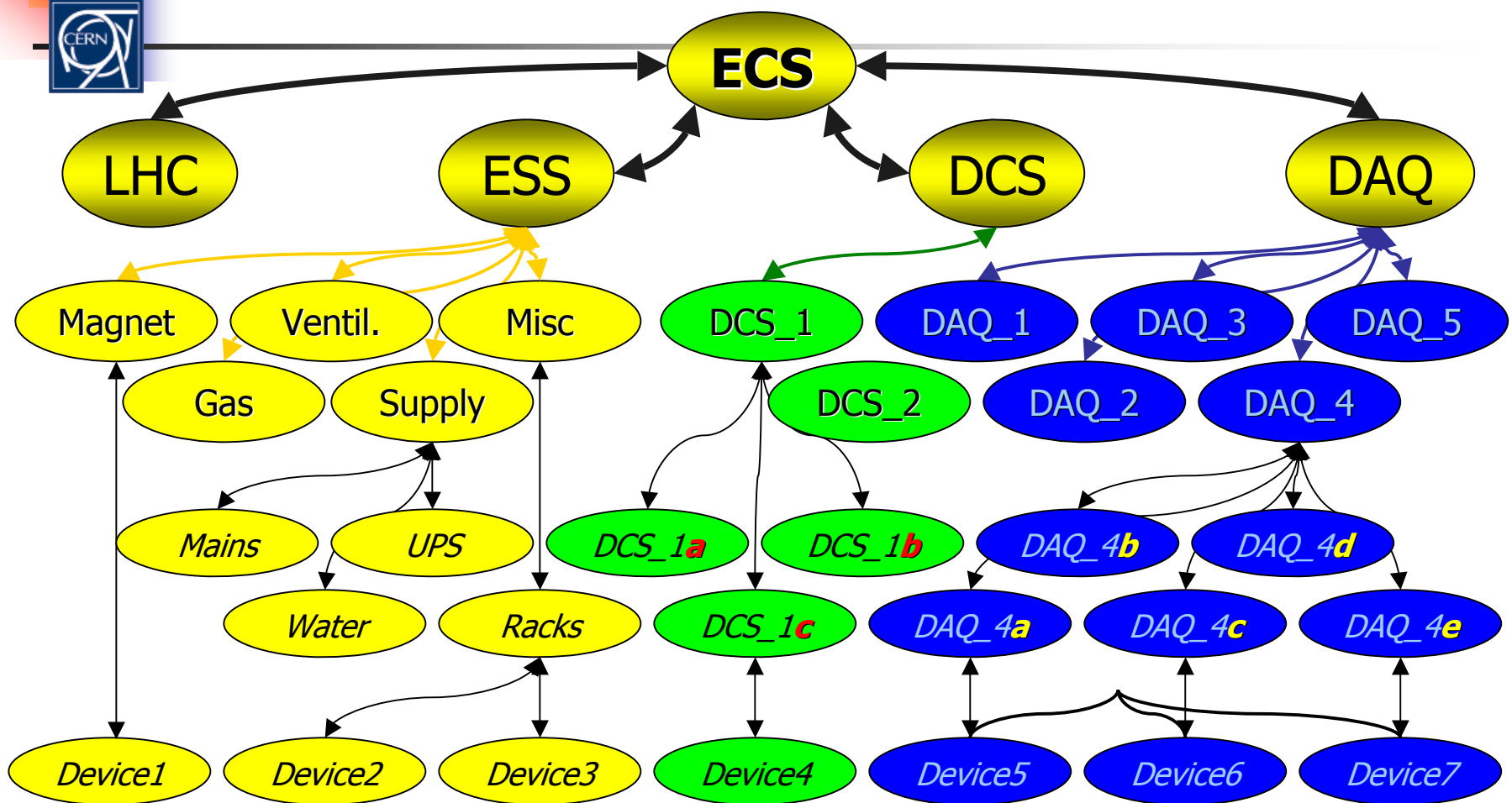


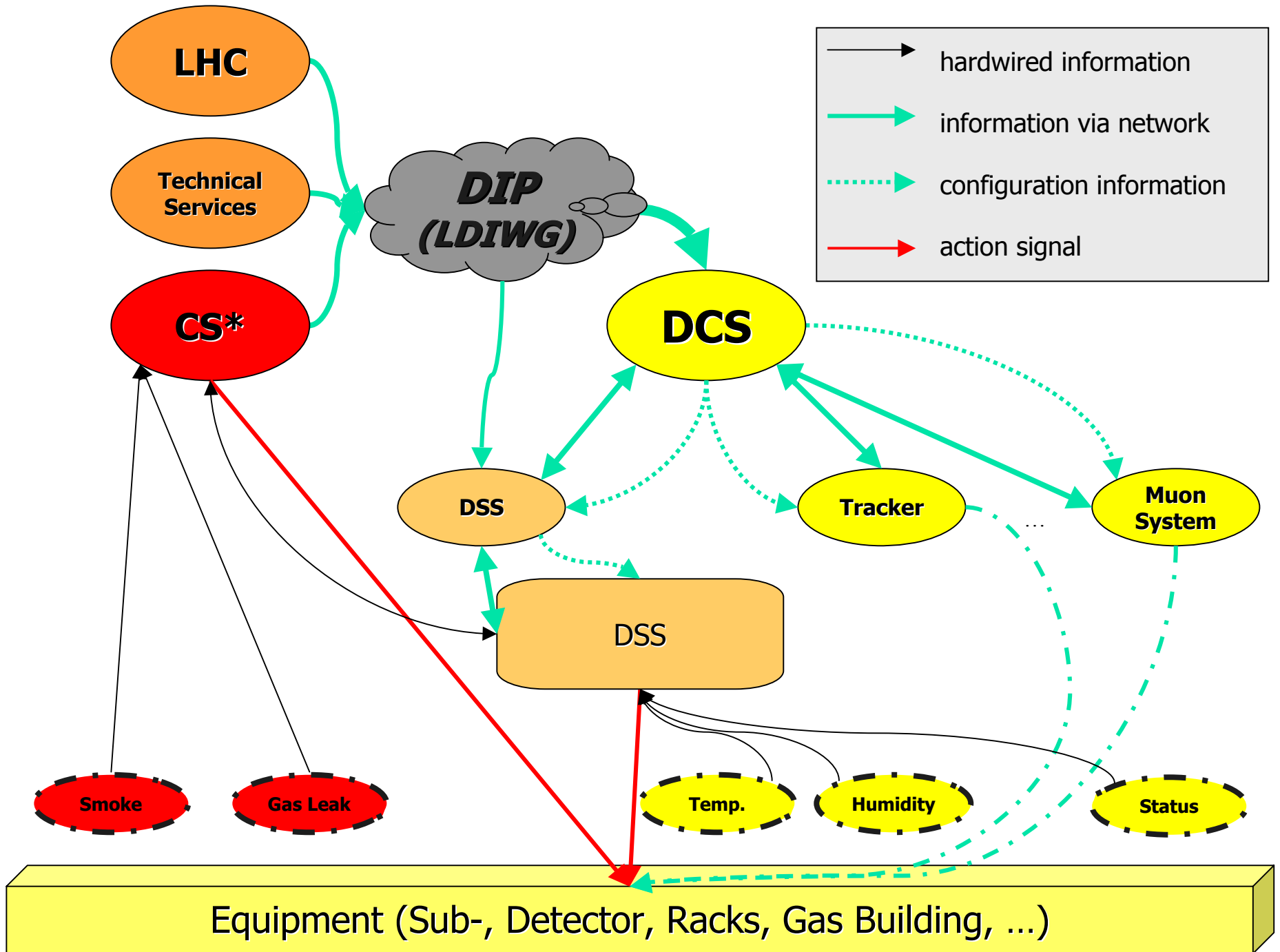
■ System

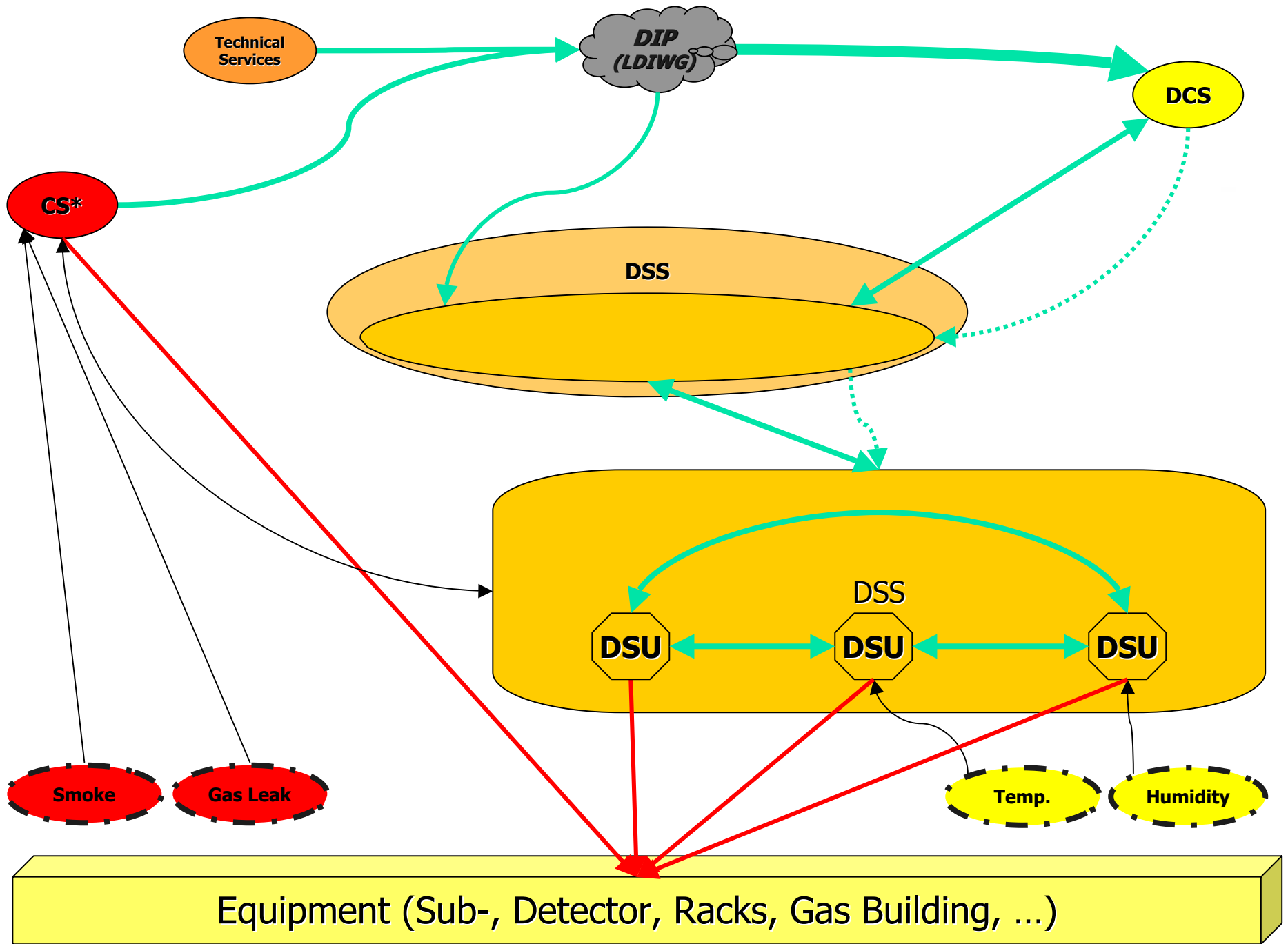
- highly reliable
- permanently operational independent from the DCS
- integrated into the DCS
- scalable
- configurable
- able to take actions
- easy to use
- accessible

- from different locations
- partly without special infrastructure

ECS ↔ ESS







Outlook and Questions



- A DSS will be a set of tools to implement a highly reliable safety logic.
- The logic itself has to be defined by the GLIMOS together with the SD experts.
- What does the GLIMOS want from the ESS?
- What do the subdetectors expect to be taken care of by a ESS?
- How to keep track of developments and details?
 - <http://itcowww.cern.ch/>
 - <http://cern.ch/lhcb-comp/DSS>