

# **IT Critical Services session: Overview of the feedback received and discussion**

**Zhechka Toteva and Julia Andreeva, CERN**

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# Background

- Need to categorize critical CERN-IT services for LHC experiments
- A large part of services and its criticality have been already prioritised per WLCG MoU Agreements  
<https://twiki.cern.ch/twiki/bin/view/LCG/WLCGCritSvc>.
- Additional areas to address:
  - Hidden Dependencies: Unforeseen tools in the critical path.
  - Technological Shifts: Influenced by changing technology.
  - Service Evolution: Services evolving over time.
  - Post-COVID: Altered practices for daily operations.

# Goals

- Pragmatic approach: Best-effort coverage for critical service requires manpower
- Cautious approach: Minimizing reliance on small components to reduce risk.
- Optimising approach: Review and evaluate services labelled as "really" critical:
  - **Real** Critical Services: Risk to data loss and detector operations
  - Reassessing Service Criticality: Potential **relocation** out of the critical path
  - **Impact** evaluation: painful impact but not 100% affecting data taking and detector operations

# Methodology

- The foundation: **WLCG Critical Services Structure**
- Measurable **impact** and **urgency** values to calculate **criticality**
- Introduce **reasoning** explanation
- Collect RCS communities' input
- Strive to **converge** with the WLCG Critical Services Structure
- **Map** the collected input to ServiceNow Functional Elements and Service Elements
- Potential for dependency rationalization on critical path
- **Collaboration** with RCS communities and IT managers for **mitigation plans'** evaluation

# Methodology

- Collect RCS communities' input

Thanks for all your efforts  
and contributions!

This is your presentation!

# Common basis

- People depend on SSO with high impact and high urgency.
- Critical Role of OracleDB for Online Teams.
  - With increasing impact of DBoD on the communities.
- CERNphone, Mattermost, ServiceNow are essential tools for the daily operations.
- Daily utilisation with high impact of OpenStack, LXPLUS and LXBATCH.
- Network and remote access are vital for connectivity.
- Many communities have already reviewed and updated the WLCG Critical Services Structure.

Service	ALICE	ATLAS	CMS	LHCb	SME	Theory Dep	EP-ESE	Criticality I Consolidat
	Criticality AL	Criticality AT	Criticality CMS	Criticality LHCb	Criticality SME	Criticality TH	Criticality I	
Network	100	70	70	100	100	0	0	440
OpenStack	16	100	49	100	100	0	49	414
OracleDB online	0	100	100	100	100	0	0	400
EOS	0	49	70	49	100	100	0	368
LXPLUS	70	49	70	70	0	100	0	359
AFS	28	49	70	0	100	100	0	347
DBoD	0	70	40	100	100	0	0	310
OracleDB offline	0	100	70	100	0	16	0	286
CEPH	0	100	28	100	0	0	49	277
Authentication (kerberos, SSO, AD)	70	0	100	100	0	0	0	270
CVMFS including Stratum-0	0	70	28	40	100	0	0	238
Batch /LXBATCH	0	49	28	28	0	100	0	205
CTA	0	49	28	28	100	0	0	205
FTS	0	100	49	40	16	0	0	205
Linux Support	0	0	0	0	100	100	1	201
CERNPhone	100	0	49	49	0	0	0	198
Mattermost in its 2 instances - main and emergency	100	0	49	49	0	0	0	198
Videoconferencing (Zoom)	49	49	49	49	0	0	0	196
GitLab	16	49	0	0	70	49	0	184
IAM (and VOMS until its retirement)	0	70	40	70	0	0	0	180
CERNBox	0	0	4	0	100	0	70	174
Kubernetes	0	100	70	0	0	0	0	170
ElasticSearch/OpenSearch	0	0	49	100	0	0	0	149
ServiceNow / Ticketing	100	0	49	0	0	0	0	149
Software Licence Servers	0	0	0	0	0	100	49	149
GitLab CI/CD	0	0	49	70	0	0	28	147
MonIT / Hadoop Service	0	49	49	49	0	0	0	147
CVMFS including Stratum-1	0	28	28	70	0	0	0	126
Indico	0	49	28	49	0	0	0	126
ACRON	0	0	0	0	100	0	0	100
Configuration Management	0	0	0	0	100	0	0	100
DIM	0	0	0	0	100	0	0	100
HPC	0	0	0	0	0	100	0	100
HTCondor	0	0	0	0	100	0	0	100
Mathematics tools	0	0	0	0	0	100	0	100
HammerCloud	0	0	28	0	70	0	0	98
CEs	0	49	16	28	0	0	0	93
Twiki	0	28	49	16	0	0	0	93
JIRA	16	28	16	16	16	0	0	92
CodiMD	70	0	0	16	0	0	0	86
DBfroNTier and squid services	0	0	70	0	0	0	0	70
Documentation browsing	70	0	0	0	0	0	0	70
Remote access	70	0	0	0	0	0	0	70
ROOT & Geant 4	0	0	0	0	70	0	0	70
Rucio	0	0	70	0	0	0	0	70

Full list available at <https://cernbox.cern.ch/s/dYzBenedl6oyMIP>



# And not so common basis

- Diverse impact and urgency given by different communities for the same service:
  - Custom applications
  - Different perception
- Some communities are preparing exit plans due to upcoming tool migrations.
  - Shall we try to align?
- Non-LHC communities needs
  - Unique requirements may lead to extra service support

# Proposal

- All the communities to review the consolidated document <https://cernbox.cern.ch/s/dYzBenedl6oyMIP>
  - All the individual documents are also shared
- Each community to finalise the impact, urgency numbers and reason field
- We escalate the document with the current input to the IT management
- In parallel, we organise a working group to explore community dependencies on critical IT services.
  - Use Cases: Study specific use cases for each community.
  - Mitigation Strategies: Analyse the presence or absence of mitigation strategies.
  - Relocation Ideas: Share concepts for service relocation.

# **ADDITIONAL MATERIALS**

# ALICE Input

The matrix is based on the input from [https://docs.google.com/document/d/1gt51h0L8xKLW92PZcrunfHid0uva36LNGcP1g\\_Cv0UY/edit](https://docs.google.com/document/d/1gt51h0L8xKLW92PZcrunfHid0uva36LNGcP1g_Cv0UY/edit)

Service	Urgency	Impact	Reason	Criticality	Comments
1. Cabled network and DHCP resolution		10	10 P2 - ALICE data taking, shift work, support, coordination, run-time assessment, emergencies, local and remote access	100	
2. Remote access		10	7 P2 - ALICE data taking, interventions, operations, support and emergencies. Can be replaced by local access at a (potentially heavy) cost	70	
2a. Shell connection (lxtunnel / lxtplus)		10	7 P2 - access to Point 2 Intranet	70	
2b. AFS		7	4 P2 - not needed if lxtunnel can operate without AFS	28	
2c. Authentication (kerberos/AD)		10	7 P2 - needed by 2a	70	
2d. Web browsing / operations inside GPN (CERN/TS, SSH tunneling)		10	7 P2 - support, configuration, assessment, monitoring	70	
2e. Authentication (SSO/AD)		10	7 P2 - can be disabled for key P2 services which would continue working with reduced functionality, but not for GPN services (e.g. login @ CERN). Needed by 2d	70	
2f. Videoconferencing (Zoom)		7	7 P2 - needed for remote support and coordination, and occasionally for operations	49	
3. WiFi		7	4 P2 - operations in the Control Room and underground areas	28	
4. Communications (MatterMost in its 2 instances - main and emergency, phones, SNOW)		10	10 P2 - coordination, assessment, planning (also from/to out-of-P2 e.g. CERN/IT support)	100	
5. Documentation browsing		10	7 P2 - needed for operations, support, reconfiguration: MkDocs/GitLab Doc.generator +CODIMD (even just in read mode)	70	
6. Development, deployment, distribution.		4	4 Urgent if an emergency situation needs changes in the running environment.	16	
6a. OpenStack		4	4 Development and deployment, impact and urgency depends on the program of work and on the need for urgent fixes/changes	16	
6b. JIRA		4	4 Issue tracking	16	
6c. GitLab		4	4 Deployments and infrastructure control	16	
6d. S3 storage		4	4 SW generation and distribution	16	
7. e-mail		4	4 Coordination, planning, information exchange	16	
				0	

<https://cernbox.cern.ch/s/uGTETGvisuJOCKH>

# ATLAS Input

The matrix is based on the input from [https://indico.cern.ch/event/1221162/contributions/5143606/attachments/2559836/4419462/RCS-IT\\_CERN-ATLAS-Team\\_2022-12-09.pdf](https://indico.cern.ch/event/1221162/contributions/5143606/attachments/2559836/4419462/RCS-IT_CERN-ATLAS-Team_2022-12-09.pdf)

Service	Urgency	Impact	Reason	Criticality	Comments
Ceph	10	10		100	done
CERN Cloud services	10	10	OpenStack, GitOps, Puppet, containers (Kubernetes), load-balancing; Required by all groups and activities	100	done
FTS	10	10	Required by Rucio for all ATLAS data transfers + Offline	100	done
Kubernetes	10	10		100	done
Oracle offline (inc. streaming)	10	10		100	done
OracleDB Online	10	10	Required for T/DAQ, Tier-0 and Rucio operations	100	done
CVMFS Stratum-0	7	10		70	done
DB-on-Demand	7	10		70	done
IAM	7	10		70	done
Network	7	10		70	done
VOMS	7	10		70	done
AFS	7	7		49	done
CE	7	7		49	done
CRIC	7	7		49	
CTA	7	7		49	done
Dedicated batch	7	7		49	done
EOS	7	7		49	done
GitLab	7	7	Used as repository and bug/feature tracking tool; Required by all groups and activities; Required especially by Rucio for Kubernetes/GitOps	49	done
Indico	7	7		49	done
LXBATCH	7	7	HTCondor; Required for Tier-0 operations; Required for local CAT physics analysis activities + Offline	49	done
Lxplus	7	7		49	done
MONIT infrastructure (Including Opensearch)	7	7	Required for DDM daily operations - Including dedicated ATLAS instances of Opensearch + Offline	49	done
Video conf	7	7		49	done
CVMFS Stratum-1	7	4		28	done
JIRA	7	4		28	done
TWIKI	7	4		28	done
MyProxy	4	4		16	done
SiteMon	4	4		16	
ActiveMQ	1	7	Required by Rucio and the monitoring infrastructure	7	
Authentication & Authorisation	1	7	X509 certificates, OAuth tokens; VOMS, IAM	7	
CERN storage services	1	7	EOS for disk, CTA for tape, associated network; Required for T/DAQ, Tier-0 and Rucio operations; Required for local CAT physics analysis activities	7	
Data management clients (GFAL, Davix)	1	7	Required for all ATLAS storage interactions	7	
Hadoop / Spark	1	7	Required for DDM operational reporting and overview reports for management	7	
WAU / WSSA	1	4		4	
Windows terminal service	1	4		4	

## Disclaimer:

This input has been generated by the engagement team, not validated by the ATLAS teams.

# CMS Input (I)

The matrix is based on the input from [https://indico.cern.ch/event/1221162/contributions/5143605/attachments/2559753/4419555/IT\\_CMS\\_Engagement\\_December\\_2022.pdf](https://indico.cern.ch/event/1221162/contributions/5143605/attachments/2559753/4419555/IT_CMS_Engagement_December_2022.pdf)

Service	Urgency	Impact	Reason	Criticality	Comments
SAM (including ETF and SiteMon)	7	7	Impacts services and site monitoring	49	
HammerCloud	7	4	Impacts site monitoring	28	
Rucio	10	7	Impacts data access/distribution and thus Tier-0, c	70	service operated by CMS
XRootD	0	0	??? don't know what you mean, XRootD protocol	0	
Network (including P5-compute centres, LHCOPN, LHC)	7	10	Impacts detector access/operation, prevents data	70	
OracleDB online	10	10	Impacts detector calibration, operation, and data	100	
Network Monitoring	0	1		0	
Non-x86 and Heterogeneous platforms	1	4	Impacts software development	4	
Linux Support	0	4		0	
CVMFS (including Stratum-0 and 1 at CERN)	4	7	Impacts software and configuration updates and c	28	
K8S	4	10	Impacts IAM in the near future and thus data distr	40	
CERNBox	1	4	Impacts analysis	4	
OpenStack / VM service	7	7	Impacts Kubernetes, services, xrootd federation a	49	
MonIT / Elasticsearch /Hadoop Service	7	7	Impacts data transfer, job, services, and site moni	49	
Batch / Ixbatch	4	7	Impacts data quality checking and analysis	28	
Global xrootd redirector	7	7	Impacts data processing and analysis	49	service operated by CMS
Configuration Management Service	0	1		0	
IAM (and VOMS until its retirement)	4	10	Impacts data distribution, data processing, and an	40	
Authentication and SSO (old and new SSO)	10	10	Impacts twiki, Indico, MonIT access and thus the c	100	
Discourse / CMS Talk	7	7	Impacts collaboration to conduct buisness	49	
Mattermost	7	7	Impacts collaboration to conduct buisness	49	
EOS	7	10	Impacts Tier-0 operation, data quality checking, d:	70	
OpenShift	4	10	Impacts k8s, thus IAM in the near future and thus	40	
GitLab CI/CD	7	7	Impacts software and analysis development, and :	49	
CERNPhone	7	7	Impacts detector operations and collaboration to	49	
CodiMD	0	1		0	
Indico	7	4	Impacts colabration to cunduct buisness	28	
CDS document server	0	1		0	
Twiki	7	7	Impacts colabration to cunduct buisness, analysi	49	
WordPress	0	0		0	
JIRA	4	4	Impacts services operations/maintenance	16	
Email	7	7	Impacts colabration to cunduct buisness	49	
E-Groups	1	1	Impacts CMSWeb and IAM permission updates	1	
ServiceNow / Ticketing	7	7	Impacts services communication and thus service	49	

# CMS Input (II)

ServiceNow / Ticketing	7	7	Impacts services communication and thus service	49
Zoom / video conferencing	7	7	Impacts colaboration to cunduct buisness and det	49
Notifications	0	0	??? don't know what notifications you mean ???	0
Newdle	0	0		0
LimeSurvey	0	0		0
OracleDB offline (including streaming)	7	10	Impacts detector calibration, operation, and data	70 added
DB on demand	10	4	Impacts CRIC, VOMS, IAM, data processing, and ai	40 added
CTA	4	7	Impacts data processing and stops data taking onc	28 added
FTS	7	7	Impacts RAW data distribution, data processing, a	49 added
CEPH	4	7	Impacts CMSWeb services and thus data processi	28 added
DBfroNtier and squid services	7	10	Impacts calibration/alignment DB access and thus	70 added
CEs	4	4	Impacts Tier-0 operation, data processing, and an	16 added
MyProxy / Vault service in the furture	10	4	Impacts analysis / will impact data distribution, da	40 added
CRIC	4	4	Impacts CMSWeb and IAM permission and site co	16 added
MonIT	7	7	Impacts data transfer, job, services, and site moni	49 added
Kubernetes	10	7	Impacts CMSWeb and services operation and thus	70 adde, service operated by CMS
Ixplus	7	10	Impacts colaboration to cunduct buisness, service	70 added
AFS	10	7	Impacts colaboration to cunduct buisness, second	70 added
*.docs.cern.ch	7	7	Impacts services operations/development	49 added
				0
Docker image repository	4	4	Impacts software updates and thus data processir	16 added
GocDB	4	4	Impacts site communication and service status up	16 added, service operated by EGI
MyOSG	4	4	Impacts site communication and service status up	16 added, service operated by OSG
GGUS	7	7	Impacts site communication and thus services/sit	49 added, service operated by KIT/EGI
Stratum-1s outside CERN	4	7	Impacts software and configuration distribution	28 added, services operated by various sites

<https://cernbox.cern.ch/s/iAn6q5vQG6jrztm>

# LHCb Input

The matrix is based on the input from [https://indico.cern.ch/event/1221162/contributions/5143603/attachments/2559448/4411126/20221209\\_RCS-IT\\_TC\\_LHCb.pdf](https://indico.cern.ch/event/1221162/contributions/5143603/attachments/2559448/4411126/20221209_RCS-IT_TC_LHCb.pdf)

Service	Urgency	Impact	Reason	Criticality	Comments
Px-CC network	10	10		100	connects Online to Oracle
LHC-OPN / LHC-ONE / GPN	7	10		70	
Oracle online	10	10		100	we cannot take data without it
Oracle offline (inc. streaming)	10	10		100	
DB-on-Demand	10	10		100	
CTA	4	7		28	
EOS	7	7		49	downtime > 2d will like lead to backpressure and data-loss online
FTS	4	10		40	
Ceph	10	10		100	there is a CEPH-dependency for CVMFS Strata (0,1)
CVMFS Stratum-0	4	10		40	
CVMFS Stratum-1	7	10		70	
Batch service	4	7		28	
CE	4	7		28	
IAM	7	10		70	
VOMS	7	10		70	
CRIC	1	4		4	
WAU / WSSA	1	4		4	
BDII	0	0	not relying on CERN BDII	0	
Monit	7	7		49	migrating monitoring from DIRAC to Monit
SiteMon	1	1		1	
AI cloud services	10	10	openstack-based VMs	100	
Lxplus	10	7		70	
GitLab	7	10	critical for continuous integratio	70	
JIRA	4	4		16	
Twiki	4	4		16	
Indico	7	7		49	
Video conf	7	7		49	
CERN SSO	10	10		100	Lot of services used by LHCb are based on authorisation based on GRAPPA
CERNphone	7	7		49	it's ok to have the majority on VOIP but safety requires two phones which are guaranteed to work (to call the firebrigade in case and also the CCC
CodiMD	4	4		16	
Mattermost	7	7		49	kind of alternative to CERN phone [not for safety]
OpenSearch	10	10		100	

<https://cernbox.cern.ch/s/1M9BxhYSOIHeLan>



# SMEs Input

The matrix is based on the input from [https://indico.cern.ch/event/1221162/contributions/5143609/attachments/2558375/4409964/RCS-IT\\_EP-SME.pdf](https://indico.cern.ch/event/1221162/contributions/5143609/attachments/2558375/4409964/RCS-IT_EP-SME.pdf)

Service	Urgency	Impact	Reason	Criticality	Comments
EOS	10	10	Basis of everyday work, required for HLT data taking	100	Critical service for AMBER and NA61, nTOF can run up to a week with local disks
CTA	10	10	Required for HLT data taking (AMBER)	100	Daily Backup of AMS data to CTA, nTOF can run up to a week with local disks
FTS	4	4	Very convenient way for massive transfers	16	Massive transfers are not very frequent. Lack of the service could be worked around.
HTCondor	10	10	Required for HLT data taking (AMBER)	100	
OpenStack	10	10	Required for HLT data taking (AMBER)	100	AMS duplicated VMs in several availability zones
Configuration Management	10	10	Required for HLT data taking (AMBER)	100	
OracleDB	10	10	Required for data taking	100	NA61 doesn't use but AMBER and nTOF does
DBoD(MySQL)	10	10		100	NA61 doesn't use but AMBER does
CVMFS	10	10	Required for HLT data taking (AMBER)	100	
Linux Support	10	10	Required for HLT data taking (AMBER)	100	
ROOT	7	10	Basis of everyday work (NA61)	70	This entry is a little confusing. We rarely need an active support from this service team. But if in some way it disappeared from CERN, we would be lost.
Geant4	7	10	Basis of everyday work (NA61)	70	This entry is a little confusing. We rarely need an active support from this service team. But if in some way it disappeared from CERN, we would be lost.
AFS	10	10	Required for HLT data taking (AMBER)	100	tried to get rid of but required for HTCondor submissions, AMS running some production on VMs on behalf of AFS users
(A)Cron	10	10	Required for HLT data taking (AMBER)	100	Daily backup + monitoring
GitLab	7	10	Important service	70	Used almost every day, but we could survive the downtime for a day or two.
JIRA	4	4	Service of convenience	16	Gives an order to our work. Not used every day. Its downtime could be problematic after couple of weeks.
Network	10	10	Required for HLT data taking (AMBER)	100	AMS needs a constant connection to NASA servers and operators
CERNBox	10	10	required for user analyses	100	
DIM	10	10	required for data taking	100	nTOF uses this service for data taking
OpenShift	4	4	Hosts many interfaces for nTOF	16	nTOF uses openshift heavily although they can run it locally if needed

Input received from: NA61, nTOF, AMBER and AMS

<https://cernbox.cern.ch/s/Vw9lm5yohkdEzOY>

# Theory Department Input

The matrix is based on the input from <https://indico.cern.ch/event/1221162/contributions/5143613/attachments/2559832/4411933/TH%20Computing.pdf>

Service	Urgency	Impact	Reason	Criticality	Comments
HPC	10	10	Jobs not running, most important to get head-node with data access back on	100	
INSPIRE	7	7	used daily by theorists for their research, impacting world-wide community	49	
CERN Web team support	1	1		1	
Drupal Infrastructure	7	7		49	
LXPLUS Services (includes LXTHEORY9)	10	10	used daily by theorists for their research, impacting world-wide community	100	
LXBATCH Service	10	10	used daily by theorists for their research, impacting world-wide community	100	
GPU Platform Consultancy	1	1			Unclear use case of consultancy for TH? 1 TH researchers usually experienced with GPU use.
Linux Support	10	10	LXPLUS and LXBATCH are LINUX services (see above)	100	LINUX desktops self-maintained in TH
AFS	10	10	All research on LXPLUS, LABATCH and HPC clusters depend on working file system	100	
EOS	10	10	All research on LXPLUS, LABATCH and HPC clusters depend on working file system	100	
OracleDB	4	4		16	
CVMFS	1	1		1	
GitLab	7	7	Gitlab being used Gitlab Pages, extended downtime bad for availability of research websites used also outside CERN	49	To our knowledge not used for code development (we use Github and Bitbucket etc.) as collaborators do not have CERN account.
Linux Support	1	1		1	
Software Licences	10	10	E.g. Mathematica heavily used by TH for research	100	
Mathematics tools	10	10	E.g. Mathematica heavily used by TH for research	100	
Geant4	1	1		1	

<https://cernbox.cern.ch/s/NKrvB2SMuLxKMx>

# EP-ESE input

The matrix is based on the input from <https://indico.cern.ch/event/1221162/contributions/5143608/attachments/2563529/4419021/20221208rcs-it.pdf>

Service	Urgency	Impact	Reason	Criticality	Comments
GitLab		4	7 most chip design repositories (for EP-ESE) are here, including CI. Offline work is possible, for some tim	28	
OpenStack		7	MIC cluster is hosted on OpenStack, at least EP-ESE-ME engineers cannot work interactively (design+simulate chips) without the VMs. Openstack UI is less critical.	49	
Linux Support		1	1 (not understood why this is on the list; document requests a clarification on strategy)	1	
CERNBox		7	10 This affects ability to meet manufacturing deadlines, for not just EP-ESE used as "gateway" for collaborations with external partners, for NDAed-must-stay-in-CERN content.	70	
FILER		7	7 MIC cluster unusable without this (software), at least most EP-ESE-ME engineers cannot work	49	
CephFS		7	7 MIC cluster unusable without this (scratch areas), at least most EP-ESE-ME engineers cannot work	49	
LicenseServers (for EURORACTICE and CLIOsoft/CADENCE)		7	8 MIC cluster unusable without this, also affects engineers outside EP-ESE (ca 200 in total) (licenses for commercial EDA tools)	56	

<https://cernbox.cern.ch/s/A9QeNnd2sOcoWCQ>