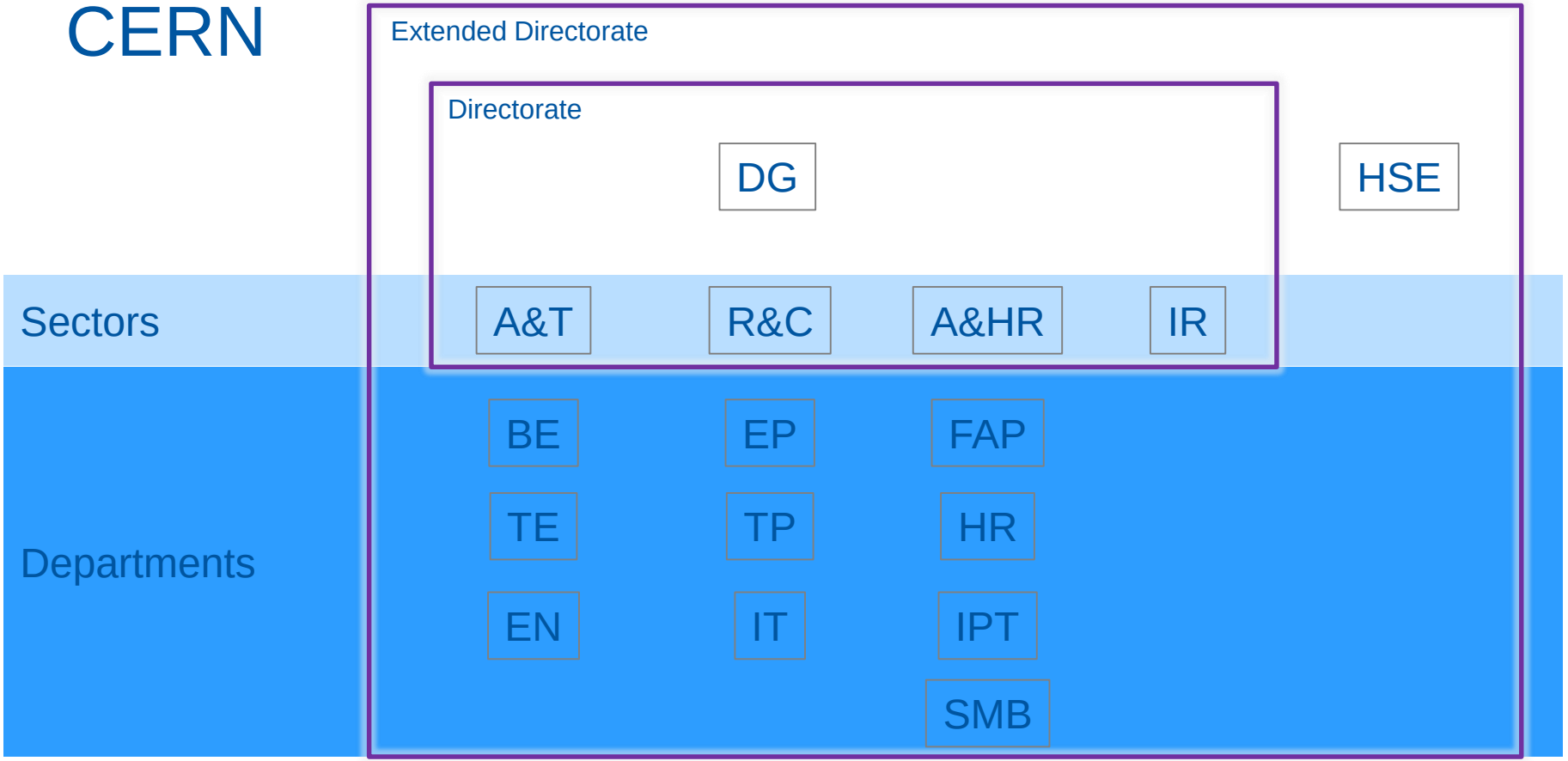

CERN

CERN, IT & CS

CERN


Extended Directorate
Directorate
DG
HSE
Sectors
A&T
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Departments
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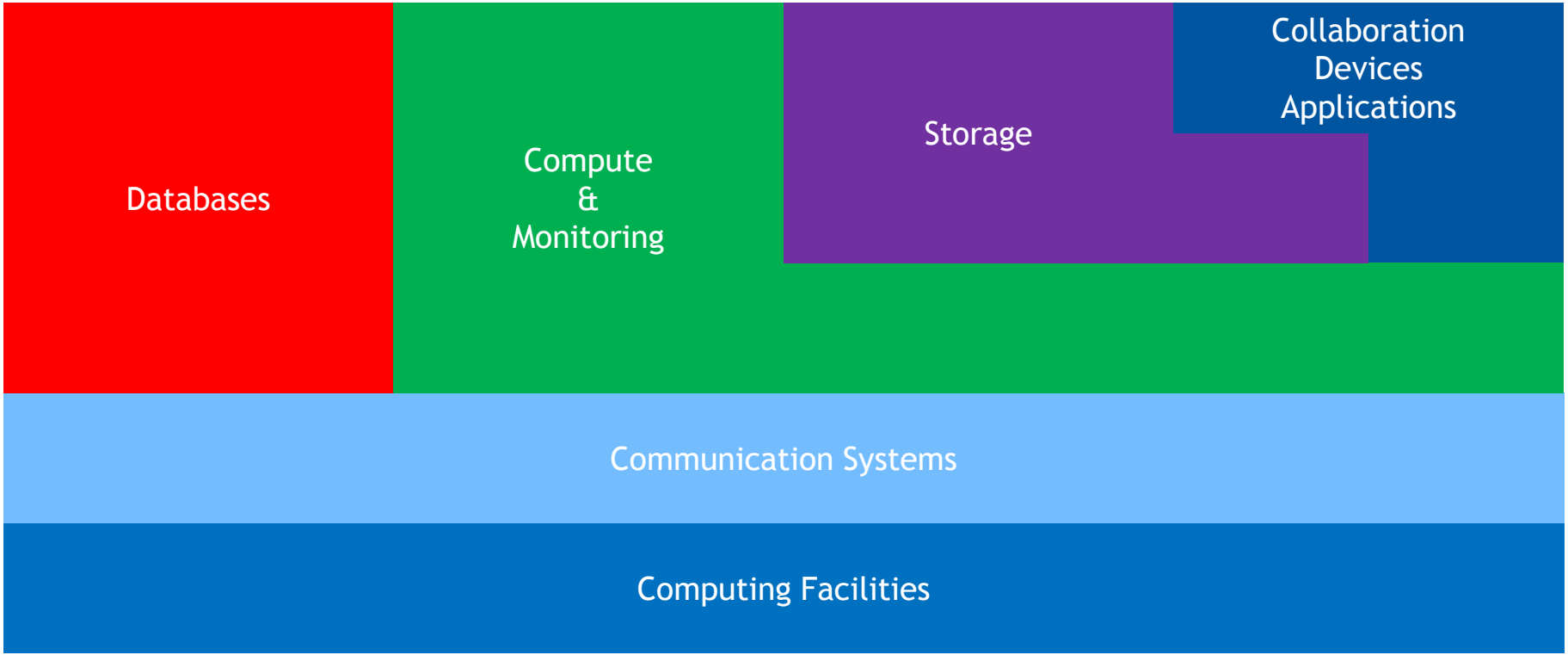
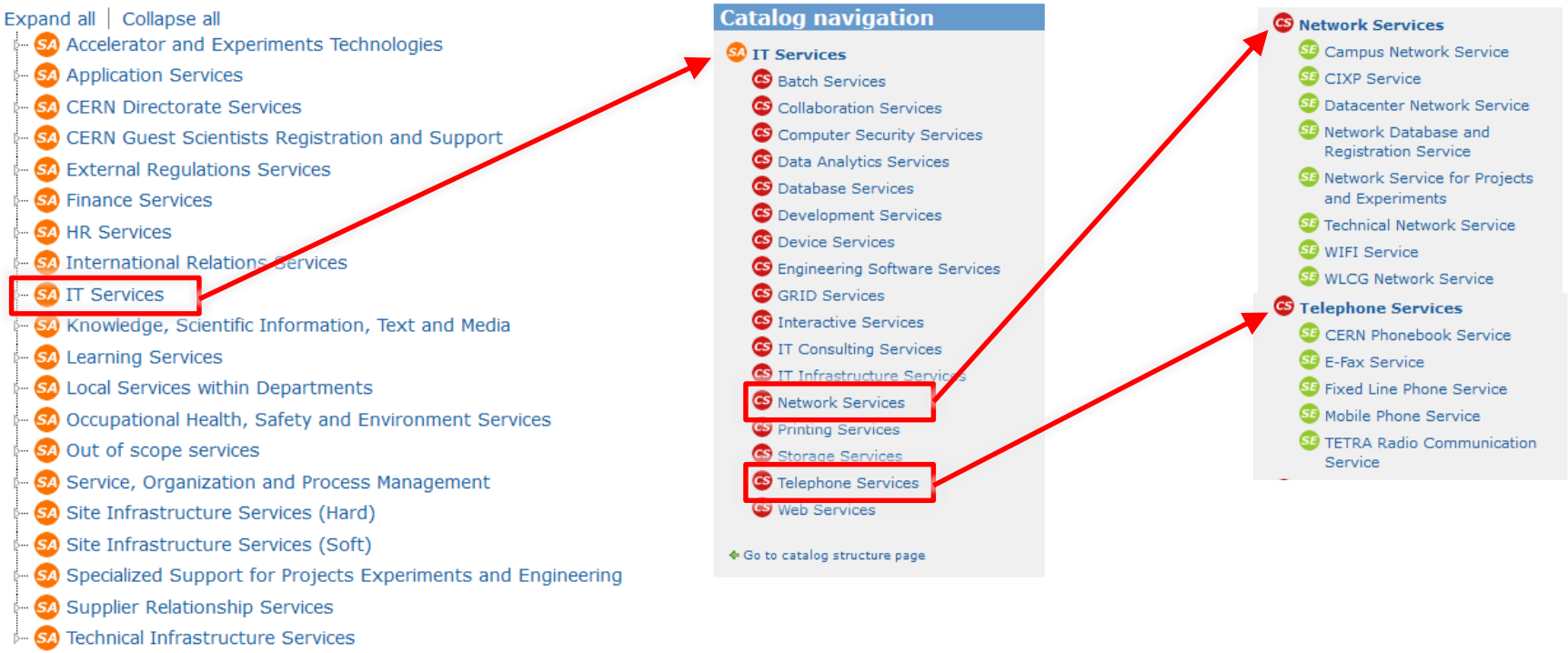
SMB

IT


Databases
Compute
&
Monitoring
Storage
Collaboration
Devices
Applications
Communication Systems
Computing Facilities

Service Catalogue



IT Personnel (Headcount)

	Staff			Fellows		AST
	Engineer	Technician	Total	Engineer	Technician	
CF	11	8	*19*	3		5
CS	17	9	*26*	3	6	4
DB	21	1	*22*	7	2	7
CM	31		*31*	15		10
ST	26	4	*30*	5	3	3
CDA	35	8	*43*	20	5	18
DI	37	9	*46*	4	2	2
Total	*178*	*39*	*217*	*57*	*18*	*49*

AST: Associates, Students & Trainees

CS Personnel (FTE)

		3 Staff	2	3 FVA	2	Tech	CERN	C'tract	*Total*
Overhead	Group Management		1.1				1.1		*1.1*
	subtotal		*1.1*				*1.1*		*1.1*
Misc	WiFi	0.4	1.6	0.5	0.3		2.8	1.2	*4.0*
	Software Support		4.1		6.8	1.0	11.9		*11.9*
	openlab		0.0				0.0		*0.0*
	LS2	2.4		0.9			3.3	3.3	*6.6*
	CIXP		0.7				0.7		*0.7*
	subtotal	*2.8*	*6.4*	*1.4*	*7.0*	*1.0*	*18.6*	*4.5*	*23.1*
Phones & Radio	Fixed	0.4	1.5		1.1		3.0	1.1	*4.1*
	Mobile	1.1	0.7	0.1	0.3		2.2	1.6	*3.8*
	Radio	0.3	1.7		1.6		3.6	0.6	*4.2*
	subtotal	*1.8*	*3.9*	*0.1*	*3.0*		*8.8*	*3.3*	*12.1*
Networks	Campus	1.9	1.6	0.4			3.9	3.0	*6.9*
	Technical	1.2	1.0	0.7			2.9	2.0	*4.9*
	Experiment	1.6	0.6				2.2	0.5	*2.7*
	Computer Centre	0.7	1.5	0.4			2.6	1.0	*3.6*
	WLCG		0.8				0.8		*0.8*
	subtotal	*5.4*	*5.5*	*1.5*			*12.4*	*6.5*	*18.9*
	Overall	*10.0*	*16.9*	*3.0*	*10.0*	*1.0*	*40.9*	*14.3*	*55.2*

Other (FTE/Headcount??)

	Service	STAF	FELL	PJAS	TECH	*Total*
CM	Management	2.6				*2.6*
CM	ARGUS	0.1				*0.1*
CM	BDII	0.1				*0.1*
CM	BOINC Support	0.7			1	*1.7*
CM	Linux HPC Infrastructure	1.5	0.9		1	*3.4*
CM	LXBATCH	2.4	2.7		1	*6.1*
CM	Tier-0 Accounting		0.9	0.9		*1.8*
CM	VOMS	0.1				*0.1*
CM	Acron	0.3	0.7			*1*
CM	Configuration Management	2.45	1.1	0.9	1	*5.45*
CM	DNS Load Balancing	0.9				*0.9*
CM	Elasticsearch	0.85				*0.85*
CM	Linux Software Building	1.05	0.4			*1.45*
CM	Linux Support	1.6	0.5			*2.1*
CM	LXPLUS	0.85				*0.85*
CM	Messaging	1				*1*
CM	Monitoring	4.1	2	1		*7.1*
CM	WLCG Cloud Monitoring	0.1				*0.1*
CM	WLCG Experiment Probe Submission Framework	0.5				*0.5*
CM	WLCG HammerCloud	0.7				*0.7*
CM	WLCG Network Monitoring	0.5				*0.5*
CM	Cloud Infrastructure	5.9	3	1	1.5	*11.4*
CM	Cloud Openlab		2			*2*
CM	Support Rota	1.7	0.8	0.2		*2.7*
CM	Other Department Roles	1			0.5	*1.5*
	Total	*31*	*15*	*4*	*6*	*56*

Strategies & Planning

- There is probably no top-down IT strategy
  - We spent a couple of years saying we needed one but this never really led to anything.
- Recently, Groups have been asked to set out their strategies. These are then assembled into an overall picture.
- We probably plan on a 3-5 year timescale, but clearly influenced by the LHC run/LS rhythm.
  - Finance Committee approves a rolling 5-year spending outlook (the “Medium Term Plan”) each June.

Bottom-up strategy from February 2017.

The easiest format to copy into this presentation; groups were asked to provide a 5-year outlook as input to the annual "Programme of Work" meeting that took place in November.

Group or Project	Responsibility	Strategic Focus examples per group/project to be updated as necessary
IT-CDA	Applications, devices and the underlying infrastructure providing Digital Library Technology, AudioVisual and Collaborative Services and Web Frameworks.	• Redefine Infrastructure as a Service offer • Generic linux engineering HPC • Cluster filesystems • Home directory unificaton
IT-CS	Campus IP/Ethernet network installation interconnected with high capacity links to collaborating institutes. Fixed-wire telephone system, GSM mobile phone system, radio system for the emergency services. Retirement of Legacy on-site video and voice distribution systems.	• Reduce the diversity of the installation and bring wired and wireless services onto the ubiquitous IP/Ethernet platform • Reduce number and size of starpoints on the campus network to maximize wifi use • Evolve network architecture and deployment via a revised strategy
IT-CM	Service delivery and evolution of Compute, Monitoring and Infrastructure tools services for the CERN Tier0 and WLCG.	• Single resource management system for Compute, Database, Disk servers, VMs, Containers, Bare Metal • Consistent resource provisioning management and lifecycle • Single workflow between repair service and resource provisioning • IT service accounting and reporting • Integration of public cloud resources in future provisioning model
IT-CF	System administration and Operations of the CERN main Data Centre and associated Computing Facilities (Tier0), Facility Planning & Procurement, tools for the automated operation of large scale computing facilities and workflow based central IT tools.	• 2nd network hub for business continuity • Improved procurement planning • Evolve sysadmin role to prepare for the second data centre

IT-DB	Databases for accelerators, experiments and administrative services: Java Web applications, critical engineering and administration applications, Hadoop and analytics services for CERN and the LHC experiments. Service deployment across Tier1 and Tier2 sites.	• Evolve the database strategy:
		  ○ Oracle online database service critical for data acquisition, accelerators, electricity
		  ○ MySQL/PostgreSQL for open source OLTP
		  ○ Hadoop for larger databases and machine learning – prototype a hadoop service on OpenStack
		• Develop an open-source JavaWeb based service like Weblogic

Group or Project	Responsibility	Strategic Focus examples per group/project to be updated as necessary
IT-ST	Storage services at CERN for all aspects of physics data; Analytics & Developments, File & Disk Operations, Tape, Archives & Backups.	• Evolution of EOS as the strategic storage platform • Evolve CERNBOX strategy as EOS access service • Improve resource provisioning for all IT resources
IT-DI	Administrative and infrastructure support for the IT Department including the planning of departmental human and financial resources, inventory, car and space management.	• Interact with administrative services on planning processes and new tools (SmartRecruiters, IRIS …) and provide information within IT
SEC	Centralized security threat detection, security recommendations, dedicated training sessions, in-depth assessments, asset protection, emergency responses.	• 2 factor authentication to protect the data centre administration, accelerator sector and AIS applications • Hardened windows operating system configuration for critical PCs including administrative users • Improve the intrusion detection system and malicious email detection filters • Improve laptop encryption for frequent travellers and management
DPHEP	Software preservation, analysis capture and preservation, open data and DPHEP portals.	• Introduce an operational circular dedicated to data preservation • Remain active in the DPHEP collaboration by contributing to the DPHEP portal, organizing workshops continuing awareness raising etc.
DPP	Data Classification, Repository certification, data handling, access sharing, retention, destruction and privacy.	• Introduce a DPR policy aligned with EC regulations • Publication of data access and storage for IT services
EFP	Oversight and support functions to coordinate IT department's engagement in European Union projects.	• Participate in e-infrastructure work programme with the European Open Science Cloud to promote open science
OPL	Partnership with leading ICT companies and research institutes to accelerate the development of cutting-edge solutions for the LHC community and wider scientific research.	• Prepare openlab Phase V1 focusing on Run3 and Run 4 challenges • Assess feasibility of time-limited focused collaborations • Improve internal IT collaboration on domains including technology evolution, performance analysis and security
WLCG	Global computing resources to store, distribute and analyse the data generated annually by the LHC.	• Evolve WLCG and HEP computing to the HL-LHC era by participating in the hybrid prototype model and software initiatives

Strategy short term: 2019

- LS2, including TN router replacement (with redundancy if possible)
- Advance migration to a modern telephony infrastructure
  - Deliver, with CDA, a softphone client
  - Migrate advanced services to TONE
- Consider (and cost) options to extend Aruba-based Wi-Fi services to technical areas
- In-depth FTTO evaluation
- Continued outsourcing of low-value-added deployment & operations tasks enabling DO team to take on higher-value-added tasks from 4th level.

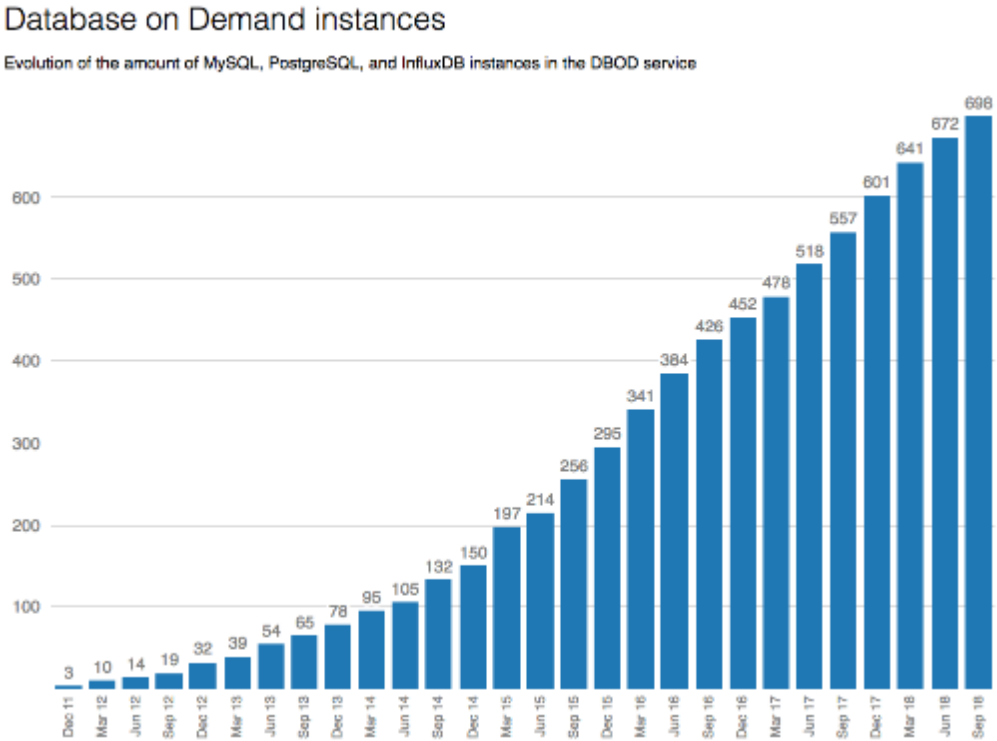
Strategy long term: in 5 years

- A cross-border mobile telephony service that will serve as a basis for a TETRA replacement.
- A lower-TCO and more secure campus network infrastructure
  - combination of Wi-Fi only and FTTO
- CERN remains a strong centre for international networking despite a move to cloud services and a rise in the network traffic of other sciences.
- Network infrastructure able to support trigger/DAQ farms hosted in IT managed buildings.
- State-of-the-art support for IoT
  - Sensors, cameras, … we are at the start of an explosion we see as being exponential.

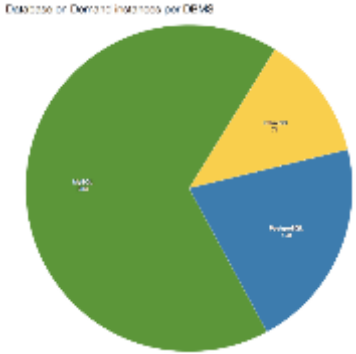
Change/Growth

- Generally, change and growth are slow.
  - CERN has a well understood experimental programme, after all.
- But! CERN has no CIO and many other departments have informatics teams.
  - Surprises can pop up with significant demands on IT resources—or the threat that they'll just go ahead anyway and worry about the consequences later.
  - Very hard to stop old services with a small number of users—they won't invest the effort to move to the modern replacement.
- When IT provides a service that meets a latent need, growth can be rapid.

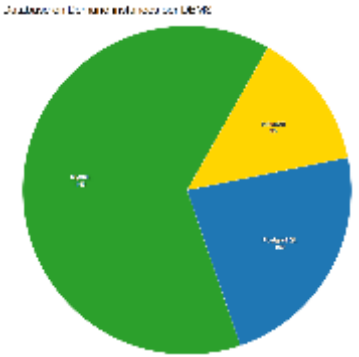
Significant numbers / DBoD



2017



2018

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