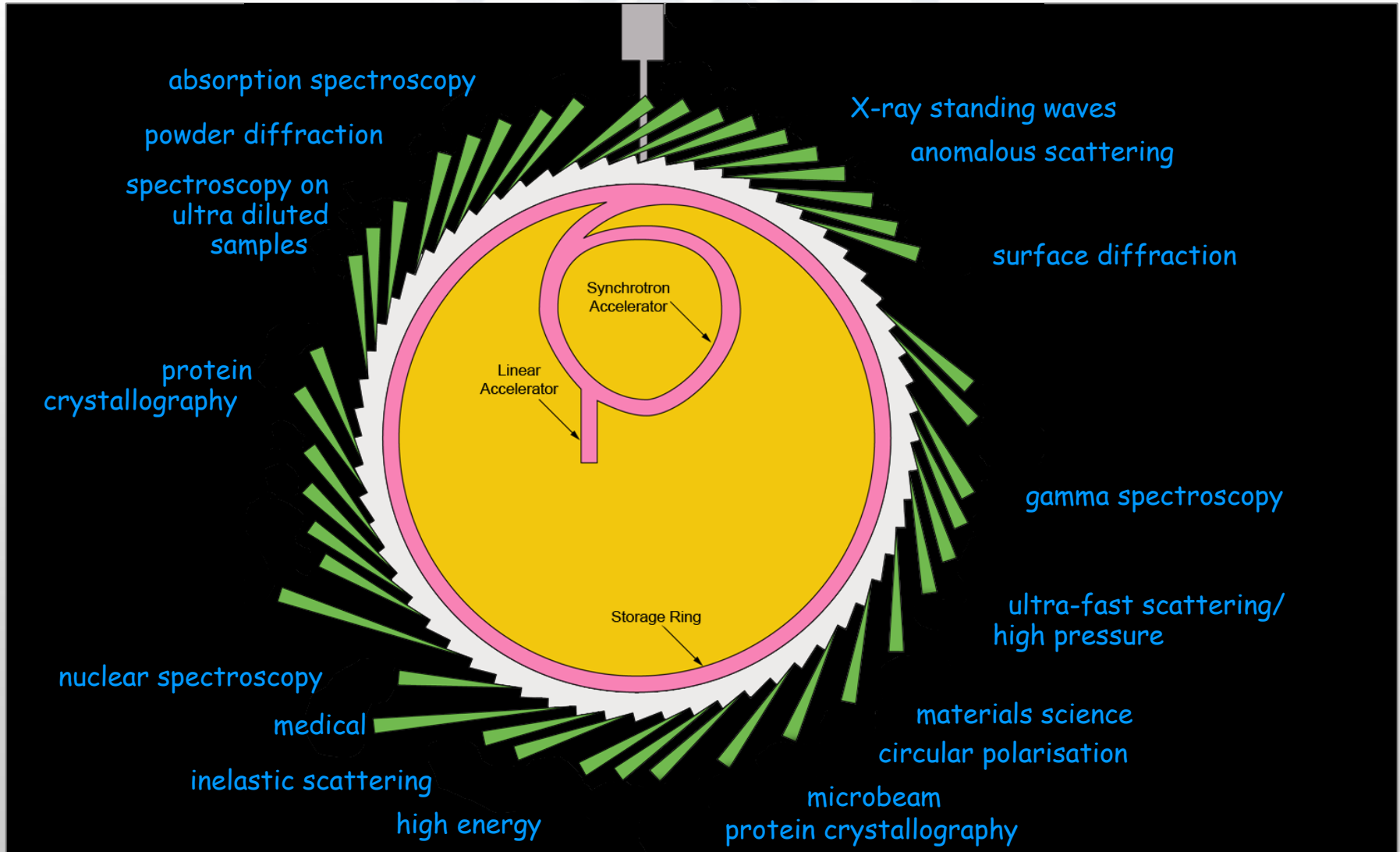**CERN Openlab – 10/11 December 2013**

ESRF: IT Challenges
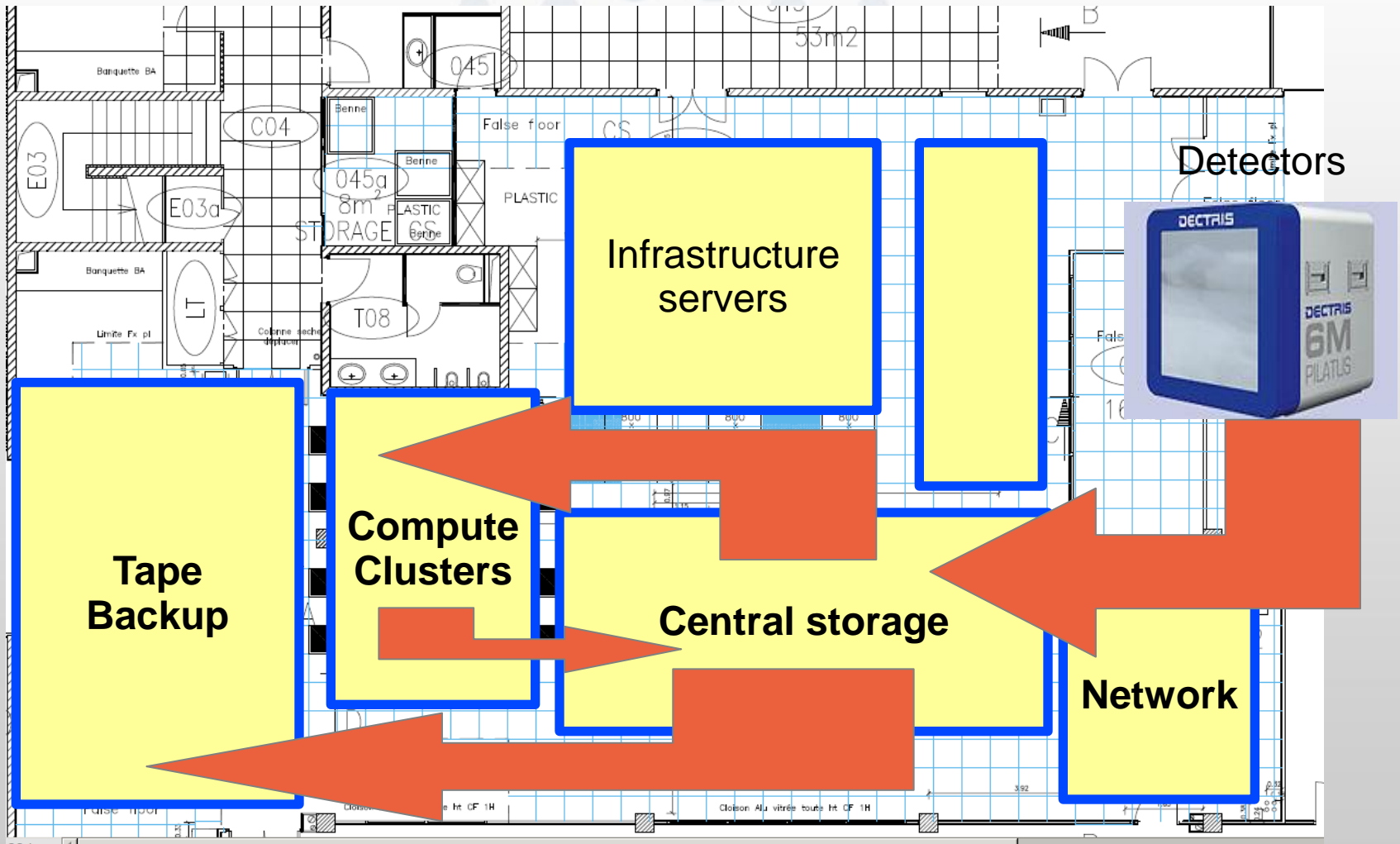
Systems and Communications
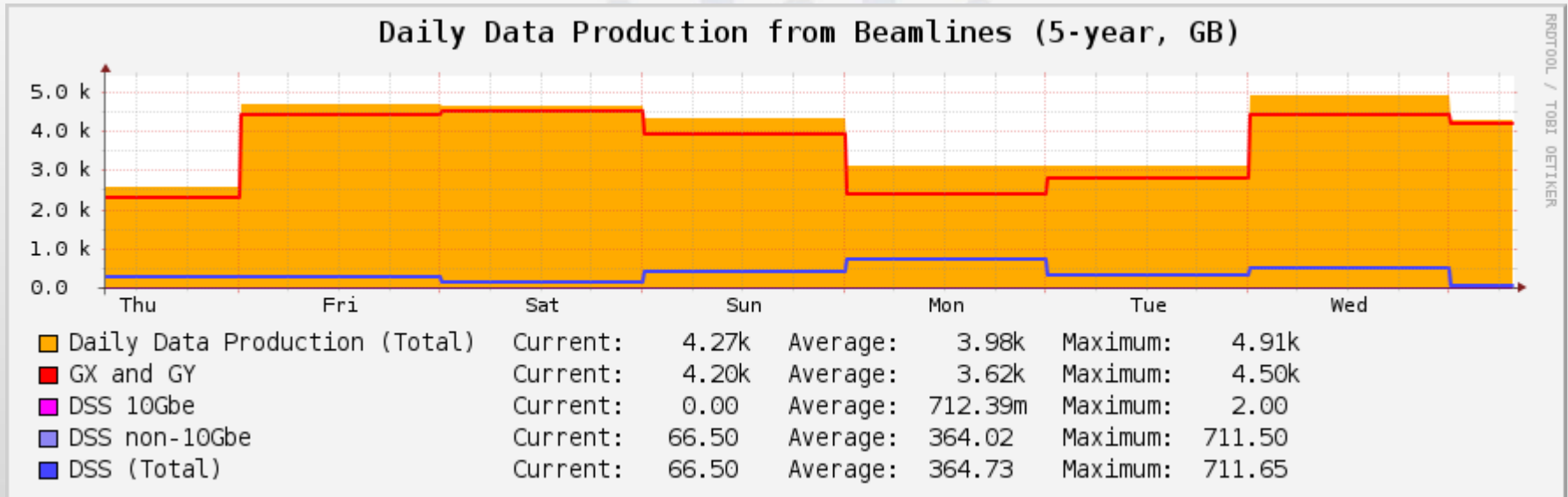
ESRF Beamlines

What is a Beamline?

Systems and Communications
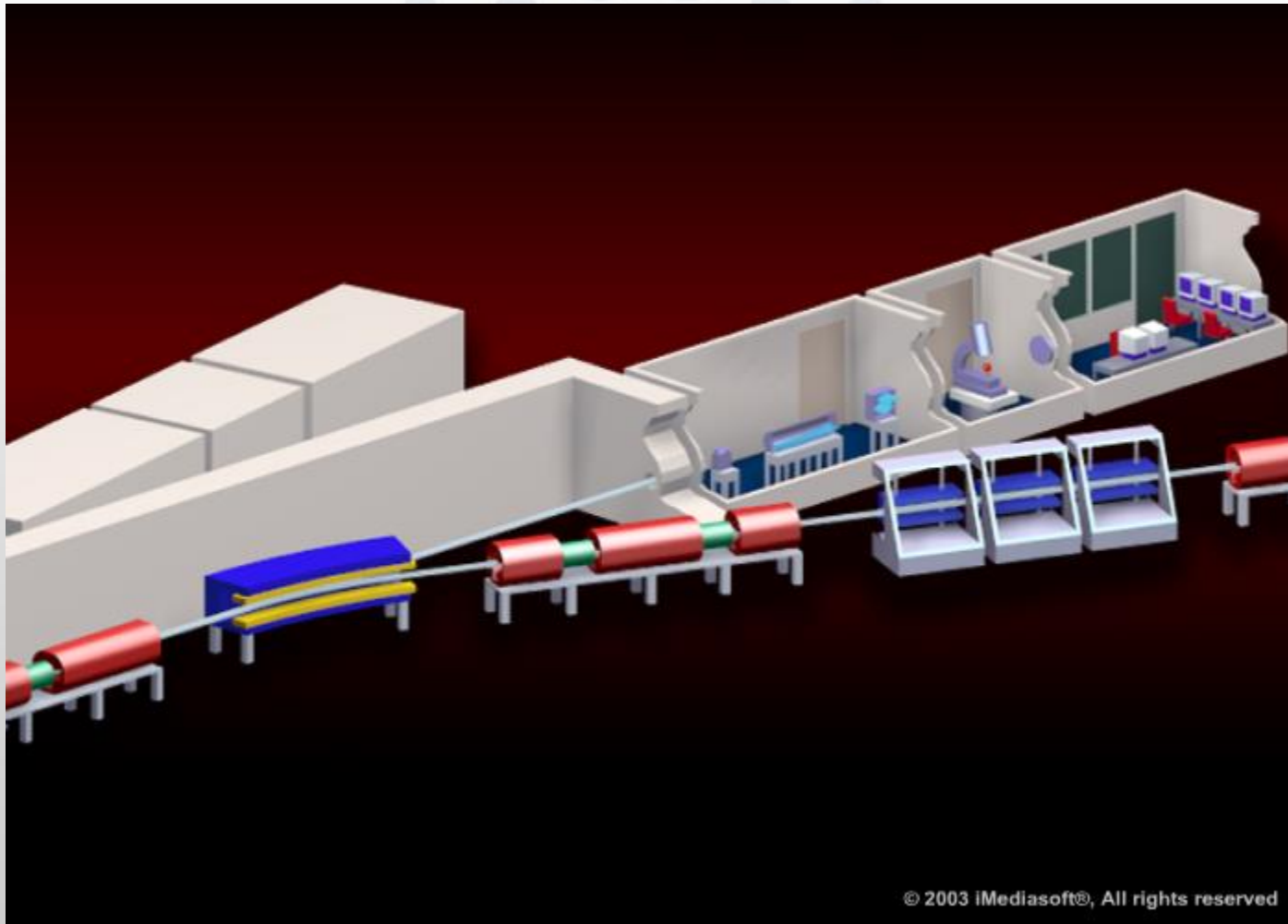
IT General architecture

Detectors

Infrastructure servers

Compute Clusters

Tape Backup

Central storage

Network

Systems and Communications

How much do we store each day?

Daily Data Production from Beamlines (5-year, GB)

	Current:	Average:	Maximum:
Daily Data Production (Total)	4.27k	3.98k	4.91k
GX and GY	4.20k	3.62k	4.50k
DSS 10Gbe	0.00	712.39m	2.00
DSS non-10Gbe	66.50	364.02	711.50
DSS (Total)	66.50	364.73	711.65

Challenges

ESRF Phase II (higher photon flux) starts in 2015

Already, two Eiger detectors arrive at ESRF in **Fall 2014**

- 4 Mpixel x 3 bytes = 12MB/image
- 750Hz = 750*12MB = 9GB/s
- Local compression => 1GB/s minimum
- 10% duty cycle => 9TB/day

Limiting factors:

- Human resources – data sorting and exploitation
- Data Analysis – online
- Data Analysis – offline
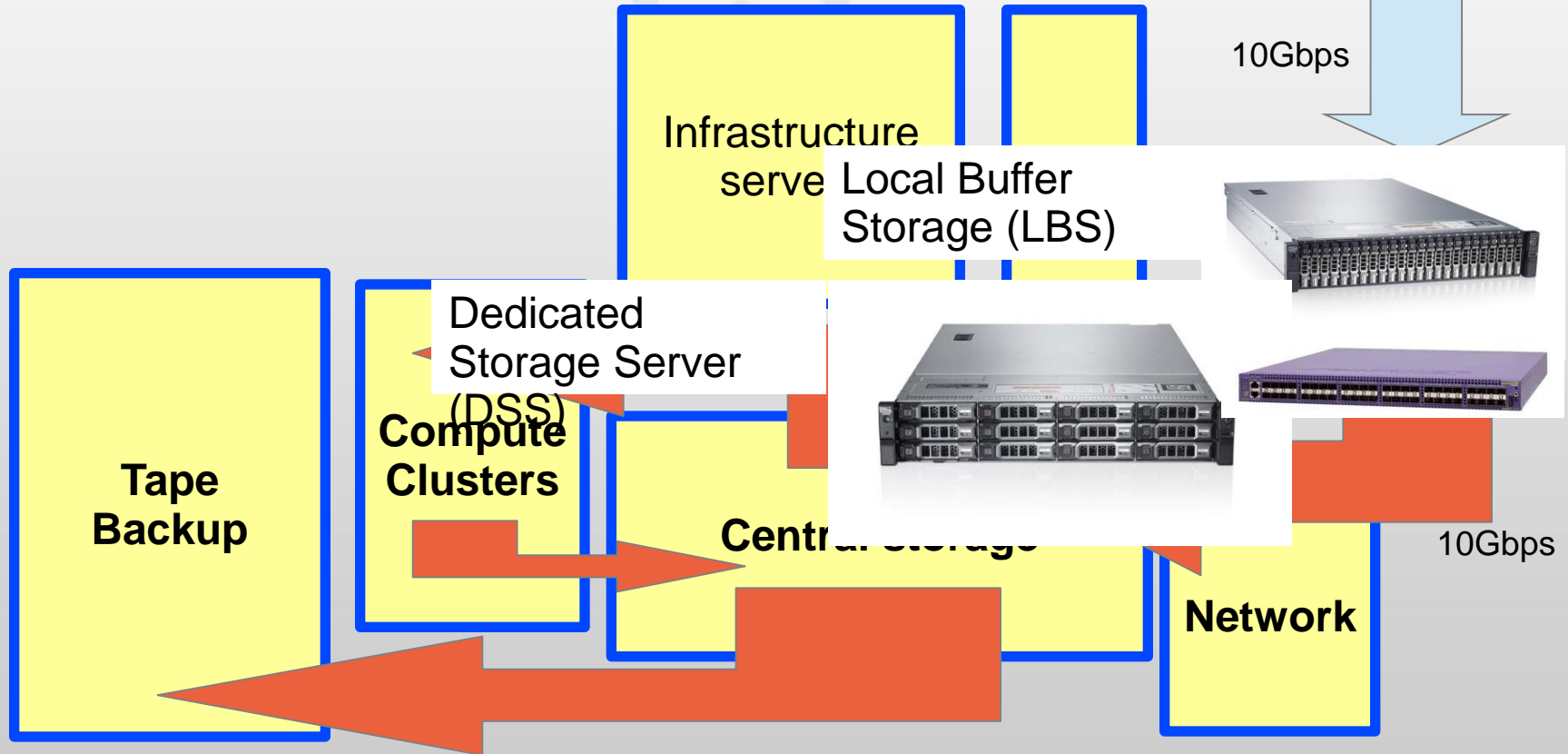- Speed of the Central storage

Ongoing works

LBS only for **Linux**-based detectors
DSS time consuming but 300-500MB/s per unit
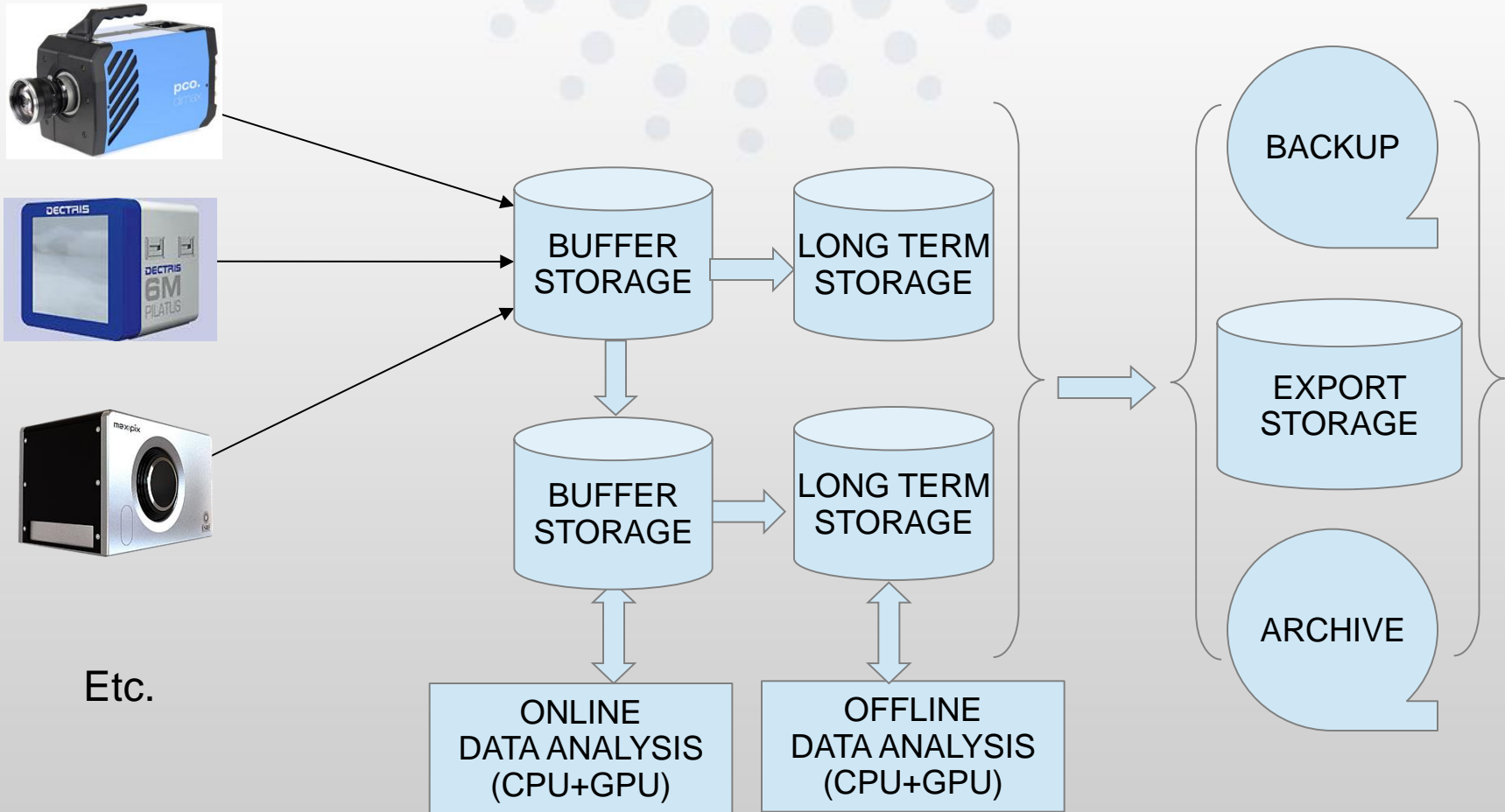HSN High-Speed Network 40Gbps

Detectors

10Gbps

Infrastructure
serve Local Buffer
Storage (LBS)

Dedicated
Storage Server
(DSS)

**Compute
Clusters**

**Tape
Backup**

Central Storage

Network

10Gbps

Systems and Communications   7

Requirements for one Beamline

Etc.

BUFFER STORAGE

LONG TERM STORAGE

BUFFER STORAGE

LONG TERM STORAGE

ONLINE DATA ANALYSIS (CPU+GPU)

OFFLINE DATA ANALYSIS (CPU+GPU)
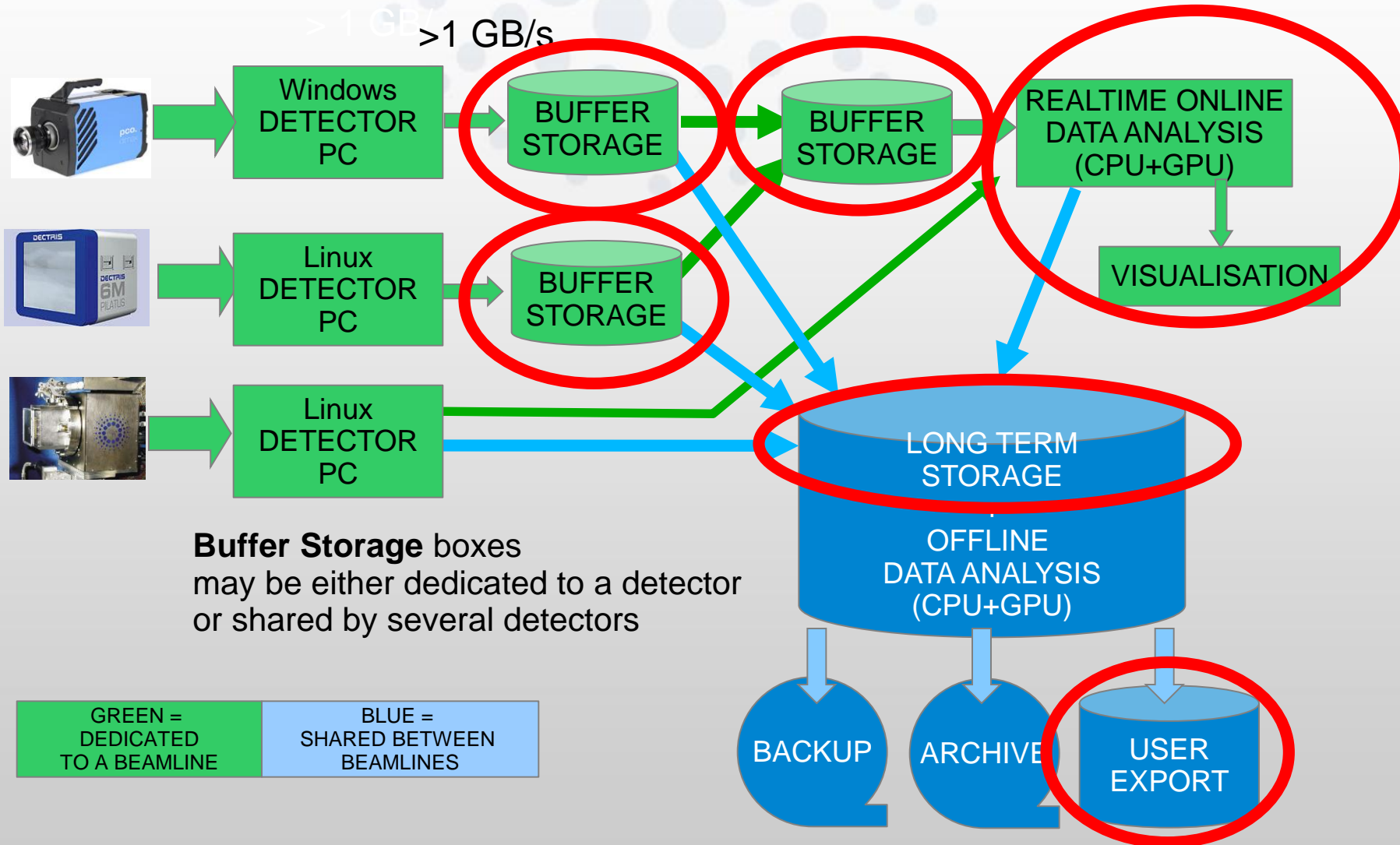
BACKUP

EXPORT STORAGE

ARCHIVE

Systems and Communications

Overall requirements

- Typically 6 – 10 Beamlines simultaneously
- Typically 6 high-speed detectors per Beamline
- Typically 2 detectors operating simultaneously per Beamline
- Peak bandwidth per Beamline = 1 – 10 Gbytes/sec

Systems and Communications

Overall architecture, with one Beamline

Other challenges

- Data Confidentiality

Questions?