

TRIUMF Site Report

Steve McDonald

2019-10-14



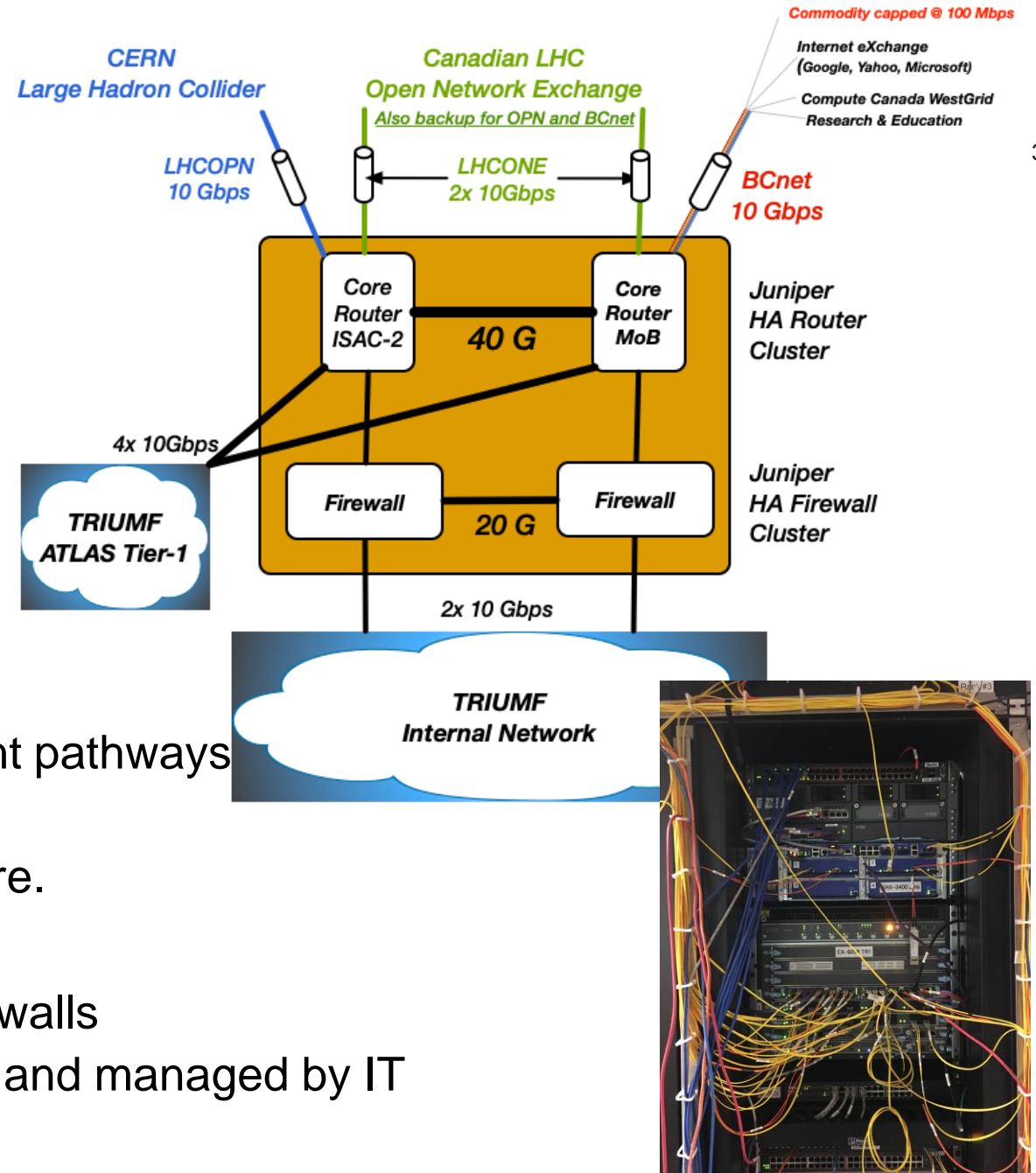
Enterprise Resource Planning - Business Software



- **New ERP System** (Finance, Procurement, Logistics, Inventory)
 - Unit4 Business World (Netherlands/Norwegian origins)
 - Online requisitioning, budgeting and account mgmt, workflow approval and self-service reporting
- **Replaced a 27yr old custom in-house system started in the 80's**
 - IBM AS/400 (mostly written in RPG)
- **Implementation started in 2011**
 - Estimated 1.5yr to 'go-live'
 - During first 4 months of Business Requirements Solution Design
 - Est. increased to 2.5yrs
 - Final Launch was January 2016 (5 yr process)
- Every IT Dept should go through one ERP Implementation – Builds Character ;-)

TRIUMF Core Network

- Network Core replaced in 2012
 - Two Juniper EX9208 10/100G Routers
 - Active-Active
 - Two Juniper SR3400 10G firewalls
 - Active-Passive
- Both Routers and Firewalls are Clusters
 - Each located in different buildings
 - With separate power sources and redundant pathways
 - Routers 4x 10G, Firewalls 2x 10G
 - Edge Switches have redundant paths to core.
- Each are hosting many virtual Routers and Firewalls
 - Groups/Depts firewalls are now centralized and managed by IT



Wireless Connectivity

- WiFi infrastructure replaced in 2014
 - Aruba IAP's ~150 Access Points
 - Good Indoor & outdoor coverage
- 802.11ac
- SSID's
 - TRIUMF Secure
 - TRIUMF Visitor
 - Eduroam
- Very reliable, good feedback, easy management, deployment and troubleshooting with **Airwave** (VM in RHEV)
- Essentially managed by 1 person



TRIUMF Organizational Changes

- Two new Directorates

- Research
- Operations

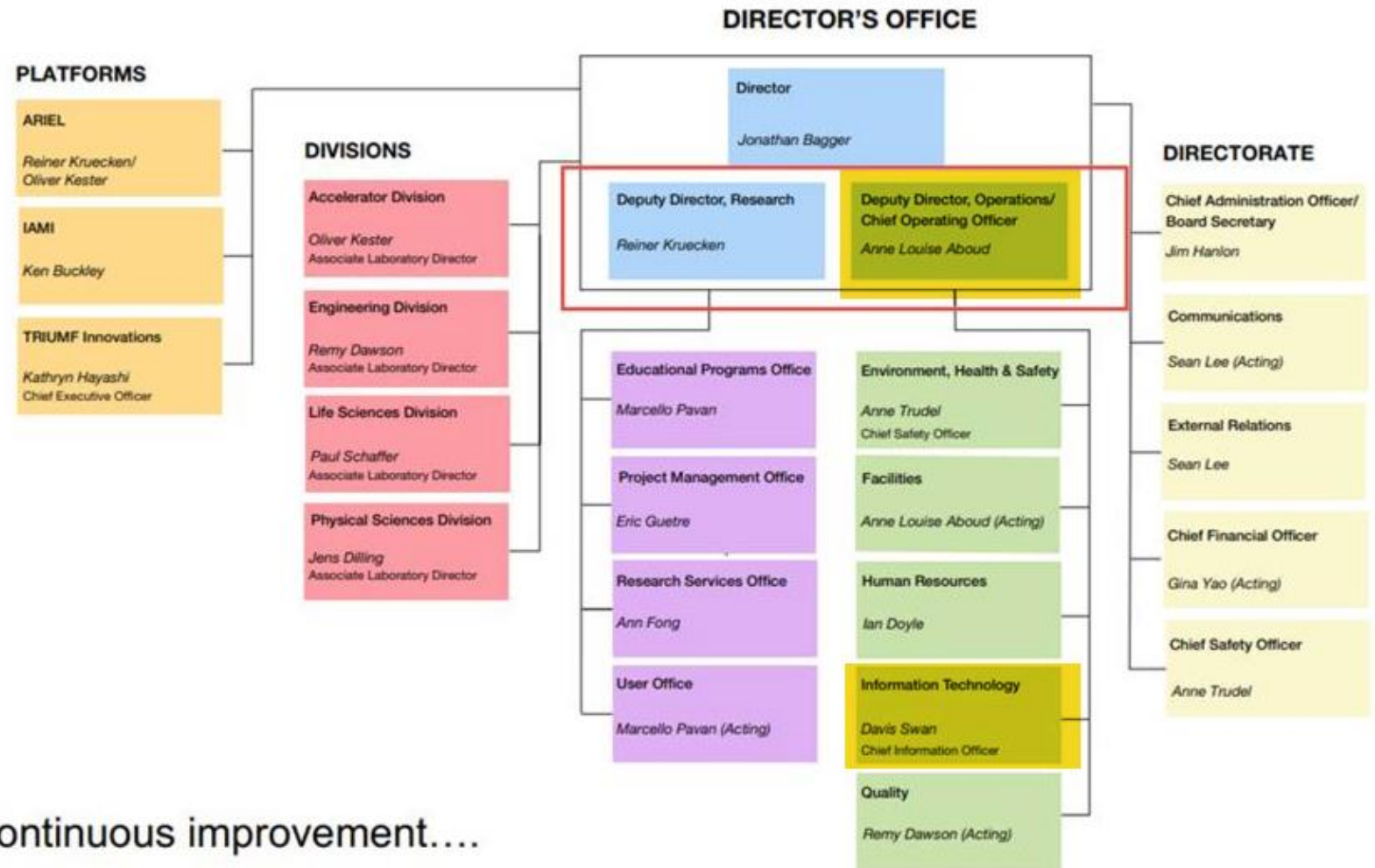
- Two new Positions

- COO (2018)
 - Anne-Louise Aboud
- CIO (2016)
 - Davis Swan

- IT Team still lean

- 13 Staff
- (Windows, Linux, Network, MIS)

Continuous improvement....

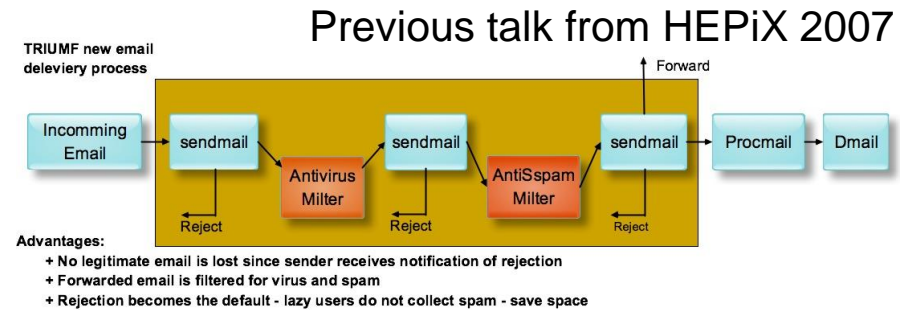


O365 Email/Calendaring

- Migrate Email/Calendaring Services to **Cloud O365**
 - One of first initiatives CIO in 2016
 - Datacenters hosted in Canada
 - ADFS for authentication

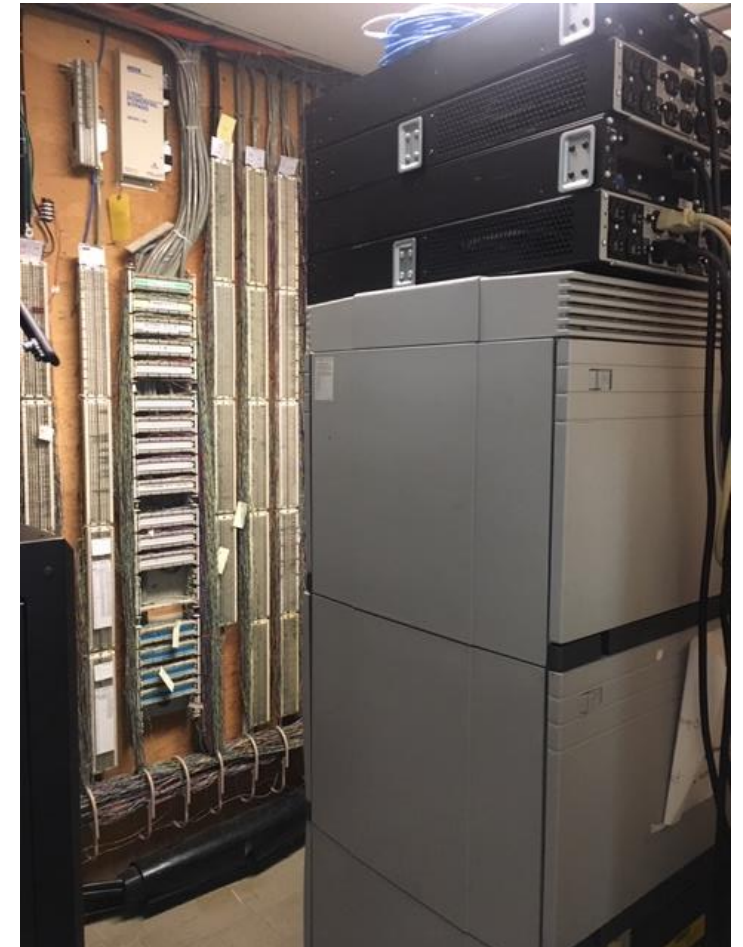
- No more Sendmail / IMAP / Google Calendar
 - milters, anti-virus, SPF records, spamassassin, procmail, dmail
 - Could it get anymore complicated?

- Email/Cal (like ERP) is commodity software, outsource it
 - Have better things to spend our time and limited resources on
- Not without significant effort ~1 year to migrate ~800 accounts



Telephony – new virtual telephony system

- TRIUMF Telephone System is ANCIENT
 - Nortel Meridian CS1000 Option 61C
 - VoIP capabilities added in 2005, but hardware is essentially 30 yrs
- Migrating to '**cloud**' based virtual telephony
 - Mitel PBX and SIP Gateways in Private Cloud (Educloud) off premise.
- ~1000 Phones (Analog, Digital, VoIP, SIP)
 - ~75% migrated to Mitel using SIP as gateway
- Challenges
 - 911 calls (where did they originate at TRIUMF ?)
 - Reliance on external networking
 - IPsec VPN tunnel to Educloud
 - In operation ~2 yrs
 - Only one significant outage ~4hrs after hrs (22:00-0200)

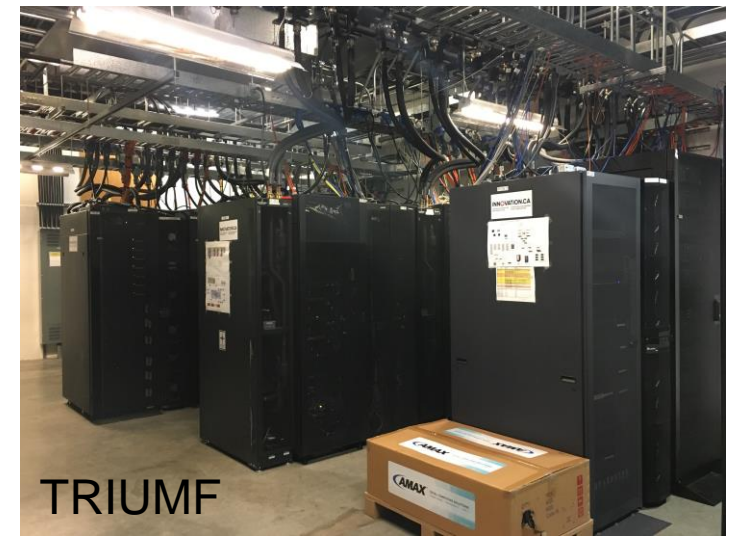


IPv4 addresses are valuable, NOW

- Another CIO initiated project and tight budgets
 - Can we sell/lease any of our IPv4 space?
- TRIUMF has a class B CIDR 142.90/16
 - 65k IPv4 addresses
 - Using <10%
 - Small window (before IPv6 becomes the norm) where IPv4 is very valuable in commercial market, down 10% from last year.
- TRIUMF looking to lease/sell half ~32k addresses

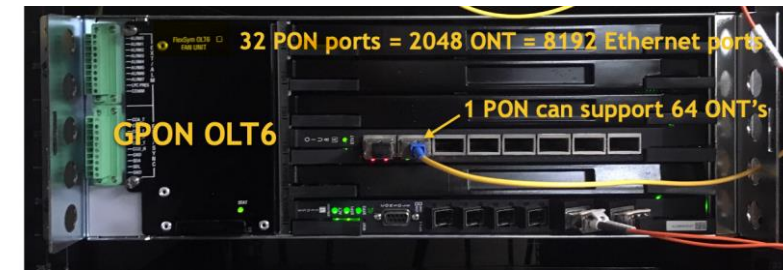
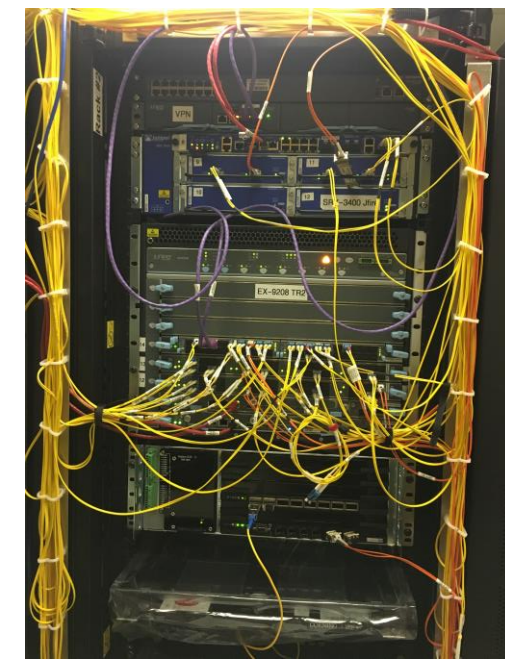
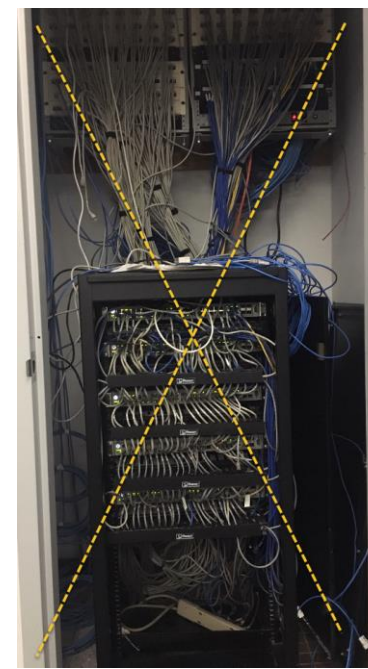
TRIUMF ATLAS TIER-1

- ATLAS Tier1 at TRIUMF 2005-2018 ~1000 sqft facility at capacity
- Tier1 center expanded and relocated to shiny new Datacenter at SFU ~50km away
- Production services started summer 2018
- SFU T1 Facility resources
 - 7680 cores
 - 11 PB disk
 - 31 PB storage
- TRIUMF
 - 4744 cores used for simulations only
 - 8PB Disk (out warrant not use in Prod)
 - No tape



Network Edge - GPON

- Pilot new network architecture for L2 edge switching
- Typically
 - Data closets with stacks of layer2 switches, lots of cabling and patching, power, space, cooling, noise ;(
 - Maintenance, troubleshooting, replacement ;(
 - 10Base2, 10BaseT, cat5, cat6, cat7 all replaced every 4-5yrs
- Solution GPON (1/10G Passive Optical Network)
 - Fiber to desktop (fiber lasts for decades), passive optical splitters in 2x2ft ceiling boxes, ONTs at desktops OLT at the Core, only passive fiber in between. Essentially a single 8000 port switch.
- DC 48v Power for Phones, Cameras, WiFi is the challenge



The Physics Of Change. Lesson Learned - Don't overlook change Mgmt

Newton's Laws of Motion

1. An object at rest tends to stay at rest, and an object in motion tends to stay in motion with the same speed and in the same direction unless acted upon by an unbalanced force

2. The acceleration of an object as produced by a net force is directly proportional to the magnitude of the net force in the same direction as the net force, and inversely proportional to the mass of the object

3. For every action, there is an equal and opposite reaction

Peter De Jager's Laws of Change

1. People stay where they are unless they have a reason to change

2. The more people have invested in the past the more difficult it is for them to change

3. When you try to change people they'll resist.

