Infrastructure Configuration Management For the "Cloud"

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What Do We Mean By The "Cloud"

Since the 90s the concept of customer consuming "services" was born

     Outsourcing of technology based services – networks, desktops, etc.

     Definition of customer "IT services" and business process services

     Services were managed with SLAs and OLAs

From a customer perspective

     The service was a "black box" which is now the "cloud"

From an infrastructure CCRM perspective – the same principles apply

     Identifiers, relationships, status, verification, reporting, presentation

Square Mile Systems

UK based – Cirencester, Glos, UK

Develop software for documenting infrastructure
AssetGen   Visio Utilities

Collate best practices for mapping and configuration management of complex IT infrastructure.
- Naming
- Data capture methods
- Integration with service/monitoring toolsets
- Presentation of dependencies

Customers 50% non-UK

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Business Processes
Departmental, Company

Services
End user, infrastructure, supplier

Applications
PC, server, mainframe, SOA

Virtual Infrastructure
PCs, Network, Servers, Storage, DBMS

Hardware Infrastructure
PCs, Network, Servers, UPS, Storage, Other

Fixed Infrastructure
(Cabling, Power, Cabinets, Rooms, Buildings)

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Overlapping Aspects Of Configuration Management(CM)

- Software development and delivery
- Asset management
- IT Service management (ITIL)
- Infrastructure (servers, data centres, networks, cabling, hardware)
- Major system (data centre, ship, oil rig, plane, car)
- Hardware/software component manufacture

Cloud computing runs on physical systems, joined by physical connections, in physical spaces!

Infrastructure CM requires conventions, interfaces, toolsets, skills, a baseline and team based processes (just like all forms of CM)
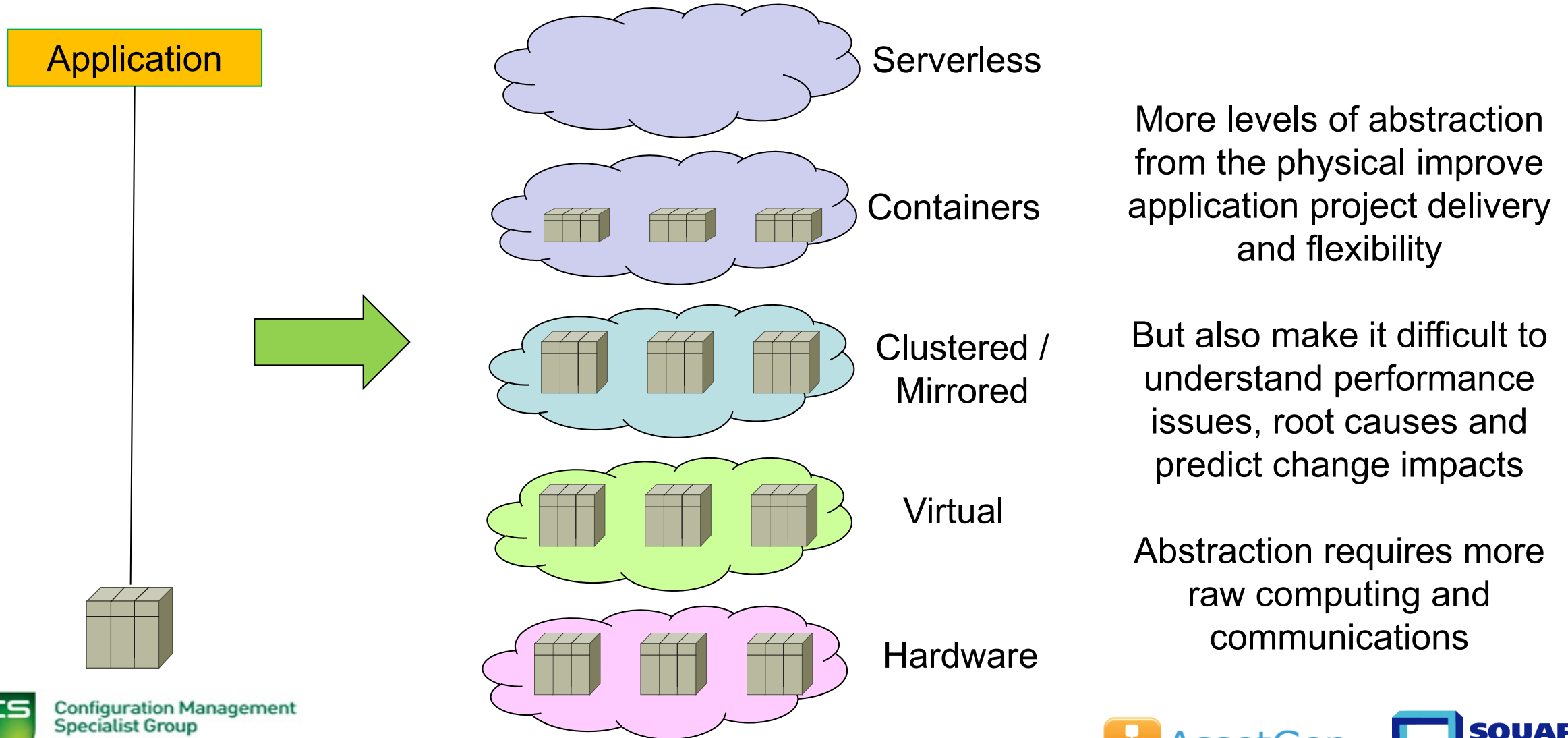
CM Maturity Continues To Evolve

- ## Service delivery
  - Change will be constant for physical and logical infrastructure technologies
  - Changes at application and business level will force infrastructure changes
  - Changing mix of internal, hybrid and external cloud services will deliver information

- ## Governance and Risk
  - Which existing IT service providers will exist in 10 years?
  - Which cloud / IoT providers will exist in 10 years?
  - Increasing cyber-security awareness of collateral damage from state / criminal actors
  - Data breaches caused by a mix of internal and external factors
  - More evidence of control required by regulators, business owners and customers

In Reality

- Many organisations don't have a maintained inventory of hardware/software, knowing where they are and what they do.

- The concept of a single master source of all IT service assets and dependencies is only partially successful. IT systems and infrastructure are too complex to represent simply in a "CMDB"

- Maintaining end to end understanding across team / supplier boundaries is still difficult, especially if supplier contracts reinforce silo thinking.

- Recognised risk mitigation methods can still be improved – such as environment management (PROD/Pre-PROD/DEV/UAT/DR),

Infrastructure Capacity and Resilience

Application

Serverless

Containers

Clustered / Mirrored

Virtual

Hardware

More levels of abstraction from the physical improve application project delivery and flexibility

But also make it difficult to understand performance issues, root causes and predict change impacts

Abstraction requires more raw computing and communications

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Current Infrastructure Challenges

- Power – for both powering server farms and cooling them
  - For building and operating data centres
- Connectivity – More data and control
  - Data, Storage, Control (mirroring, balancing, fail over), Management
- Supplier consolidation
- Change and transformation planning – impacts and dependencies
- Making local knowledge available to centralised planning and support teams
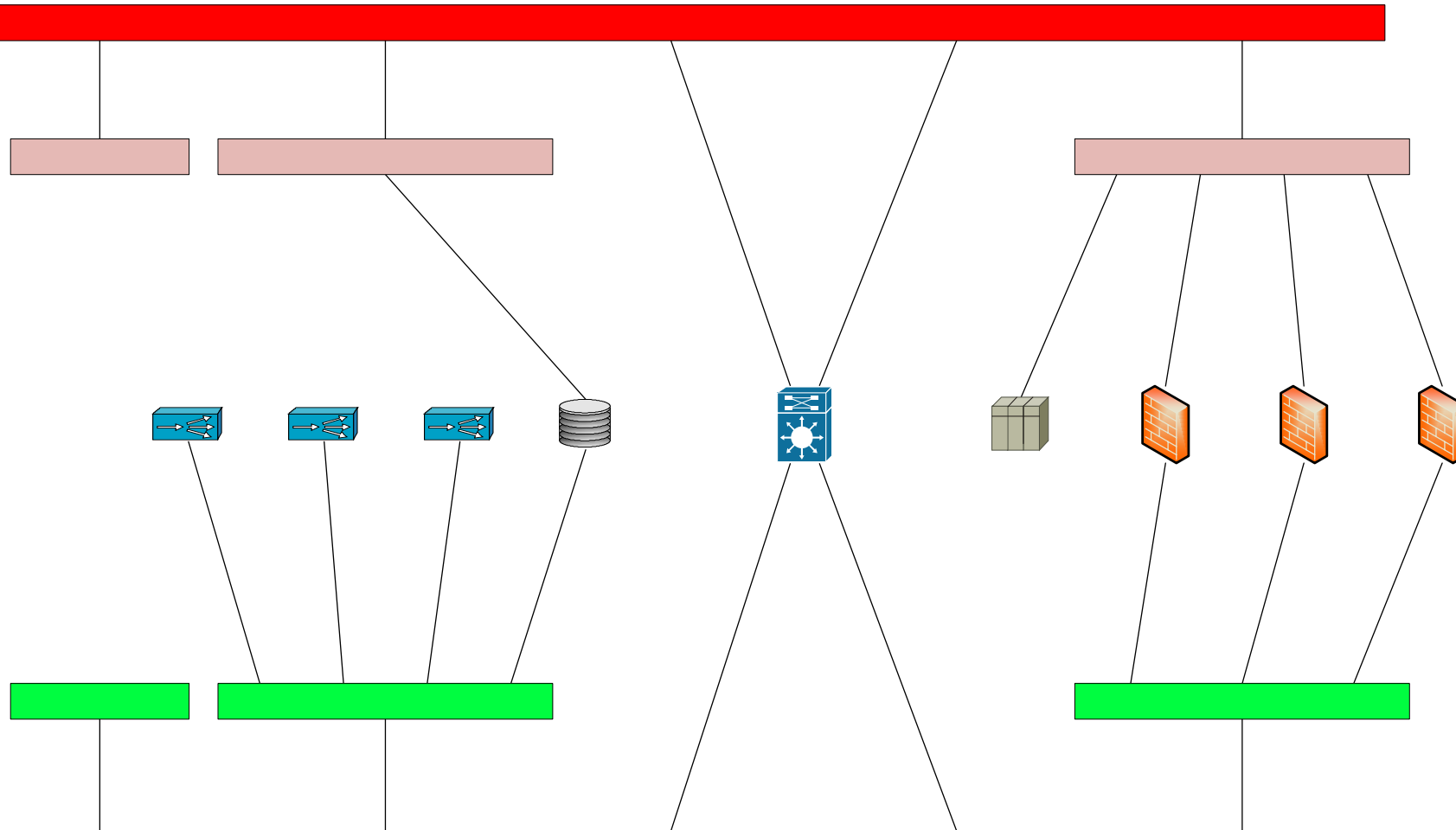- Spreadsheets….. Lots and lots of them!

Understanding Of Config Mgmt Principles and Benefits
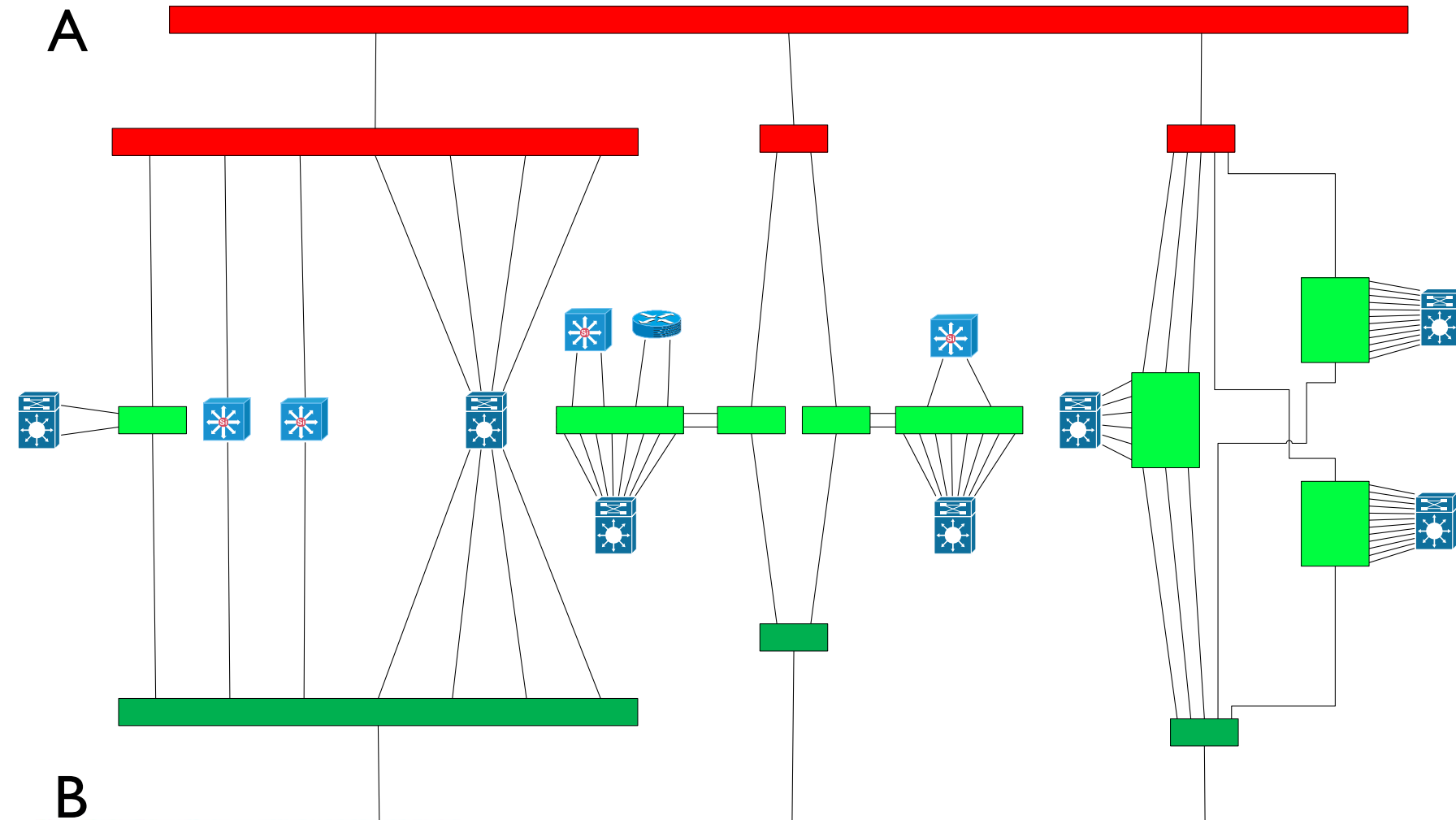
Delivering Power (AC)

A

Anyone spot a risk of a planned power down?

Would you build a DR environment with the same single points of failure?

B

Delivering Power (DC)

A

Anyone spot a breaker with insufficient rating?

Which services could be impacted by a trip?

B

Infrastructure Change, Configuration and Release Management

Different to major system, application life cycle management, component approaches of CCRM.

- Change — projects, adds/move/change, emergency
- Configuration — asset, inventory, dependencies
- Release — groupings, testing, environment

For efficient workflow you need identifiers,

status and appropriate presentation of

configuration data.

5?

5?
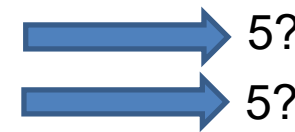
One "Service" Is Difficult To Understand

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Departmental, Company

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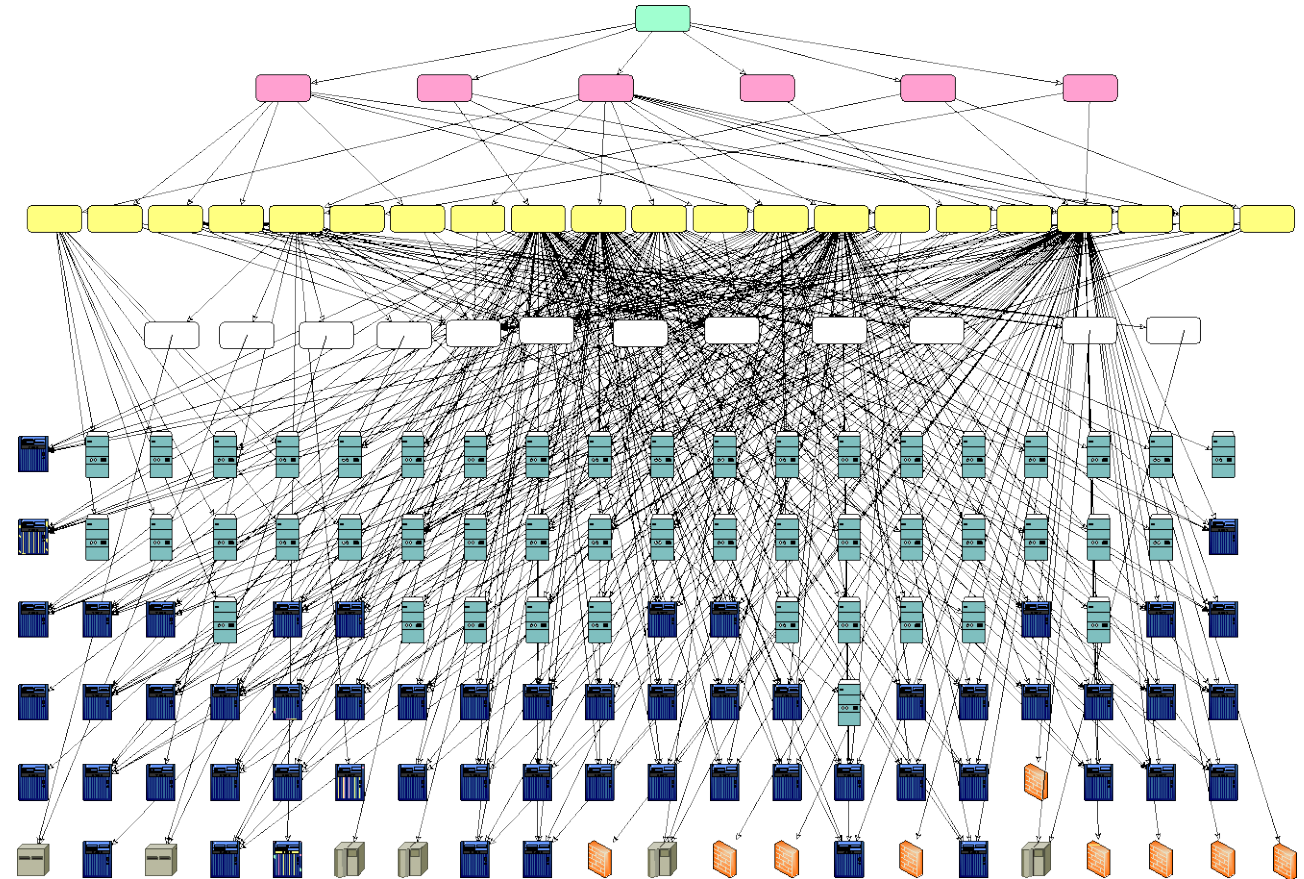
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(Cabling, Power, Cabinets, Rooms, Buildings)

Baselining An Infrastructure Supporting A "Cloud"

- Multiple locations
  - 25 sites, 85 data halls, approx. 6000+ racks, approx 160,000 separate items

- Scope
  - Inventory down to card/port level of active/passive hardware
  - Connectivity of data and power

- Manual data capture by multiple teams
  - Paper>excel>database>reports

- Starting position
  - Inconsistency of naming, labelling and current data sets

- Deliverables
  - Naming, inventory, connectivity, floor/rack layouts, topology maps photos, optical layouts

Location Identifiers

A. Adopt a hierarchy approach to suit scale – can be overwhelming so separating administrative codes and labels is useful.
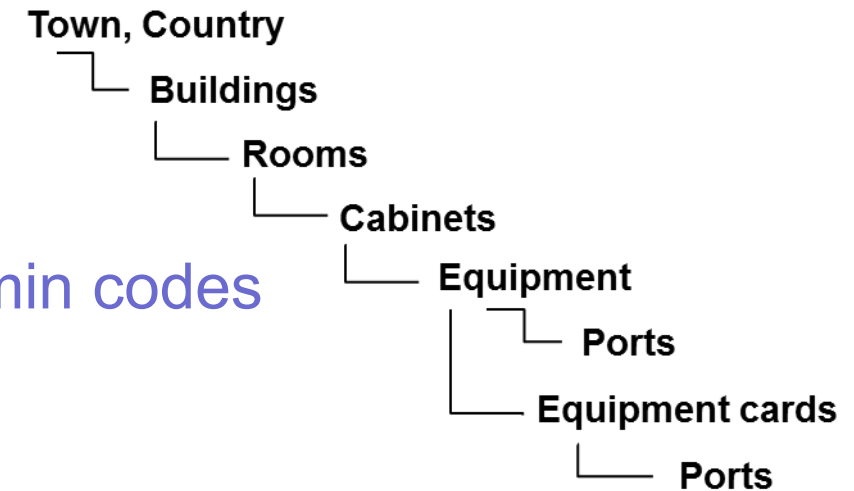
B. Be flexible to aid reading – combine labels with admin codes

    Hackney Data Centre 1 (LON-DC1)

    LON-DC1-A05 Blade Rack 3

It helps to develop a naming conventions document before bulk data capture!

Town, Country
    └─ **Buildings**
        └─ **Rooms**
           └─ **Cabinets**
             └─ **Equipment**
                └─ **Ports**
                └─ **Equipment cards**
                  └─ **Ports**

Device Identifiers

For any hardware component –four types possible

1. Logical Name	PRODSVR44SQL034	(Add location for uniqueness)
2. Functional	BLUEPIPE DB	BLUEPIPE DB-LON-DC1-A05-U25
3. Make/Model	HPE DL580 Gen7	HPE DL580 Gen7-LON-DC1-A05-U25
4. Passive Type	PPC (Patch Panel Copper)	PPC-LON-DC1-A05-U42R

Ports and Connections Identifiers

Equipment – use the physical label or logical name?

Port name

- 1 or 01 or 001?

- 2/1   2\1   2/01   SL2/1   Port 2/1   Gig 2/1 Fe2/1 Slot 2/09

- Mgmt MGT Con Console ILO ILOM Net Mgmt   iDRAC

- NIC 1   Eth A   Net 0   hba0   bge1   12F1   Primary
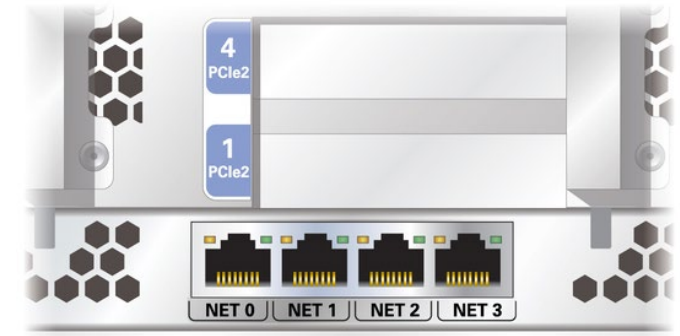
Cable Labels

| 1) port	2) local devices	3) end devices
4) full path	5) cable unique id	6) path unique ID

Reuse Of Identifiers For Documents

- Photos   Photo_LON-DC1-A05 FT.jpeg (front top)
- Rack diagram   Rack_LON-DC1-A05.vsdx
- Floor plan   Floor_LON-DC1.vsdx
- WIFI diagram   WIFI_LON-DC1.vsdx
- Power AC   Power AC_LON-DC1.vsdx
- Inventory   Inventory_LON-DC1.xlsx

- Short codes   HPE DL580 G7-LON-DC1-A05   =   DL580 G7
                          Separate the consistent admin name from local label
                          Reduce clutter on diagrams

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Infrastructure CCRM - Lessons Learnt

- Project orientated people don't like to learn – keep the interfaces simple

- Operational support teams aren't used to being heard – help them articulate

- Lots of ways to make mistakes with manual data capture

  - Use a "wave" approach where each wave checks the previous

- Auto-discovery toolsets provide another set of inconsistent data to manage

- Don't underestimate the difficulties in achieving an end to end baseline

- Don't let others stop you trying to do what is right.

- Focus - 100% accuracy of a small scope is better than 50% of a big one

Other CM Mapping Issues To Address Later

- Service/change impact mapping

- Application data flows

- Batch process dependencies

- PCI DSS compliance
  - Data/control/management planes

- Firewall rules mapping

- Regulatory reporting

- Environment management

- Test models

- GDPR data locations
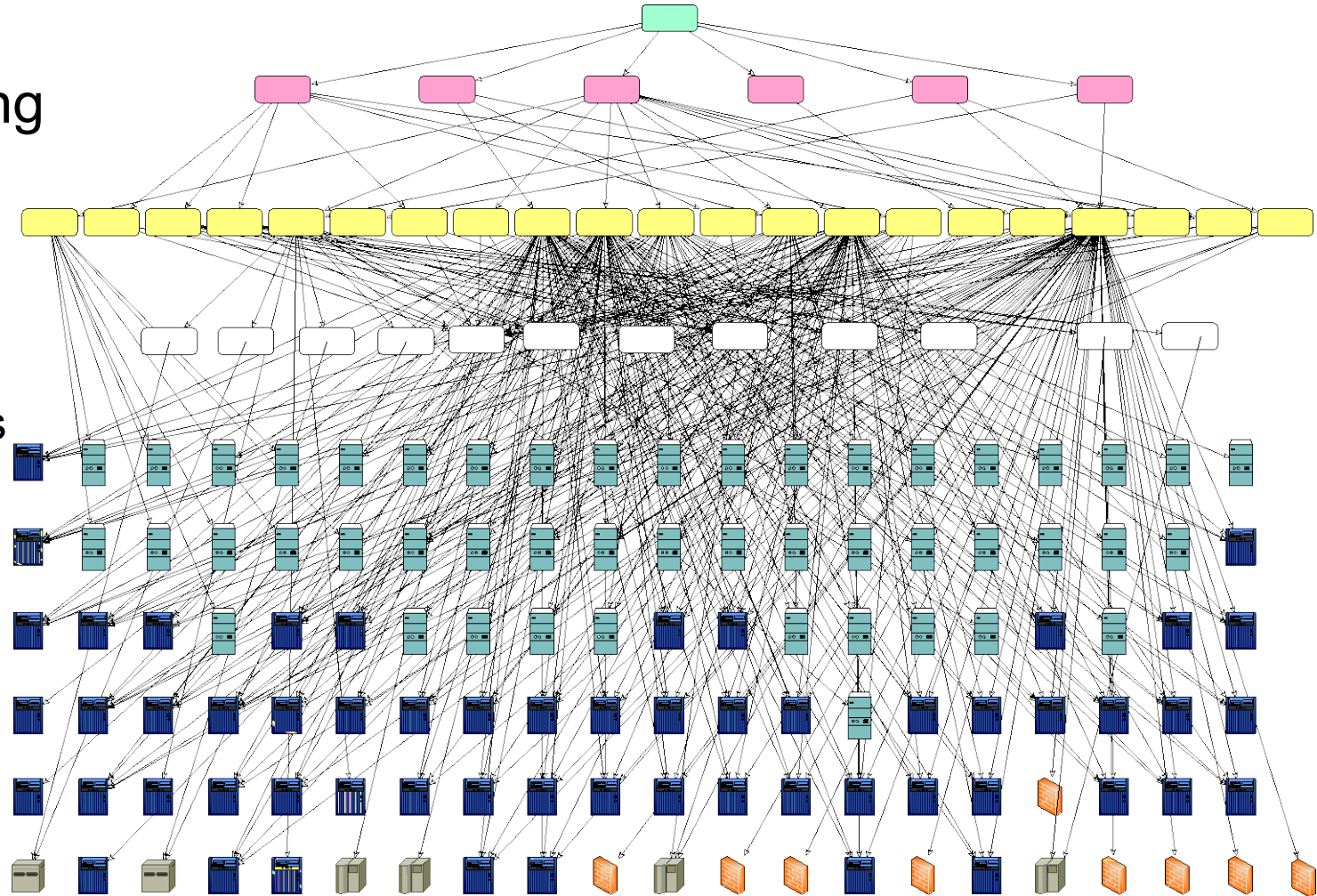
Improving Infrastructure CM For The Cloud

- Defined naming conventions across the enterprise
- Defined CIs and grouping
- Defined lifecycle processes and CI status
- Replacement of Excel with database driven systems
  - Workflow (Service desk, SCM/ALM, CMDB)
  - Must be able to handle complexity of dependencies
- Presentation of data and low/high level views to suit consumer
- Verification processes
  - manual and automated checks of both data and process
  - Supporting forms, lists, reports, diagrams

Supporting The Cloud Infrastructure

- **Everyone does configuration management**
  - But is it as effective and efficient to make it worth doing?

- **CM is a sign of mature management, it will happen**
  - Where you want repeatable, consistent processes
  - Needed to separate roles – assess, design, build, operate, risk, security

- **CCRM For Data Centers has similar principles to elsewhere**
  - Help is often needed to convince project engineers of CM value
  - Don't do the basics and you will suffer
  - Less mature than software CM, and bigger impact on cloud services!

Thank You For Attending

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Documentation methods and audits
Visio automation training
Visio mapping utilities, etc