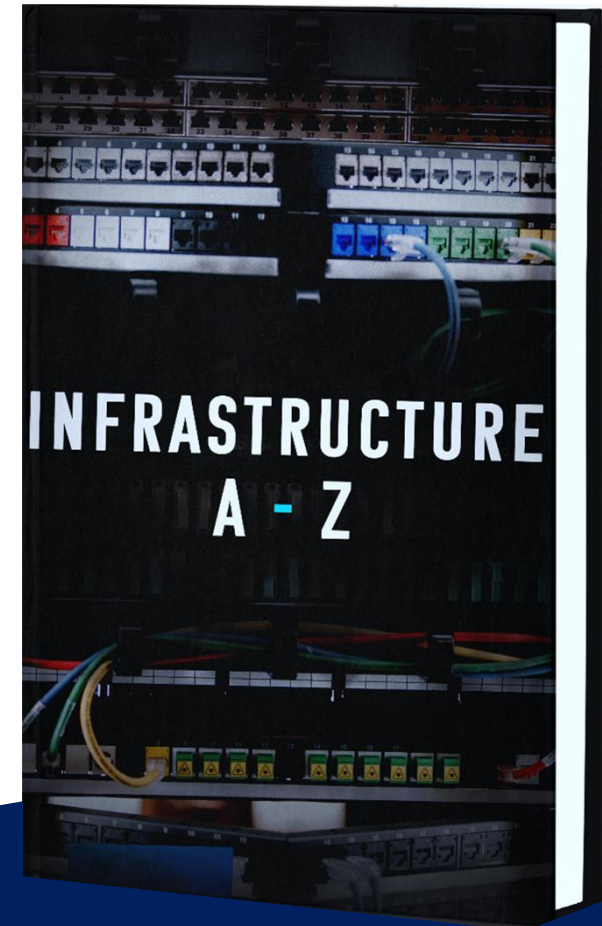# Techniques to Improve Infrastructure Documentation and Configuration Management

SQUARE MILE

Infrastructure Documentation

It's common sense that you should know what is in your IT infrastructure and how it is configured, so why is so difficult?

Because infrastructure is complex and there are multiple specialist teams!

Infrastructure Configuration Overview

Every organisation does infrastructure configuration management – with differing levels of gaps & productivity!

1.Understand infrastructure configuration management principles to aid selection of approach, appropriate supporting technology and techniques

2.Identify quick wins or tips that directly save cost and time, reduce the risk of changes and increase confidence in management controls

3.Communicate to colleagues the benefits and issues which can be achieved with adopting CM principles
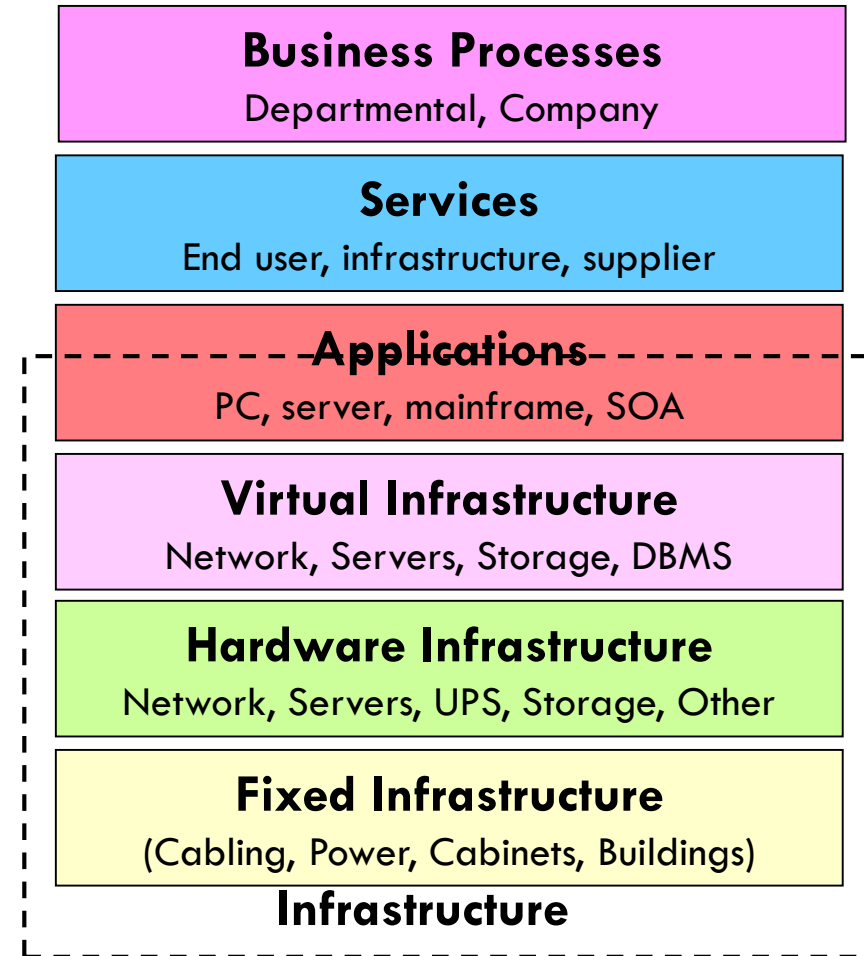
The Focus

Physical Infrastructure

- Buildings
- Data Centres
- Racks
- Cabling / Power
- Active components – servers, switches, PCs
- Other hardware

Logical Infrastructure

- Networks – LAN/WAN/SAN
- Firewalls and rulesets
- Servers – Physical, virtual, clustered
- Applications and host dependency mapping

Business Processes
Departmental, Company

Services
End user, infrastructure, supplier

Applications
PC, server, mainframe, SOA

Virtual Infrastructure
Network, Servers, Storage, DBMS

Hardware Infrastructure
Network, Servers, UPS, Storage, Other

Fixed Infrastructure
(Cabling, Power, Cabinets, Buildings)

Infrastructure

Objectives

- To communicate the issues and techniques that make it easier to implement infrastructure configuration management
  - Getting the basics right
  - Addressing both data and information needs
  - Look at the people and process changes required – as discovery tools never fix problems – they only create more data to be managed

- Help achieve quick wins as well as long term gains
  - Speed up project and programme delivery
  - Reduce the costs and skills to maintain infrastructure documentation
  - Support consolidation or optimisation programmes
  - Make it simpler to produce and maintain recovery capability

Types Of Configuration Management

- **Software configuration management**
    - How software modules, releases are managed

- **Asset management**
    - How assets are managed through their lifecycle

- **Data Centre Infrastructure Management (DCIM)**
    - Space, power and connectivity management

- **Major system configuration management**
    - The components and versions within a system ie. Aircraft, ship

- **Service and system mapping**
    - System/component dependencies for change/risk communication

- **Infrastructure configuration management?**
    - What's the difference, is there one?
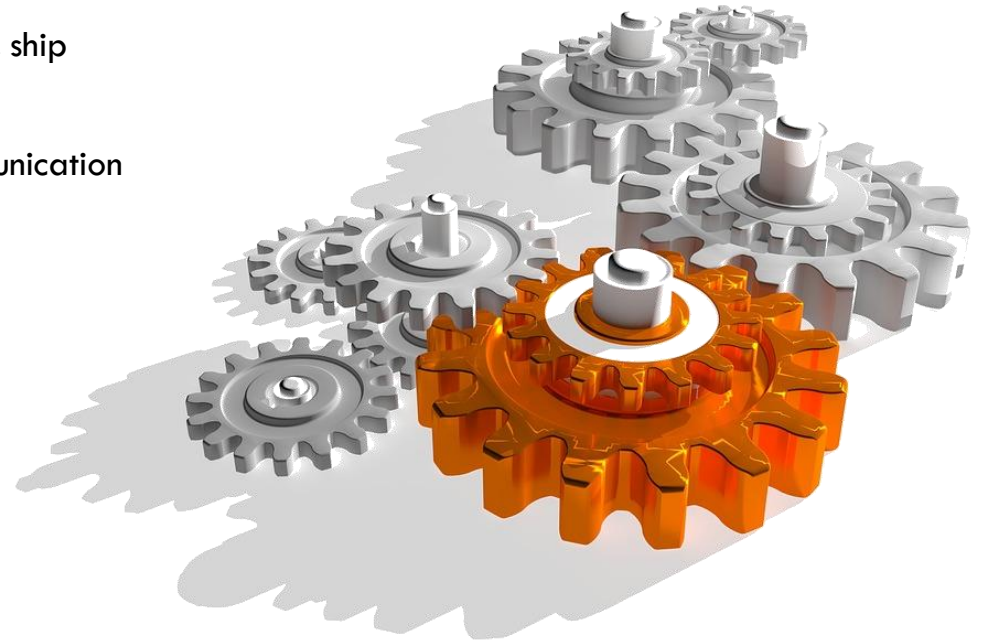
Infrastructure Documentation

Recovery Risk/ Plans	Application Software	System Architecture	Service Architecture

SERVERWIN0001

Supplier Customer	Network	Hardware Config	Software Config	Monitoring
Asset Financial	KVM	Power	Storage	Location

Planning Changes- Can We Put A Server Here?

01-07 - FRONT

UK_BIRM_UX08

UK_BIRM_UX07

UK_BIRM_UX06

UK_BIRM_UX05

SVR-BHAM-010701

Cable Mgmt 01-07-04
PP01-07-01
PWR01-07-B
PWR01-07-A
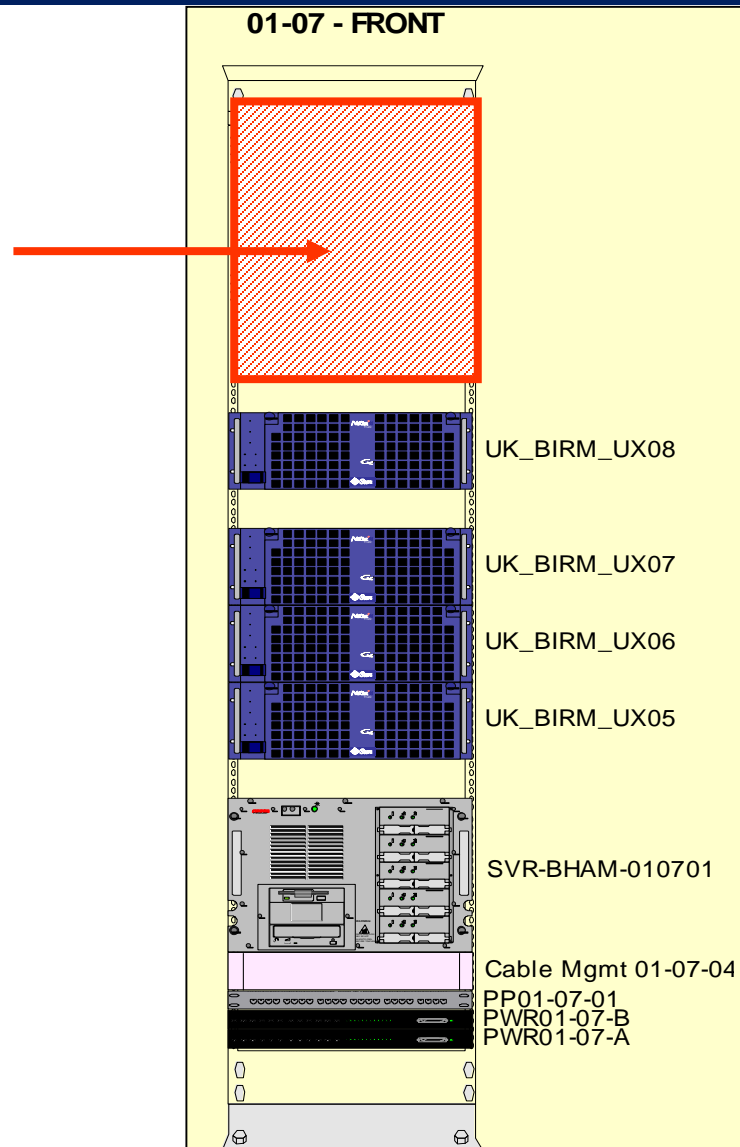
Typical Information Required

01-07 - FRONT

UK_BIRM_UX08

UK_BIRM_UX07

UK_BIRM_UX06

UK_BIRM_UX05

SVR-BHAM-010701

Cable Mgmt 01-07-04
PP01-07-01
PWR01-07-B
PWR01-07-A
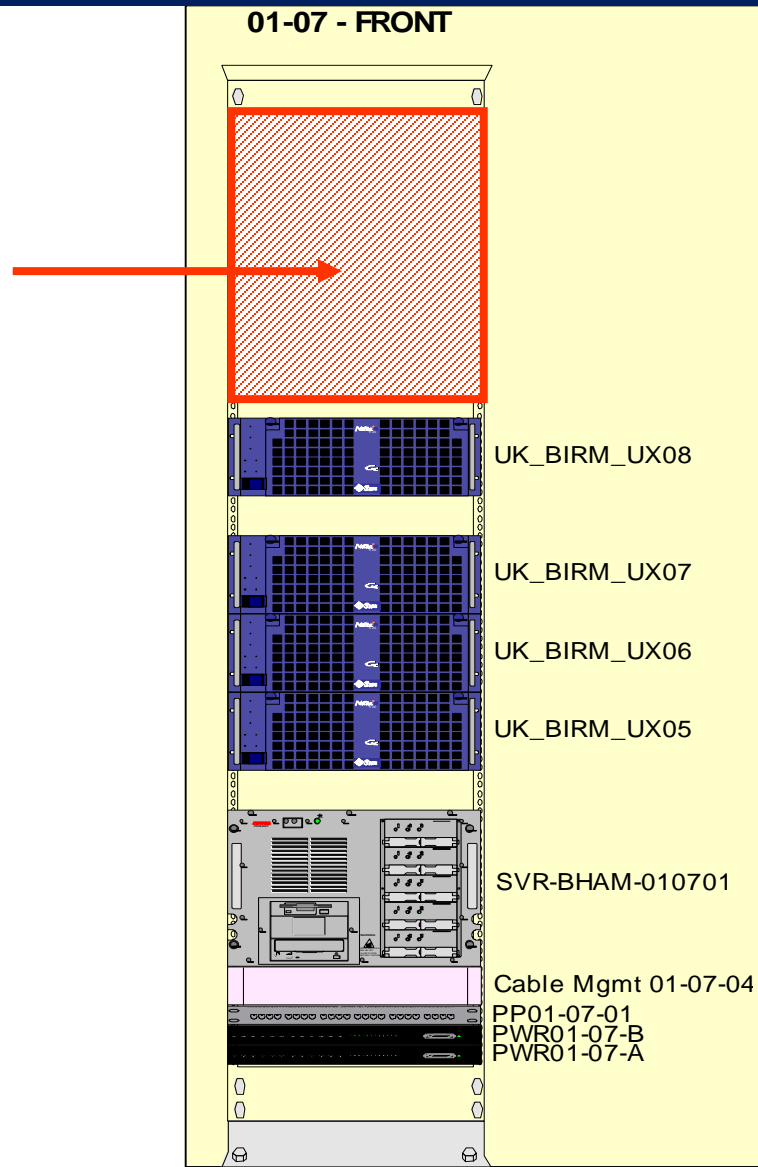
Technical

Space
Weight
Power
Cooling
Connectivity

Business

Function
Location
Cost
Capacity
Risk

And Afterwards – Document the Change!

1. Update asset/inventory list
2. Update rack diagrams
3. Update network patching records
4. Update switch port usage and capacity
5. Update floor plan capacity view
6. Update power usage spreadsheet(s)
7. Update server recovery plans
8. Update storage / backup system documentation
9. Update systems architecture documentation
10. Update DR plan
11. Update maintenance records
12. Update change records
13. Update project documentation with the "as built" details

What?
Where?
Who?
When?
How?
Why?

Documentation – Too Much Effort?

| Lifecycle	Examples	Formats
Design		Paper
Bid		Word
Project		Excel
Build	**Server**	Visio /CAD
Handover		Databases
Operate	**Switch**	Monitoring systems
MACD		Data centre toolsets
Controls		Cable management
Risk management		Internal web portals
		Work flow/service desk
		Test results
		And so on….

Focus - Basic Information Needs

1. **What we have and what we have planned for**

2. **Where a device or component is**

3. **The current attributes or configuration parameters**
   Technical, process data, organisation, commercial

4. **If a complex build – chassis/card/modules**

5. **What a device connects to and how**
   - LAN/WAN/SAN/KVM/Voice/Power/Video

6. **What changes to devices or data sets have occurred**

7. **Presented in views that explain the configuration best**
   Form, list, report, physical / logical / build diagram

Gremlins do not really exist...
It is people that make changes.

Example - Different views of a server

Rack Position

Floor Plan

H/W Build

Service impact

LAN, SAN Connections

Power Impact
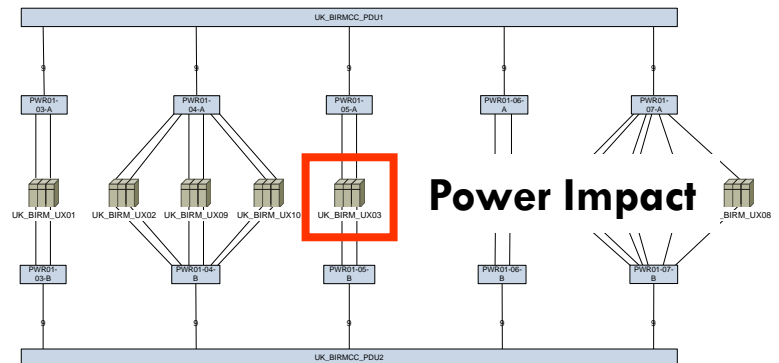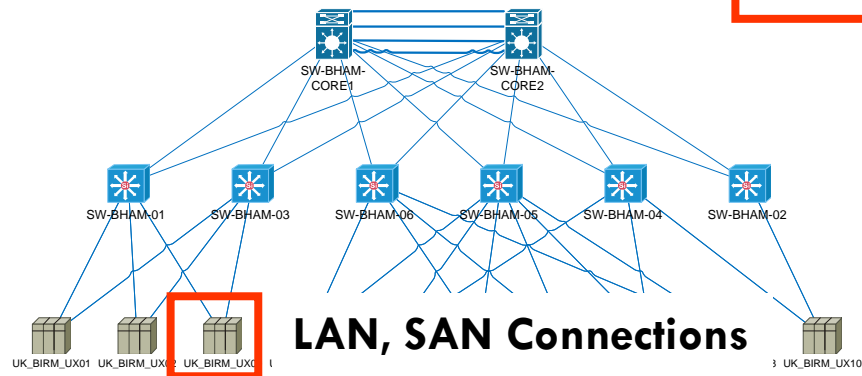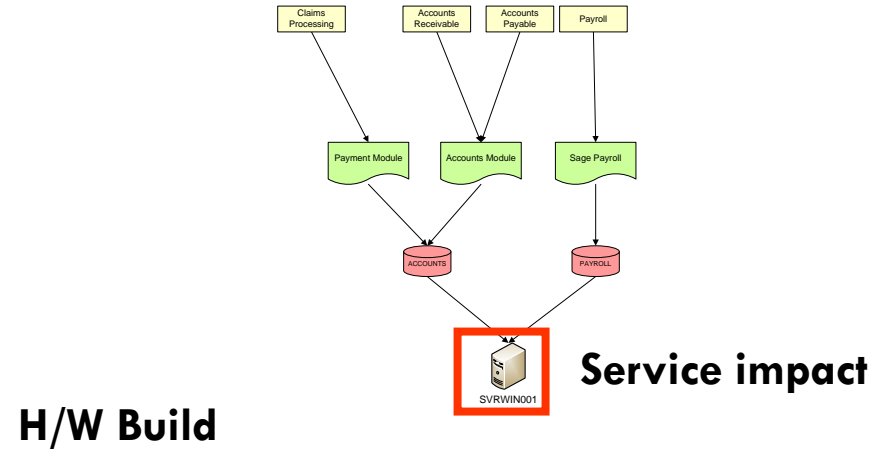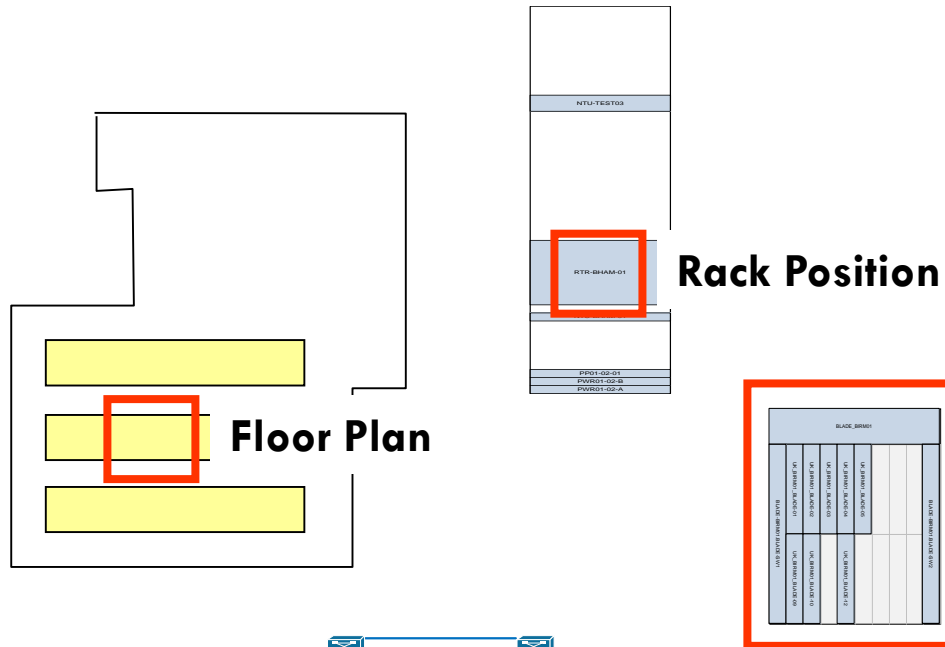
Configuration Management Basics

- **Identification of configuration items (CI)**
  - Naming and supporting attributes
- **Types of relationships**
  - Space, build, connection, dependency
- **Status accounting - workflow**
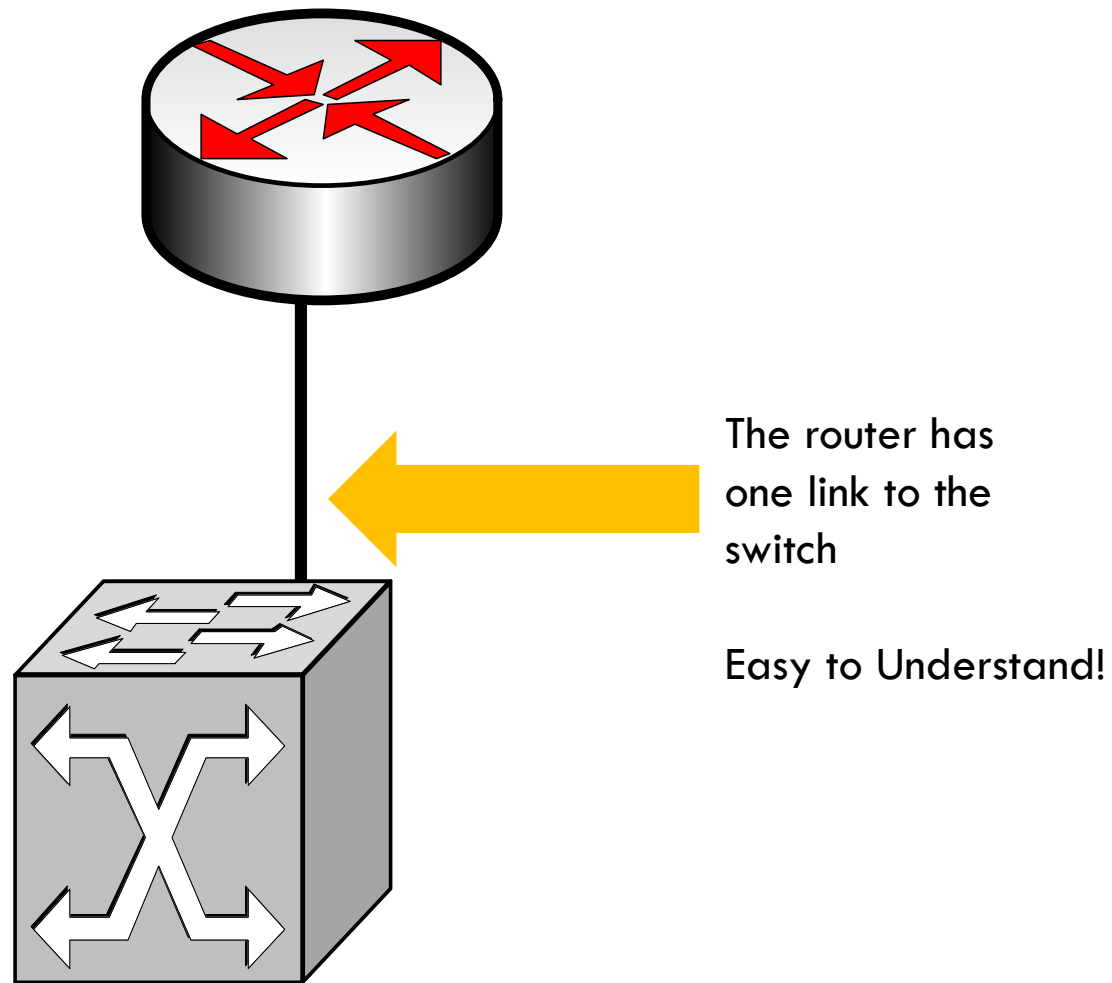- **Process and policy**
- **Verification methods**

You could do this in a spreadsheet for a
small environment, but a database solution
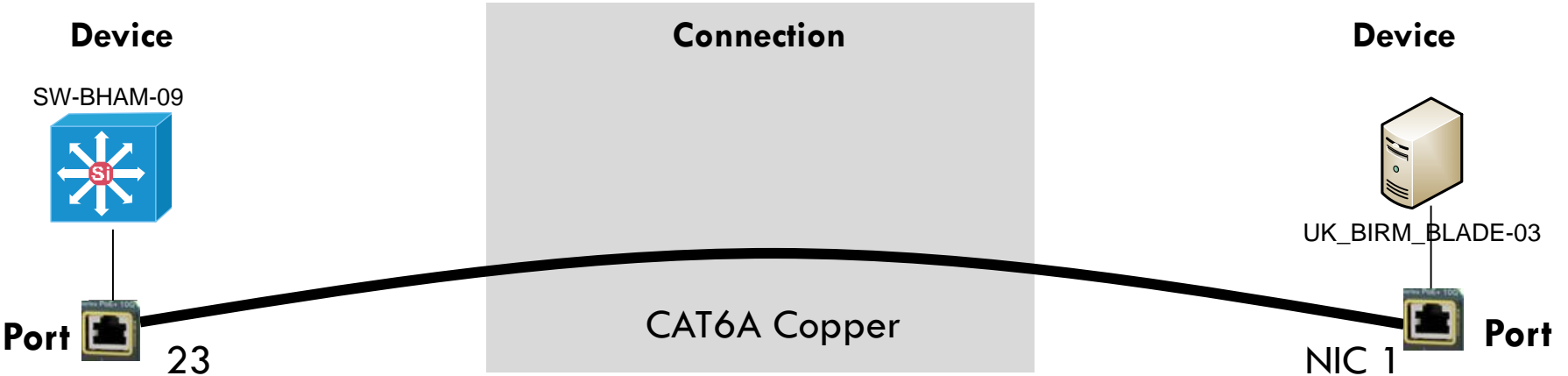is normally better suited to complexity and scaling.

Why is Infrastructure CM Different?

- **Standardised names and conventions**
  - Fixed infrastructure
  - Active and logical components
  - Connectivity power, network, SAN
- **Multiple outputs from fewer sources**
  - Rack and floor management
  - Capacity management space, power, connectivity
  - Visual views, rack, network, power, system
  - Inventory and asset management
- **Combine multiple team data sets into a reduced set**
  - Project, operations, risk, asset, audit, platforms, service management
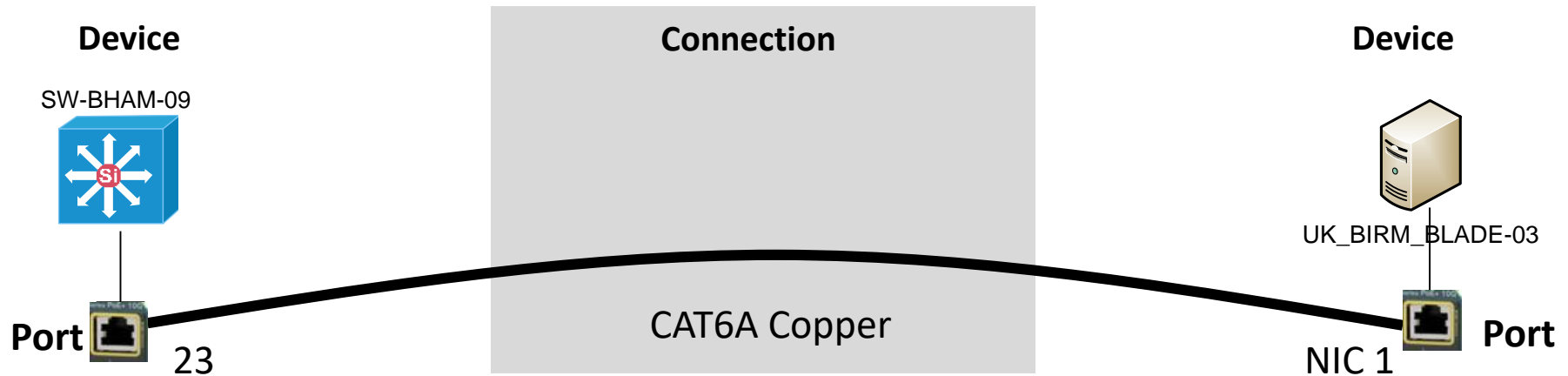
The Logical Dependency View

The router has one link to the switch

Easy to Understand!

Documenting a Connection

Device

SW-BHAM-09

Port 23

Connection

CAT6A Copper

Device

UK_BIRM_BLADE-03

NIC 1 **Port**

Device 1	Port	Connection	Port	Device 2
SW-BHAM-09	23	To be filled in by DC team	NIC 1	UK_BIRM_BLADE-03

Documenting a Connection

Device

SW-BHAM-09

Connection

CAT6A Copper

Device

UK_BIRM_BLADE-03

Port 23

NIC 1 **Port**

Device 1	Port	Connection	Port	Device 2
SW-BHAM-09	23	To be filled in by DC team	NIC 1	UK_BIRM_BLADE-03
Room Rack Position Make Model Asset Number IP Address	Port Type Speed VLAN	Colour Cable Label Connection type Length	Port Type Speed VLAN	Room Rack Position Make Model Asset Number IP Address

The spreadsheet could be 4 to 30 columns wide!

The Physical Connection View
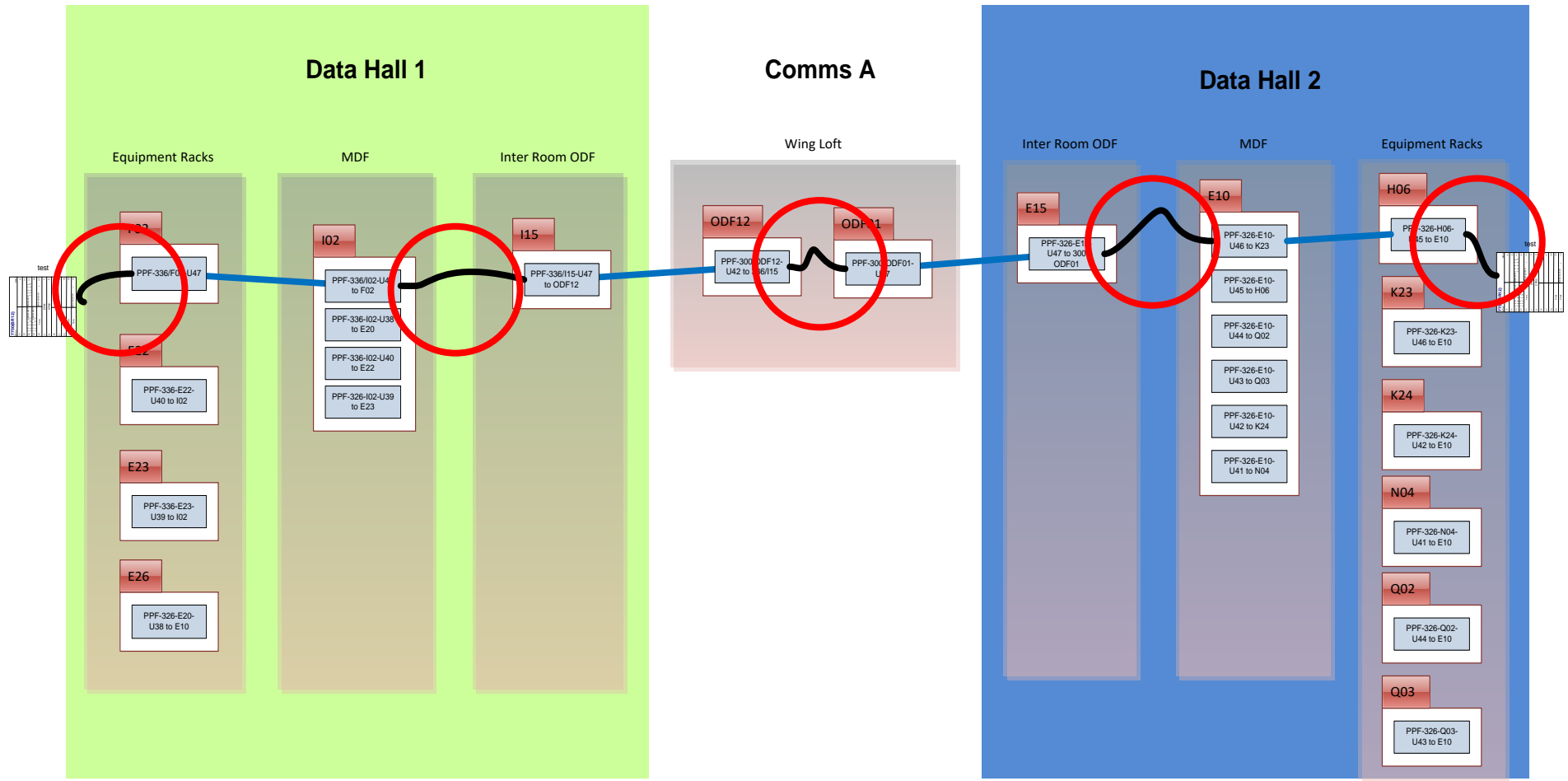
So Make The Spreadsheet Bigger

| Device	Port	Patch	PPA Port	Patch Panel A	Back to Back	Patch Panel B	PPB Port	Patch	Port	Device
UK_BIRM_UX01										SW-BHAM-01
A	23		05	AA		AC	05		NIC 1	B
Room Rack Position Make Model Asset Number IP Address	Port Type Speed VLAN	Colour Cable Label Type Length	Port Type Speed	Room Rack Position Make Model	Type Length	Room Rack Position Make Model	Port Type Speed	Colour Cable Label Type Length	Port Type Speed VLAN	Room Rack Position Make Model Asset Number IP Address

Contact
Purpose
Request date
Request Number
Project Code / Ref

Work number
Path reference
Scheduled date
Installed status
Path length

The spreadsheet data may easily grow beyond 60 columns wide and as deep as the number of connection paths

The Physical Reality – Sometimes?
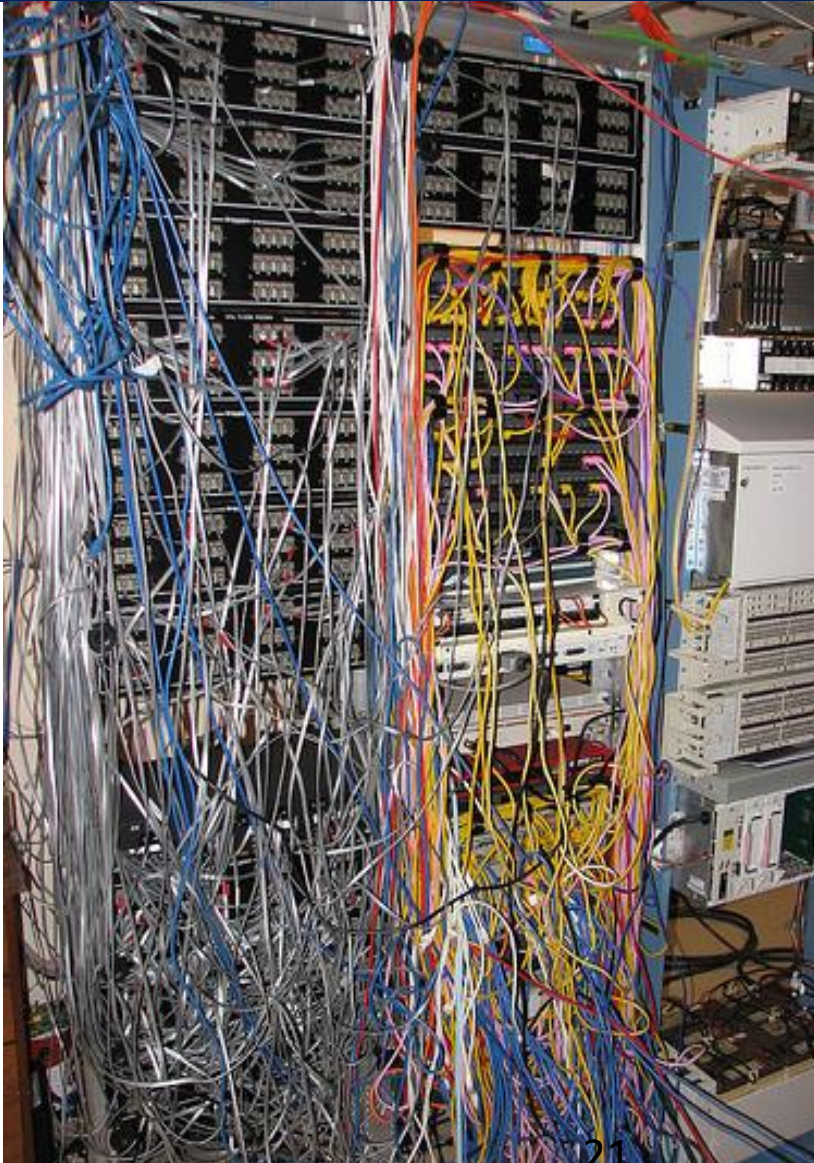
Tips and Techniques – 1 Identifying

- **Identify standardised naming for administration**
  - Labelling on devices and cables may be different
  - May need to reference other names/labels in common use
  - Don't collect or reconcile any bulk data until you have names
  - Reference standards / guidelines if useful TIA606, TIA942
- **Keep it as simple as possible**
  - Minimise number of levels to drill down / record
  - Use 01 rather than 1 if more than 9 (excel and db sorting)
  - Prefix with an Alpha – A01 better than 01-01 for cabinet row/rack
  - Use unique names if possible everywhere

Define Passive Infrastructure Naming

24 Port Copper Patch Panel

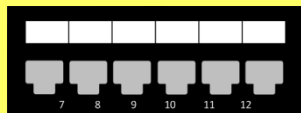### 288 Port Fibre Panel

Patch Panel

AB

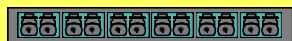B03-AB

B03-5

US-NY-DC05-H1-B03-5

PP B03-AB-U5

PP B03-AB-U5 to H07-AC-U2

PP B03-AB-U5 to H07-AC-U2/H06-AG-U9

PPC B03-AB-U5 to H07-AC-U2:Ports 01 to 24

6 Copper RJ45 Ports

6 Fiber LC Ports

Port Selection

AB-A Ports 1-6

H07-AC-B Ports 7-12

PCI AB-A Ports 1-6 to H07-AC-B Port 7-12

AC-03B Ports 1-6

PFI B03-AB-03B Ports 1-6 to H07-AC-12A Ports 1-6

Ports and Connections

Equipment – use the physical label?

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 Net Mgmt

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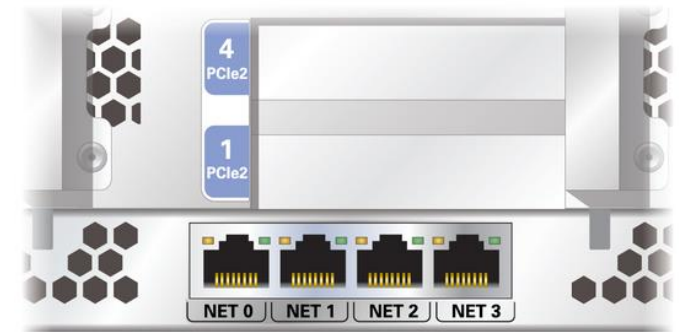
Cable Labels

1) port   2) local devices   3) end devices

4) full path   5) cable unique id   6) path unique ID

Define Active Device Naming / References

Device Name

1) Logical Name	US-SW-DC02-03P
2) Type of device / location	Cisco 6509 DC02-B03-U2
3) Asset Number	Asset HW0078732
4) Service Desk ID	83837762328993
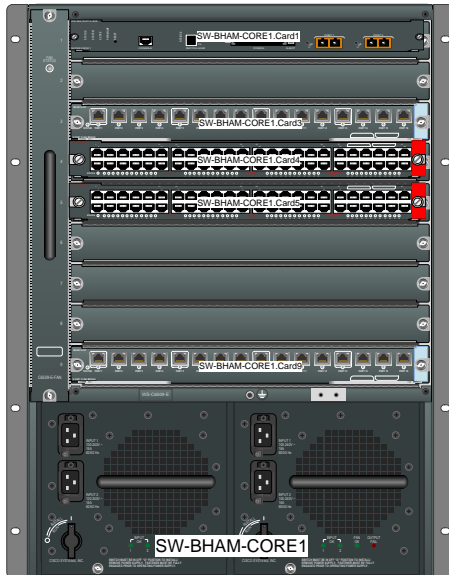
Device component – Switch Card

US-SW-DC02-03P Card3
Cisco 6509 DC02-B03-U2.Slot03
Asset HW0078737

Device component – Blade Server

UX-NY0445-PROD
HP BL685C BLNY05-DC02-B03-U2.Slot03
Asset HW0078143

A Recent Project – (With Bad Naming)
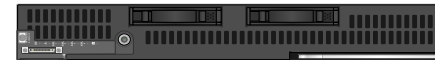
In an estate of about 400 racks

32, 000 copper / 22, 000 fiber backbone connections

  9,000 paths

20,000 patch connections

Master spreadsheet(s) with connection paths	9,000 rows
Master spreadsheet(s) for backbone capacity	54,000 rows
Approx. 4000 change spreadsheets identified	300,000 rows
Switch port allocations – a tab per switch /card	16,000 rows
San switch port allocations – a tab per SAN switch	

Plus asset list(s), 800 rack layouts, power patching, backbone diagrams

We summarised this into 3 spreadsheets – racks, equipment, connections

Presenting Data as Schematics

Physical

Front

Peer to Peer

SW-BHAM-13   SW-BHAM-14   SW-BHAM-19

FW-BHAM01   FW-BHAM02   FW-BHAM04VPN

SW-BHAM-11   SW-BHAM-12

RTR-BHAM-07   RTR-BHAM-08

RTR-BHAM-03   RTR-BHAM-04

DMZ & Internet Access

BT-NTU2   BT-NTU3   VT-NTU1   VT-NTU2

BT Wan Service   VT Wan Service

Hierarchical

ISA PAYMENT REQUEST HANDLING

WORKFLOW CLIENT   ISA PAYMENT   TRANSACT   BACS-IP

WORKFLOW   PAYLOG   AUDITTRACK   BACPAY

ORACLE FWS_03   SQL FWS_04

CITRIX SERVER

UK_VWBIRM001   UK_VWBIRM002 UK_VWBIRM004

SVR-BHAM-010301

UK_BIRM_BLADE_01   UK_BIRM_BLADE-02

More Presenting Formats …

Architecture Blocks
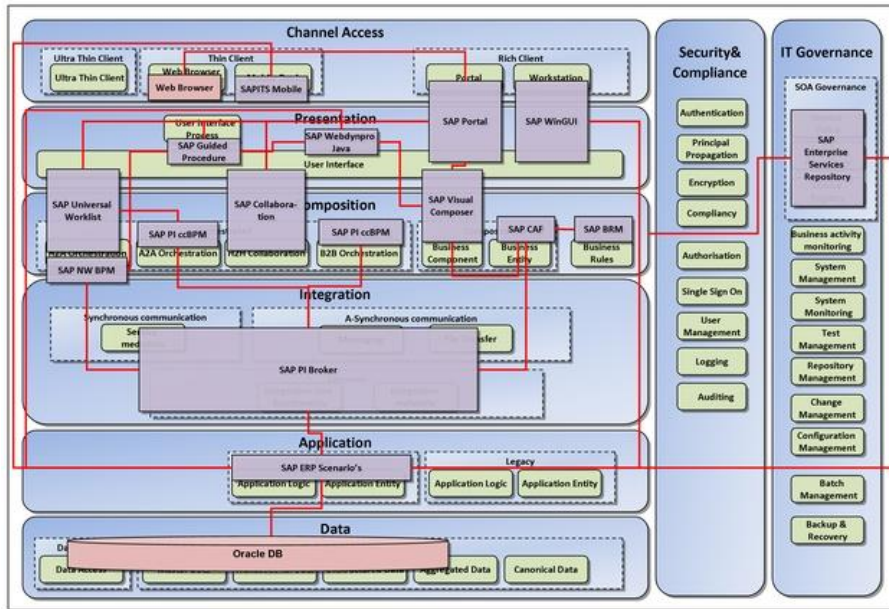
Entity Relationships
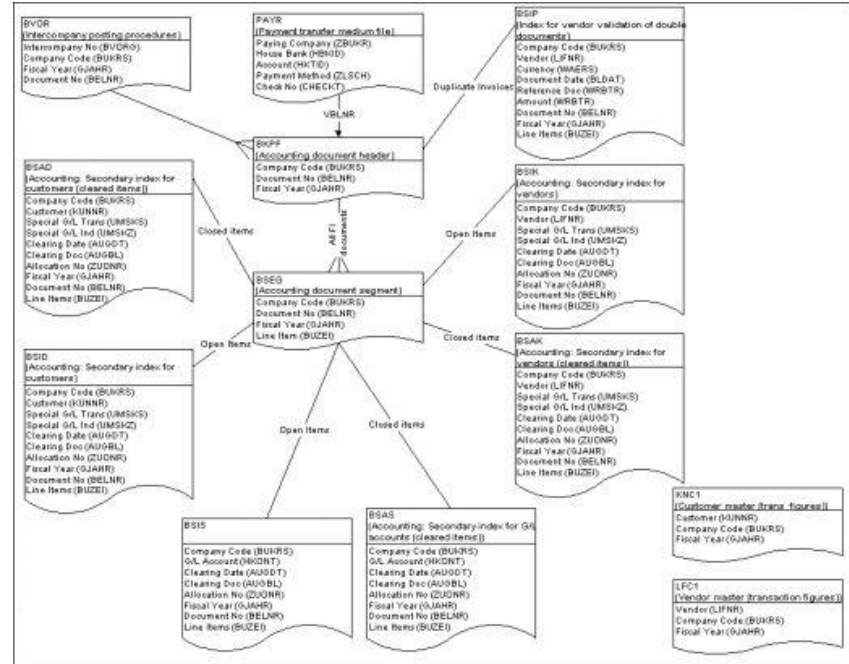
Excel / Visio

Shared Infrastructure and Applications
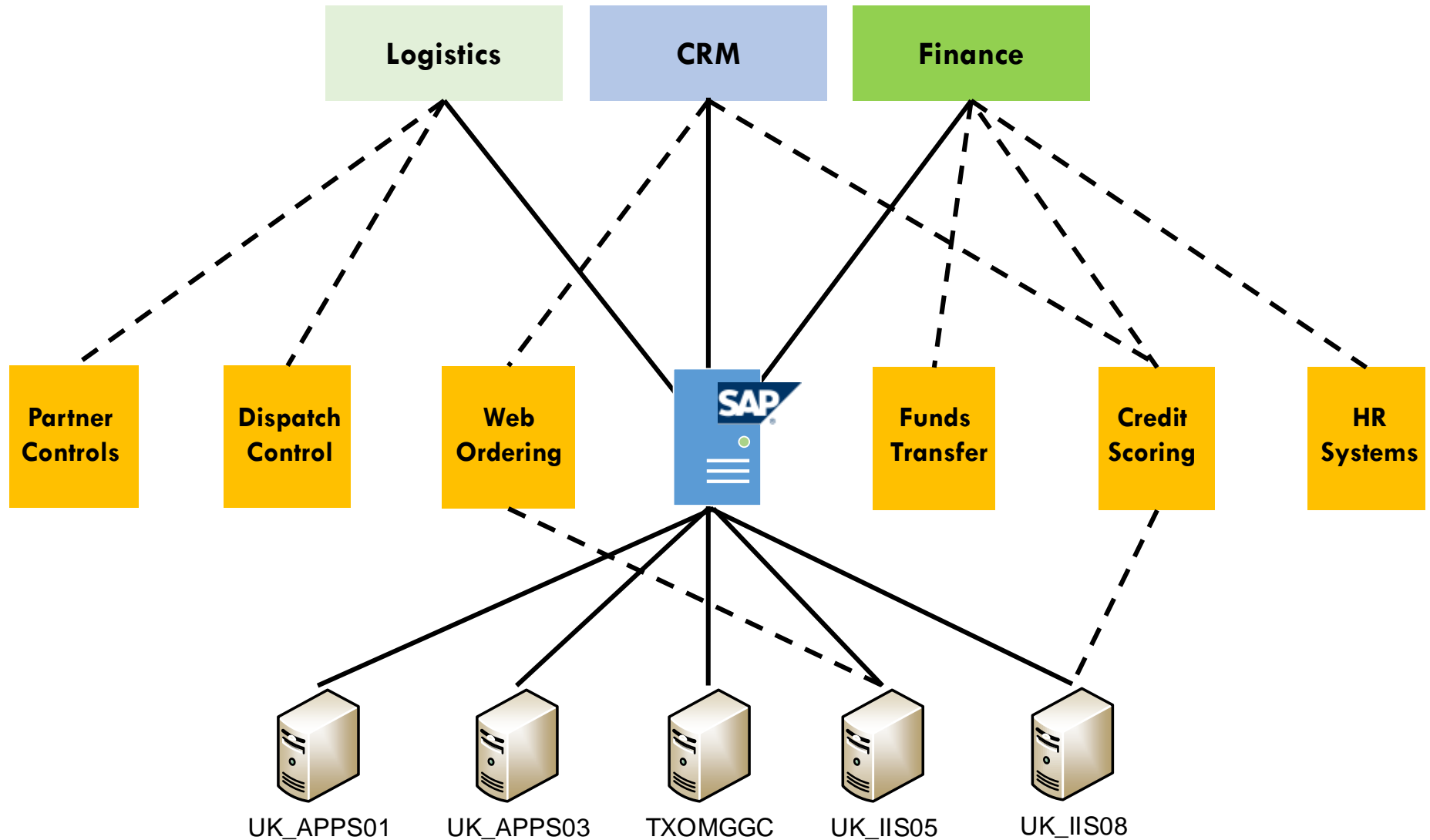
With 100 Servers plus

SAP
Servers
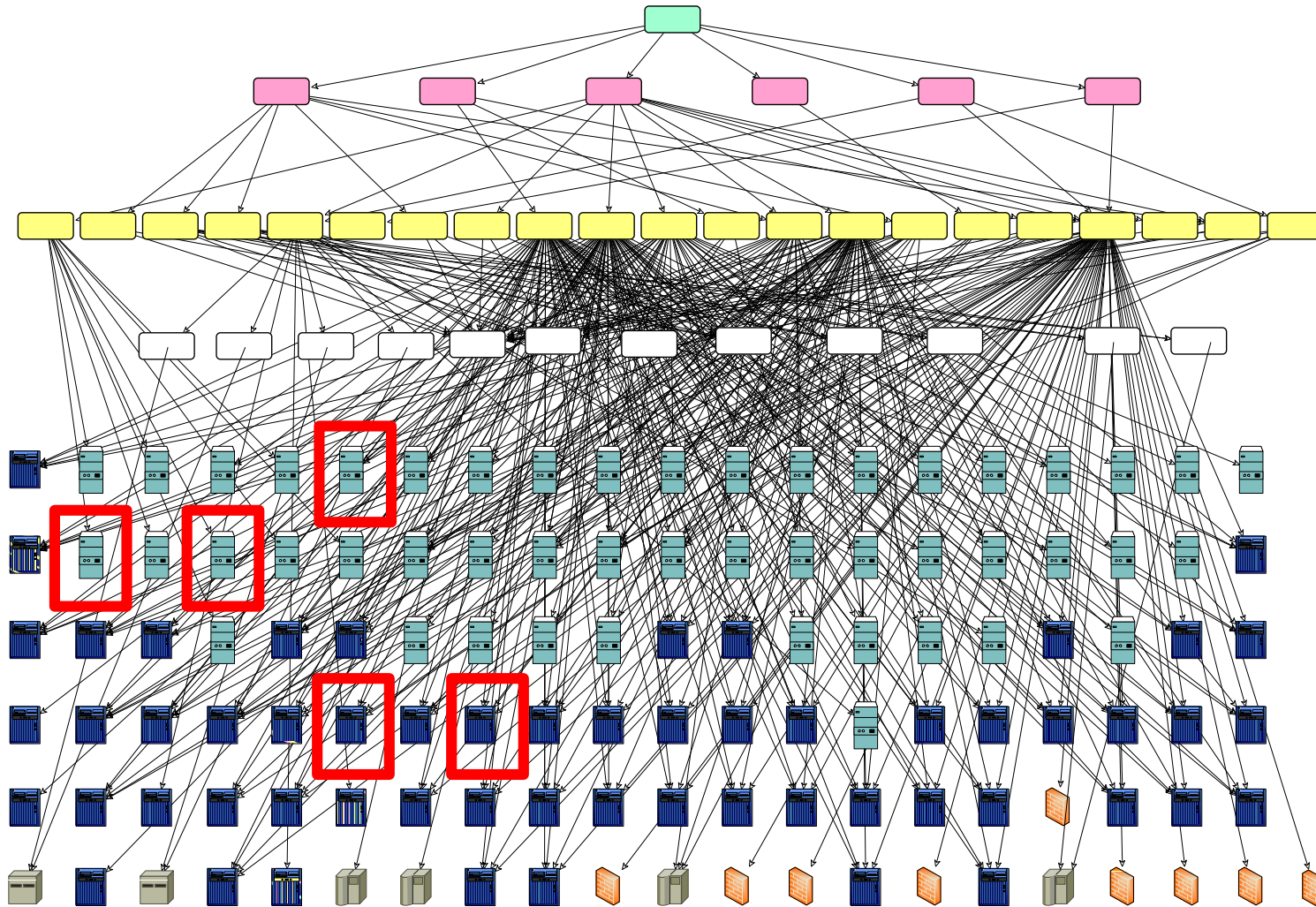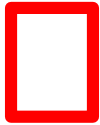
There Will Always Be Duplication!

Network Examples (only)

Layer 0, 1, 2, 3, 4, 5 views

(data, control plane, management)

Routing

Security and event management

Segregation and zoning

Network classification

Tenant models

Load balancing

Resilience and failover

Access control

Environments – data, video, VPN

Network Topology

Computer Room Layout

Rack Positions

Architecture Network Overview

Application Architectures

Cabling Backbone and Distribution

Virtual LANs/SAN/

Data Flows

Process Flows
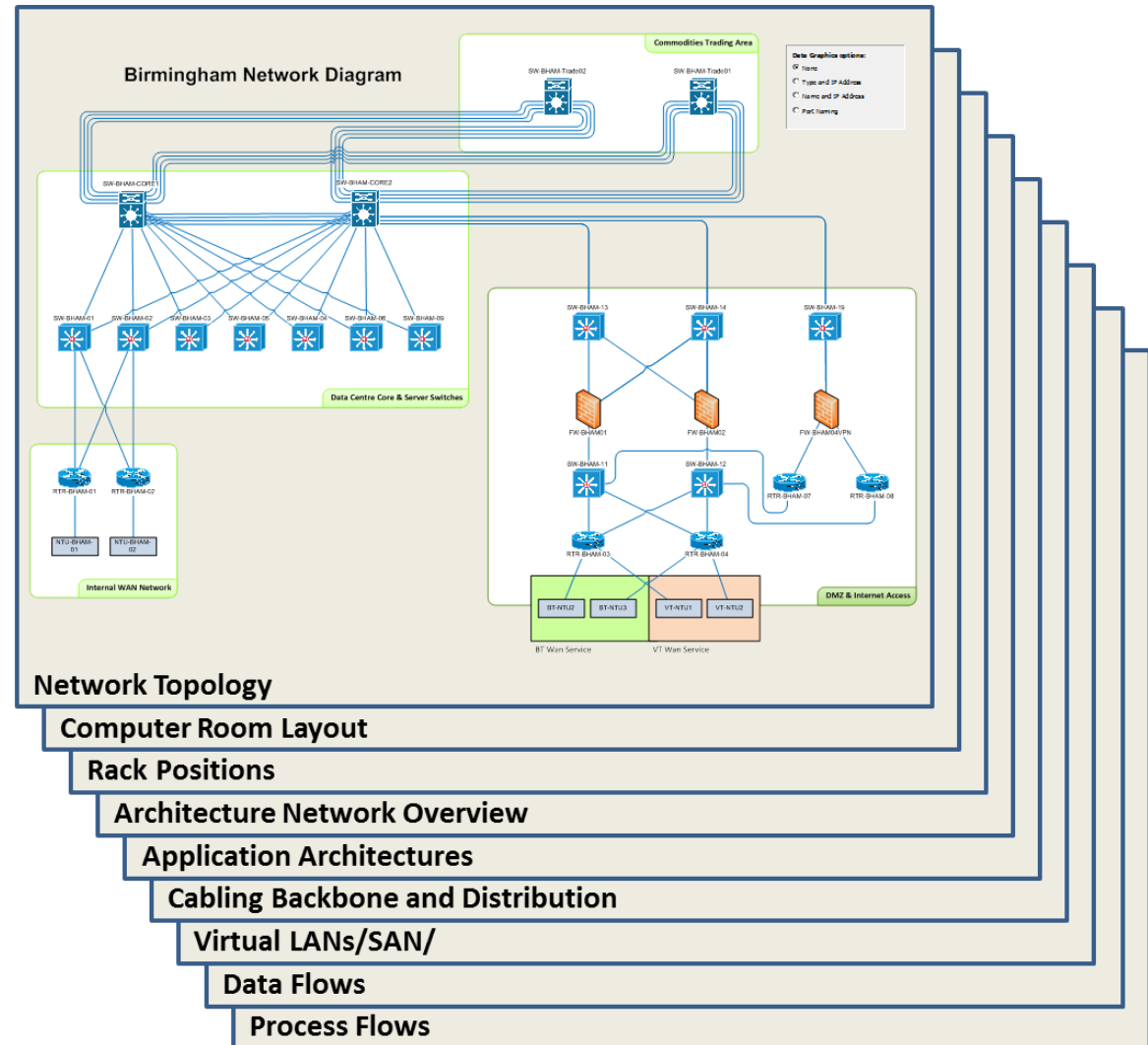
Tips and Techniques – 2 Presenting Data

Use Existing Toolsets More Effectively

Lists/Inventory

Diagrams

Examples

Excel

Visio

B

A

C

Database

Visio

B
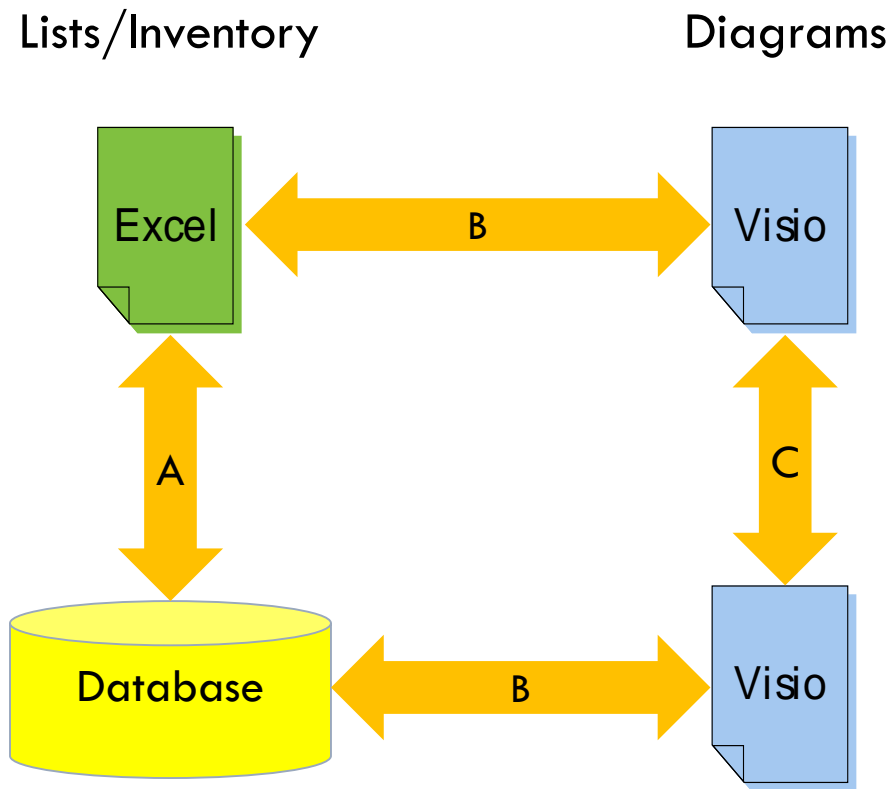
Inventory to rack layout

Inventory to network diagram

Rack list to floor plan

Power usage to floor plan

Application list to service map

Switch links to network diagram

Visio's Unknown Automation Features

- **Linking shapes to spreadsheets / databases**
  - Transfer of multi-device and attribute data without typing
  - Data can be refreshed to update diagram

- **Data Graphics**
  - Change the colour and text of any shape based on embedded data
  - Reduces the number of diagrams to maintain

- **And with our free AssetGen Visio utilities**
  - Create drill down diagrams between Visio files – data centres, networks, service maps
  - Resize racks on floor plans, draw and label floor tile grids
  - Hide / show ports on network diagrams
  - Update data graphics across multiple pages
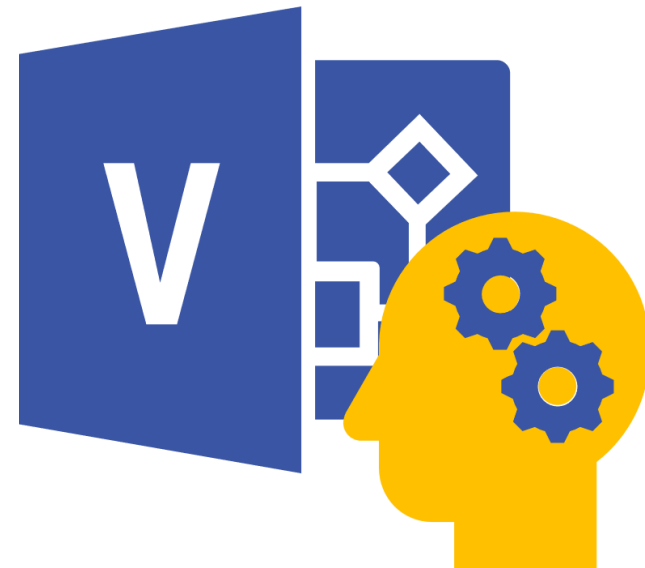
For Multi-Diagram Automation

Physical Changes
Location and position
Resource reservation for projects
Physical connectivity
Audits and manual data gathering
Impacts and dependencies
Adds, moves and changes

Updates →

AssetGen
Infrastructure
Management

Outputs →

Typical Outputs
Capacity management
– space, power, connectivity

Change impact analysis
– impact, risk, auditing

Excel → **Inventory extracts**
Custom reporting

Visio → **Physical plans**
Floor and rack diagrams

Visio → **Topology diagrams**
Networks, power, storage

Visio → **System & Architecture Maps**
ITIL services, applications

Trusted sources
Discovery systems
Monitoring tools
Service desk CMDB
Spreadsheets – risk, contracts
Recovery plans
Project handover

dB   Excel   Visio   Word

Updates →

← References

AssetGen Technology

**AssetGen
SysMap**

AssetGen Connect

SQL Server platform

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)

Tips and Techniques 3 - Work Flow Change

Plan **Build** **Operate** **Risk** **Dispose**

Project and task

Ease and speed of creation
Ease of distribution
Flexible to meet task needs
Limited training

Manage and Coordinate

Ease of use by many
Structured for integration & reporting
Support for multiple processes
Wide scope – the big picture!

Record planning decisions in the operational system
Produce project docs for/from the operational system

In Summary

- **You can start reducing documentation workload tomorrow by basic steps!**
    - Standardise naming, file locations, document locations
    - Use existing toolsets more productively – eg. Visio

- **Specialist toolsets can help – but there will never a "single pane of truth" – so be pragmatic.**
    - Look to combine any toolset with process and education changes
    - Combine project and operational systems where appropriate

- **Choose the benefits that are appropriate**
    - Reduce the cost and time of creating and maintaining documentation
    - Reduce costs, risks and workload needed to implement infrastructure changes
    - Demonstrate improved management controls and alignment with frameworks