



# How To Document Campus Infrastructure Offices, Hospitals, Universities, Airports, Etc. 29<sup>th</sup> November 2012

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[www.squaremilesystems.com](http://www.squaremilesystems.com)



# Some Background

Based in Cirencester, Glos, UK

Customers – worldwide.

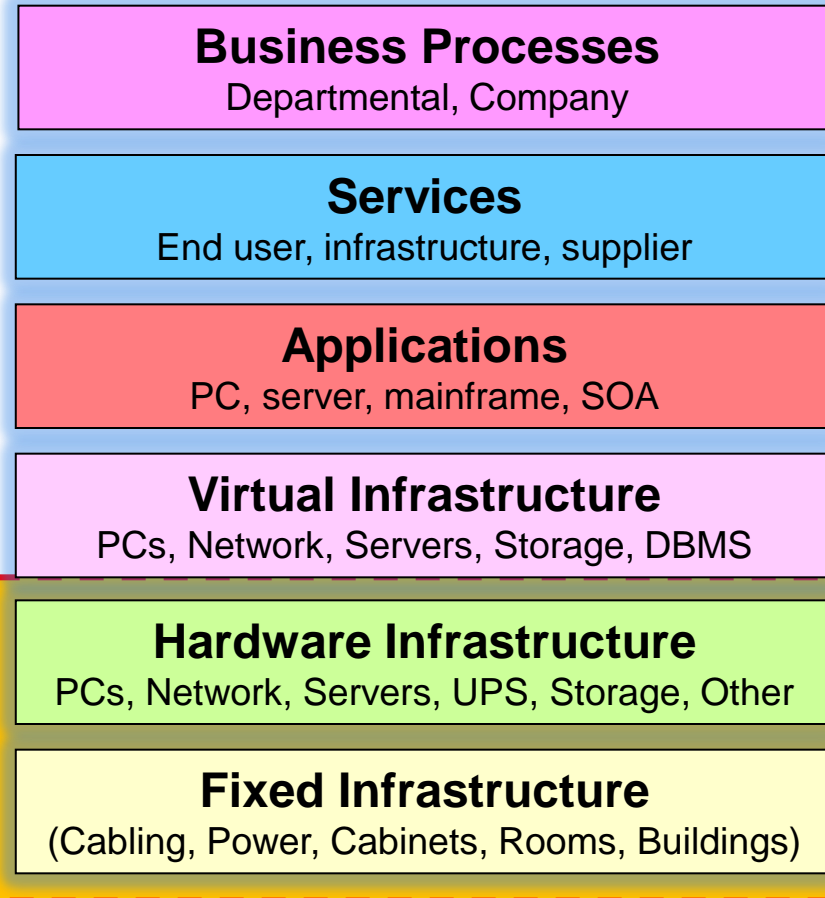
## Key Skill Areas

Documenting IT infrastructure  
Configuration management processes  
MS Visio automation

## Industry bodies & roles

- BCS-Config Mgmt Specialist Group
- BCS-ITIL Specialist Group – ex Chairman
- LinkedIn – Data Center Engineering
- LinkedIn – Data Center Operations Mgmt
- BICSI, ITSMF, Microsoft guest speaker

\*BCS – British Computer Society




**Presentation Scope**



# Infrastructure Management Maturity

1	2	3	4	5
<b>Reactive</b>	<b>Repeatable</b>	<b>Defined</b>	<b>Managed</b>	<b>Optimised</b>
Individual approach	Some process, often informal	Process documented and explained	Process checked and reviewed for gaps	Process open to external review and updated regularly



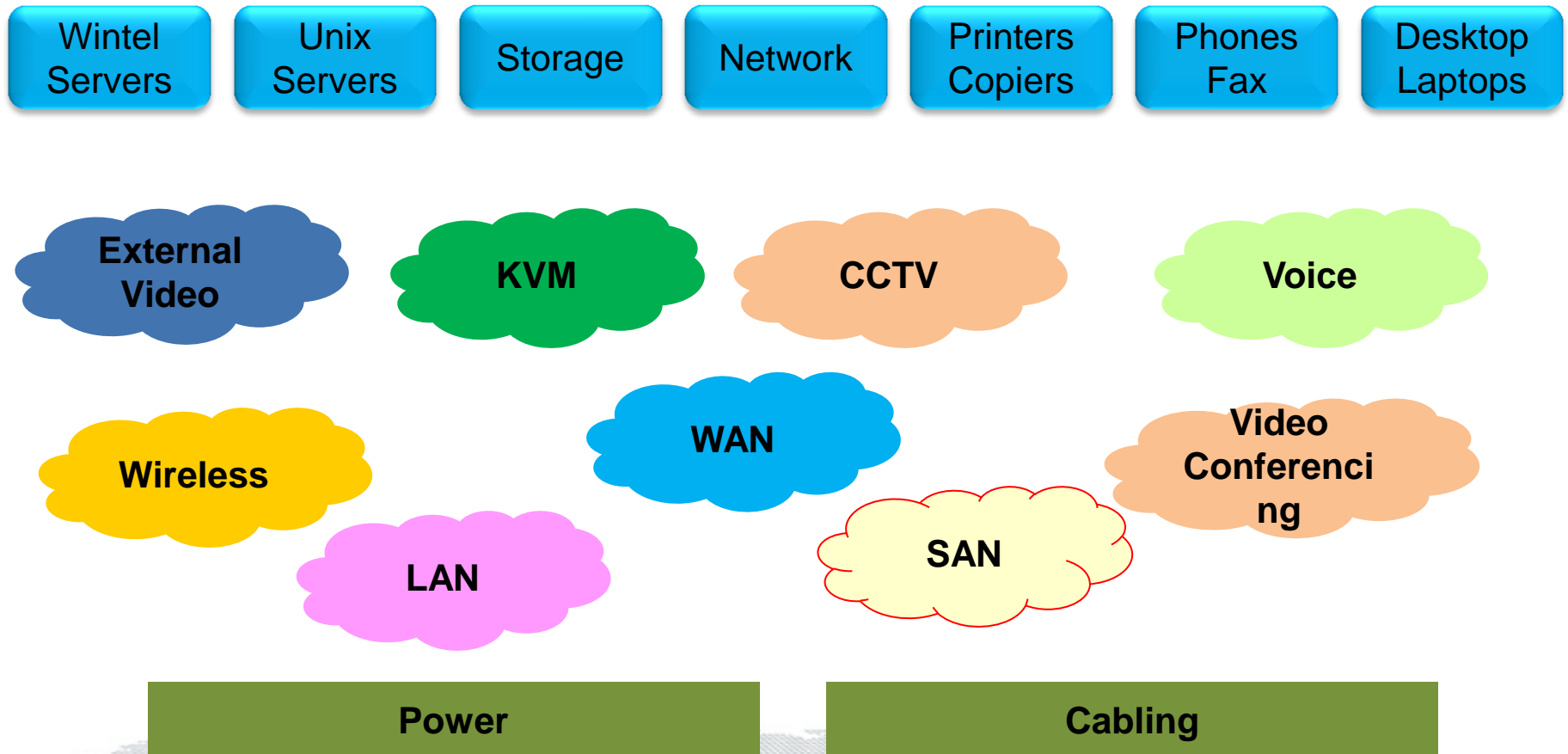
To move to the right we typically need to;

1. Embed infrastructure knowledge in team systems
2. Enable separation of roles – design, implement, operate, risk
3. Plan and allocate resource against demand
4. Feedback on metrics and changes – billing, compliance

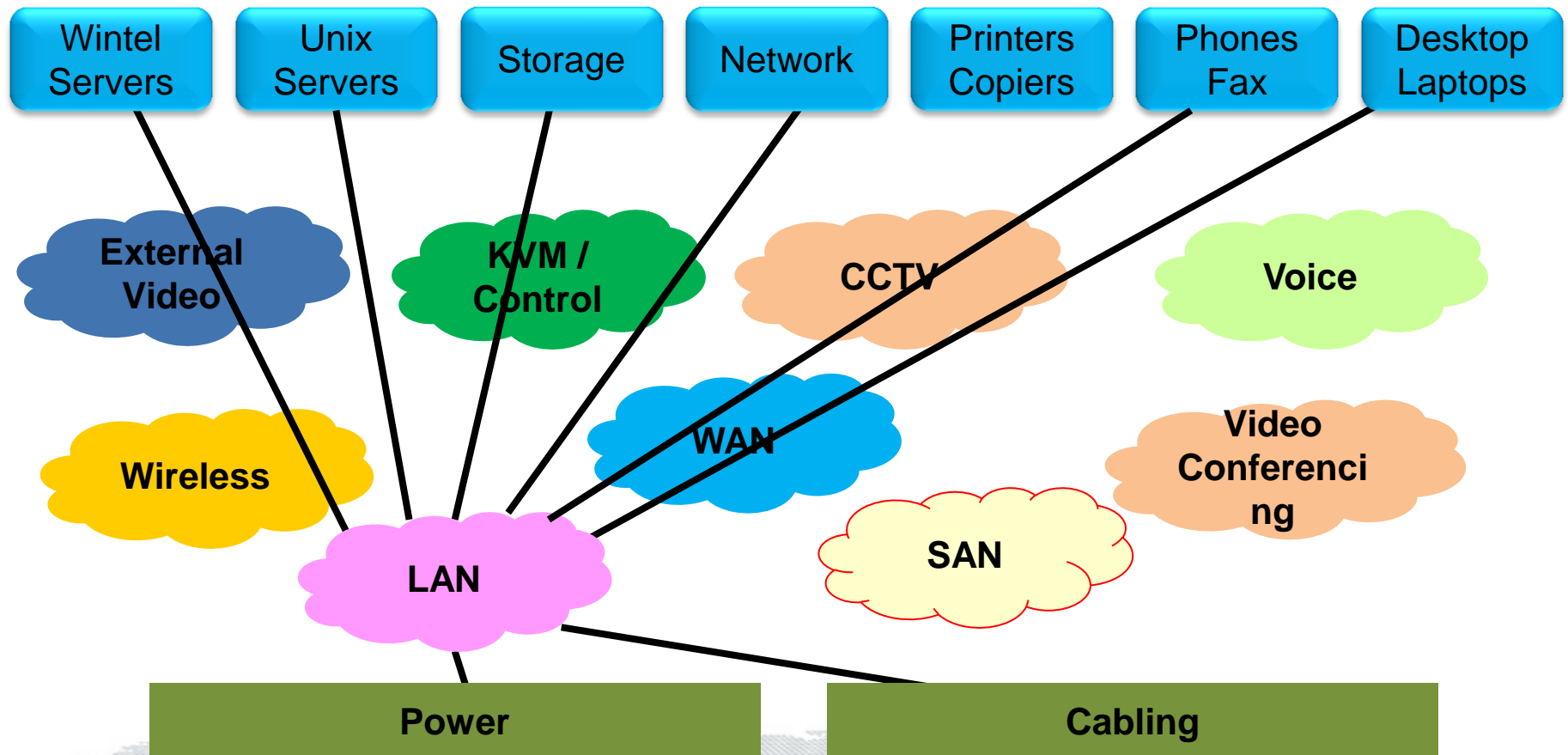
# The Current State For Many

1. Lots of existing documentation of varying accuracy, formats and purpose which isn't trusted, updated or generally known about
2. Project teams use individual MS office tools for communicating changes, whereas operations teams need multi-user systems
3. Task or projects often involve reverse-engineering, site surveys, workshops and audits **of the same infrastructure**
4. Location, business and system dependencies in peoples heads
5. IT teams are targeted to deliver projects faster and minimise disruption, not to maintain systems documentation
6. There is no identified budget for improving process or management techniques for the infrastructure
7. Multiple, repeated audits to get management data on infrastructure capacity and usage
8. Lack of standards – naming, data maintained, Visio shapes, etc

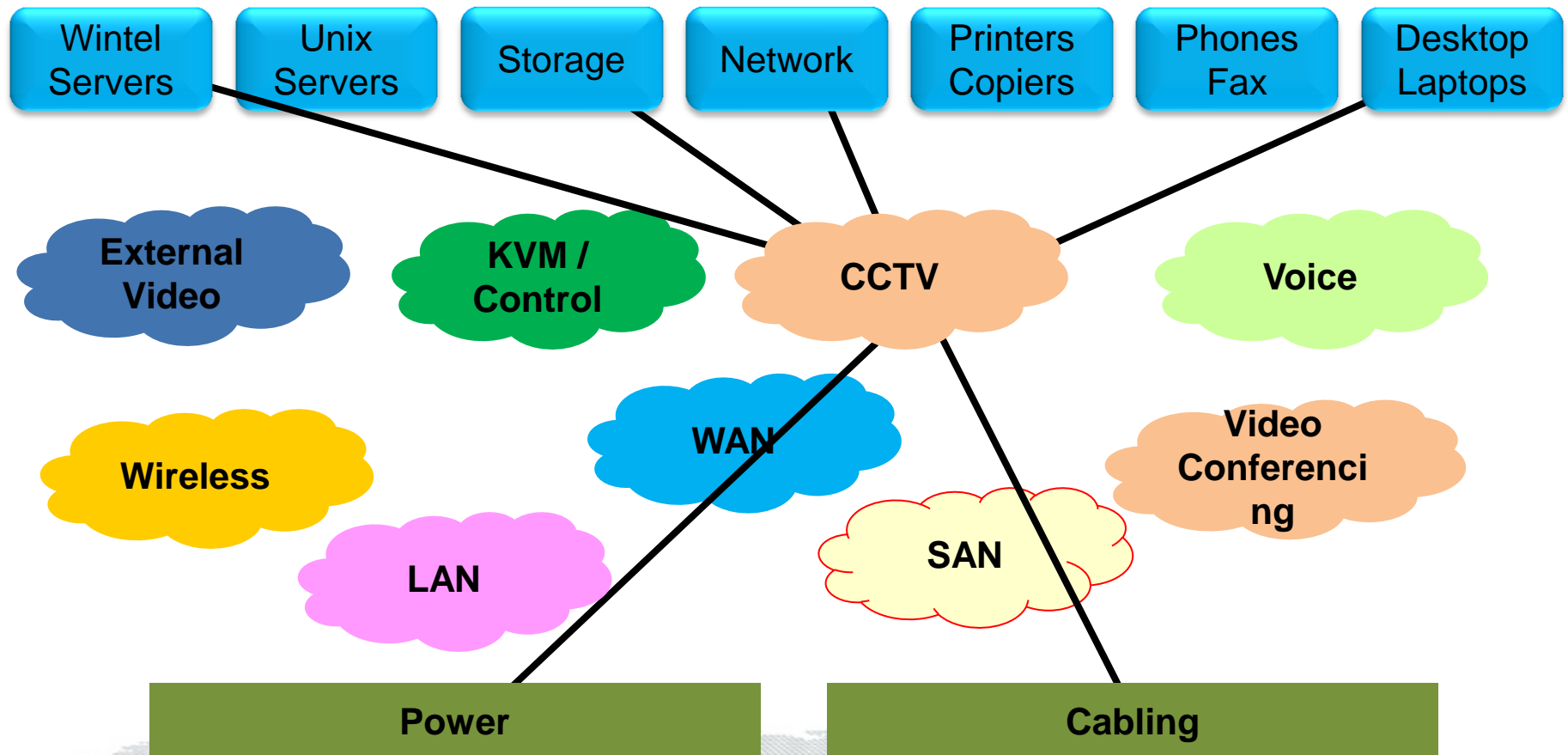
# Overlays of Technologies (1)



# Overlays of Technologies (2)



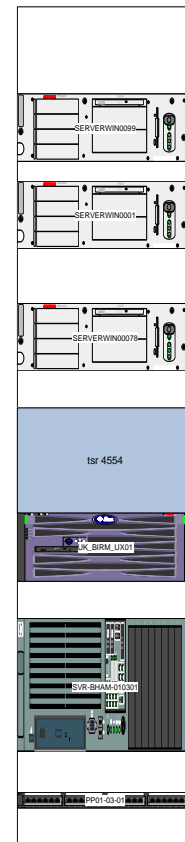
# Overlays of Technologies (3)



# Document Overload!

## After a project change, what should be updated?

1. Update asset/inventory list
2. Update rack diagrams
3. Update network diagrams/patching records
4. Update switch port usage and capacity
5. Update floor plan rack capacity
6. Update power usage spread sheet(s)
7. Update storage / backup system documentation
8. Update systems architecture documentation
9. Update DR lists and documents
10. Update maintenance records
11. Update billing and charging data
12. Update project documentation with the “as built” details

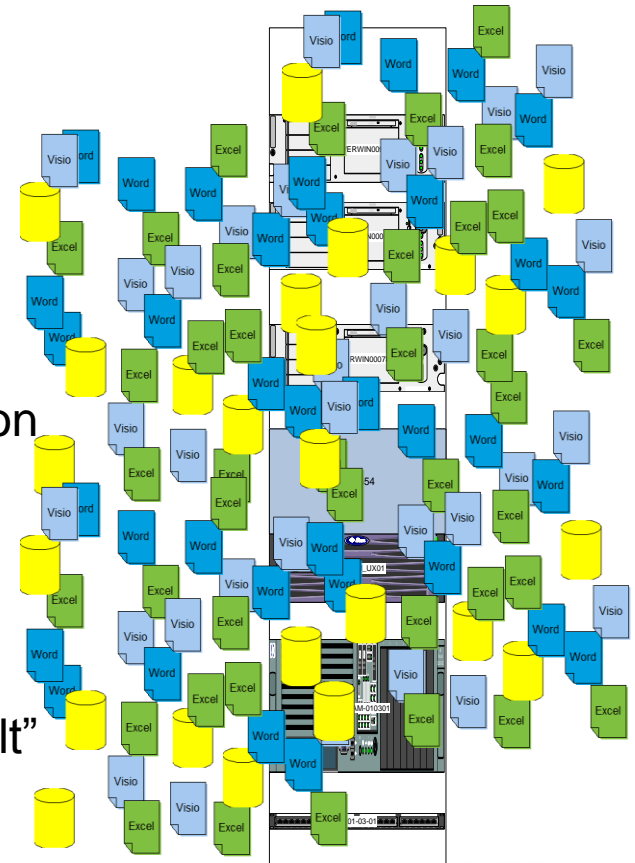




# Document Overkill!

## After a project change, what should be updated?

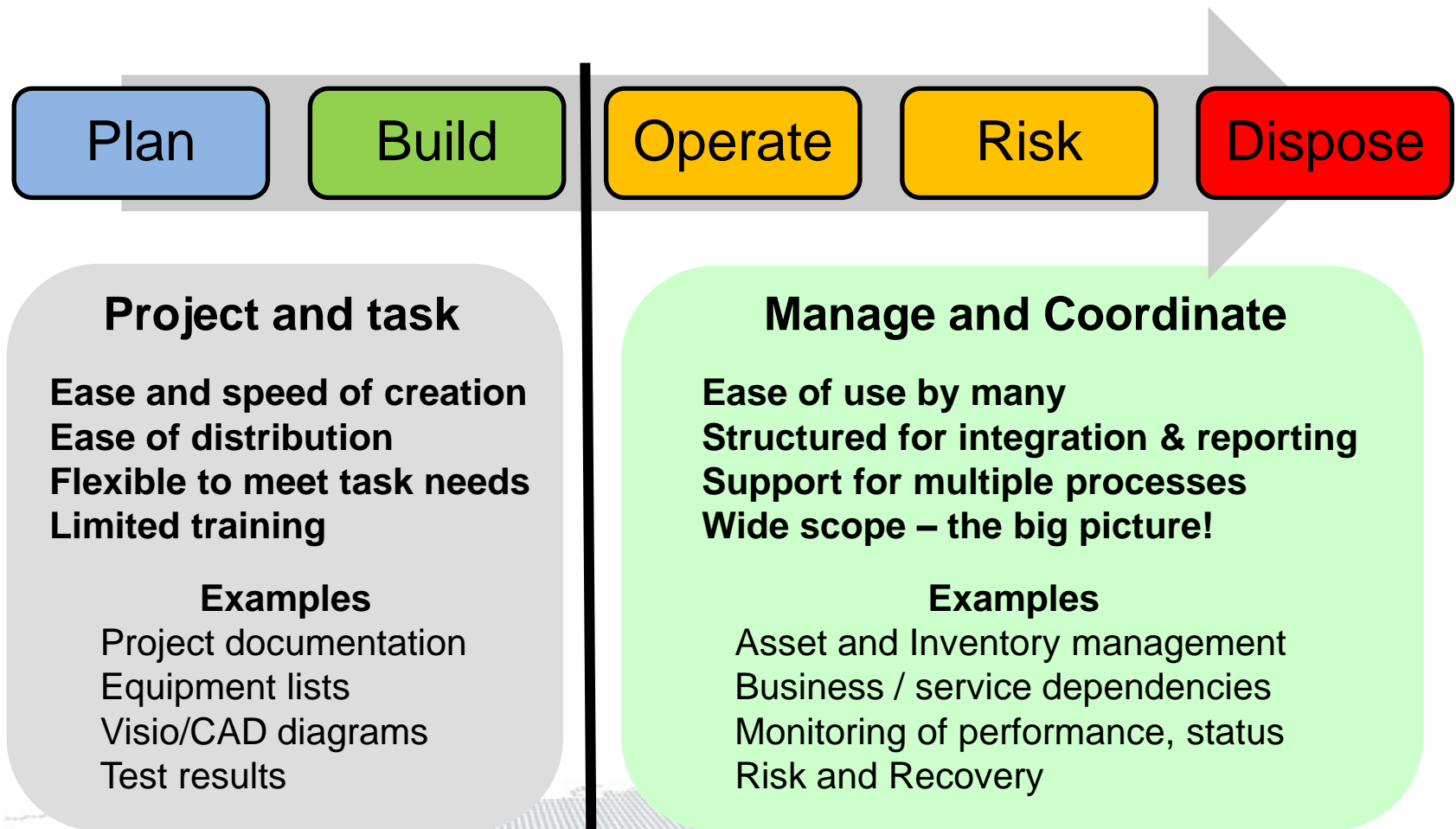
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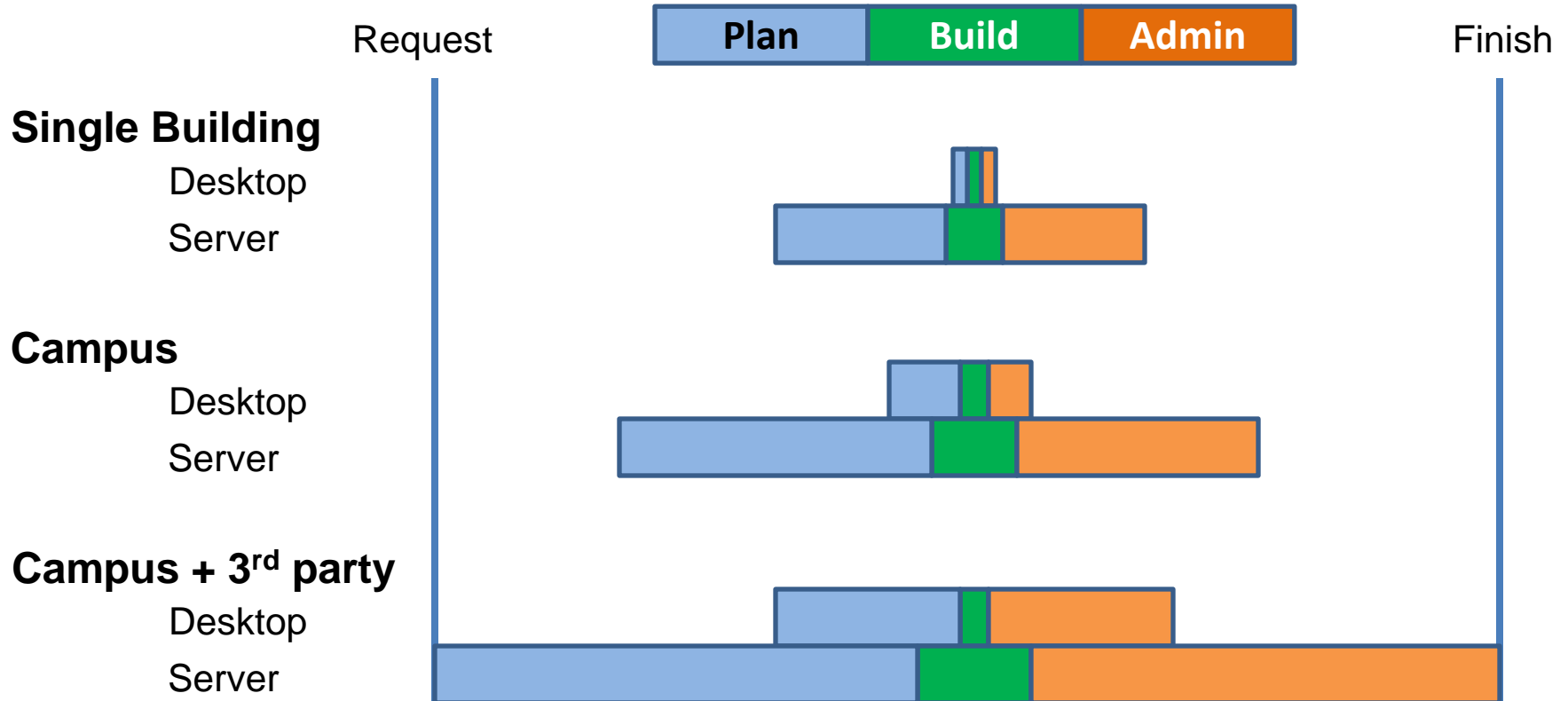
**Who, what, where, how, when?**



# Infrastructure Knowledge



# Task Resourcing



Why does it take longer?

# Change Tasks

## Plan

- Surveys, meeting
- Project docs
- Scheduling
- Ordering
- Access
- Change forms
- Costing

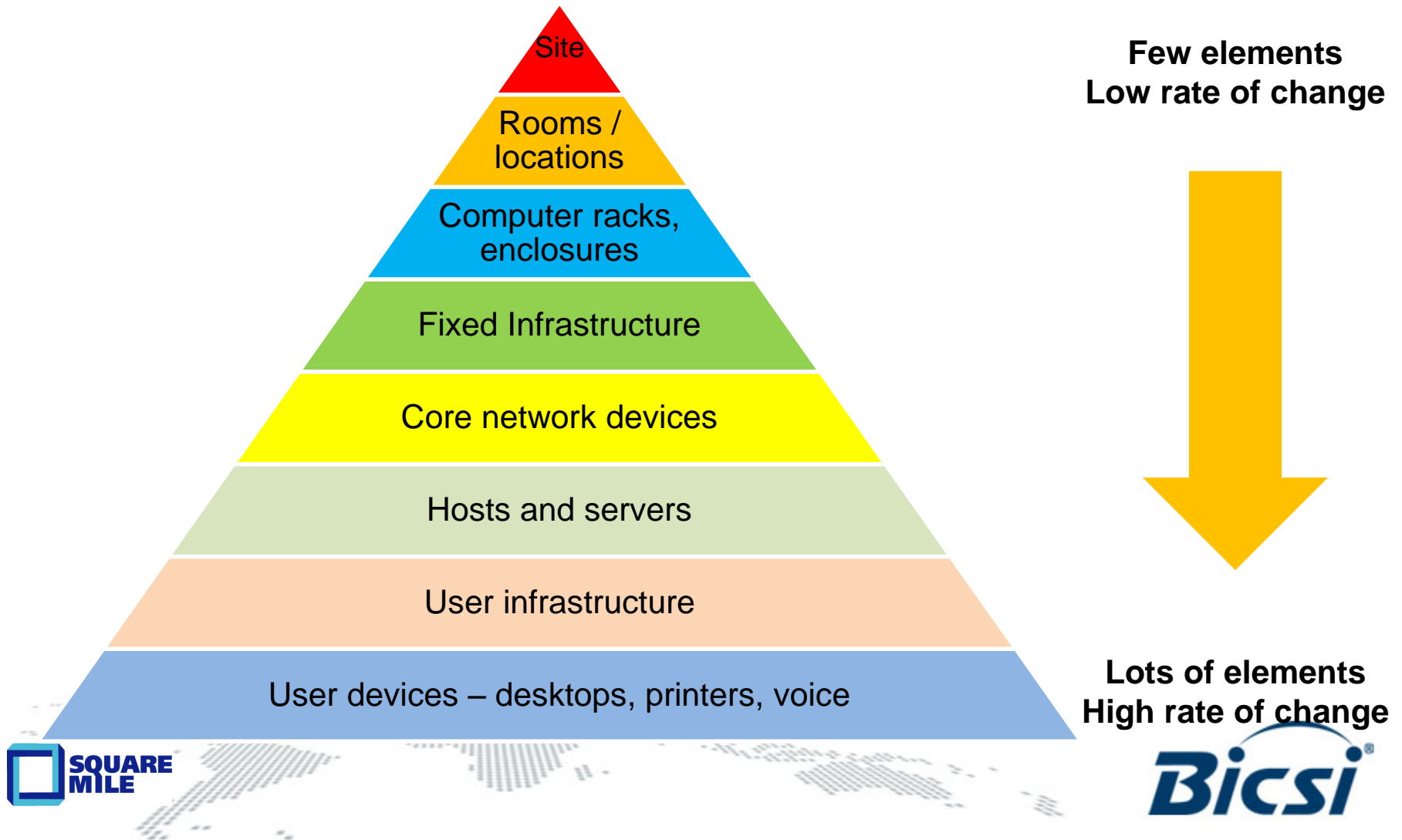
## Build

- Travel
- Unpack
- Install
- Configure
- Label
- Test
- Dispose

## Admin

- Project docs
- Operations docs
- Billing / time sheets
- Project reports
- Service reports
- Payments

# Document - Start With Quick Wins



# Prepare - Reduce The Workload

1. Establish policies, standards and clarify ownership  
Make it easy for engineers
2. Have project / operations use common terms & formats  
Supply templates, naming system, labels, etc.
3. Reduce the numbers of documents / files to maintain  
Consolidate into centralised systems and make easy to find  
Link or create Visio diagrams, reports, excel from databases
4. Update operational systems as part of planning processes

# Prepare – Define the Scope and Priority

- Technical space(s) rooms, racks, ERs, TRs, user areas
- Inventory – bigger than “assets”
- Backbone and horizontal cabling, power, voice, etc.
- Pathways, cable routes, capacity
- Attributes / data on inventory elements
- Relationships – location, chassis, links, end to end
- Diagrams – Formats, symbols and shapes
- Change processes and maintenance

# Prepare – Define Standards/Formats

- Assess existing conventions and formats to minimise variations
- Align with appropriate external standards / guidelines
  - Data centers TIA942, ANSI/BICSI-002
  - Cabling administration TIA606-B, EN50174-1, ISO14763-2
  - Manufacturers Cisco, HP, IBM, installers

## Examples

Rack U position starts from bottom	TIA942
Rack tile - identifier front right corner	AH06
Rack name - tile or row/number	AH06 or B06



# Prepare - TIA606-B Administration

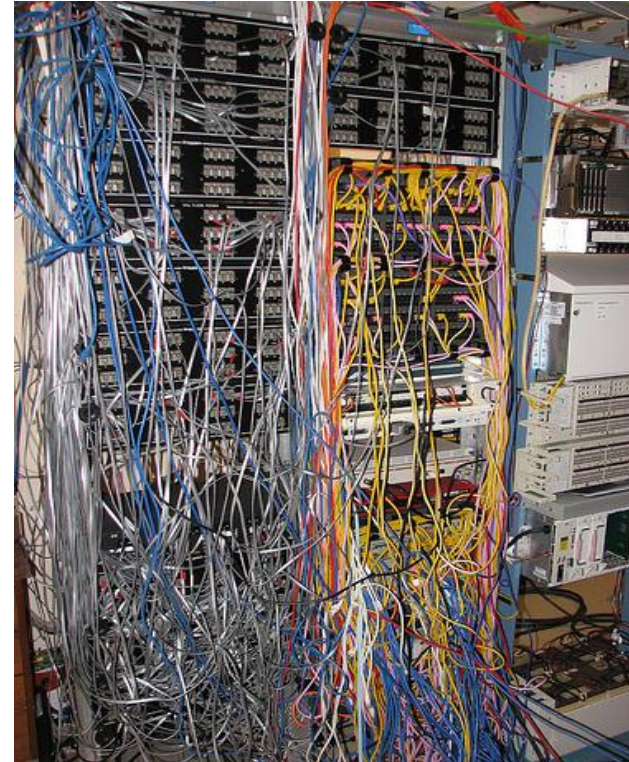
- Classes of administration
  - Class 1 single ER (equipment room)
  - Class 2 single ER with multiple TR (telecom rooms)
  - Class 3 campus Multiple ERs, TR
  - Class 4 multi-site, multiple campus
- Identifier formats for interchange of information
- Labeling formats
  - Example cable label within 300mm (12in) from end of cable
  - All letters uppercase, machine created without serifs
- Definitions of terms
- Patch panel identifier

# Prepare - Example Identifiers

- Space - LON-F1-1A                      London - Floor 1- Room 1A
- Cabinet identifier
  - XY Coord - 1A.AH06                      (front right corner tile reference)
  - Row/rack -1A.A6                              Row A, Rack 06
  - Rack number                                  R07
- Always preface with an alpha and add leading zero (excel sorting issue). A01 – good    A1 - bad
- Label rack top/bottom/ front/rear
  - Full (LON-F1-1A-A06) , short (1A-A06), simple (A06)

# Prepare - Patch Panels

- Patch panel naming – choose one system!
  - 1A-AH06-A (a panel)
  - 1A-AH06-30 (u position)
  - 1A-AH06-F30 (front u position or nsew, abcd)
- Ports
  - 1A-AH06-A-001 (put in leading edge 00s)
  - 1A-AH06-F30:015 or 1A-AH06-F30:010-020
- Backbone panels
  - 1A-AH06-30:001-010 / 2C-AH06-30:001-010
  - 2C-AH06-30:001-010 / 1A-AH06-30:001-010
- Outlets
  - EO / TO / CP / SP



# Prepare - Patch Cable Labeling

1. No label
2. Local port 23
3. Local port to port SW1:23 to PPA06:12
4. Remote port to port SW1:23 to ServerB:Eth0
5. Path/work order ref WO33432
6. Unique cable label C000232 A201201/322

All have their benefits though we recommend 6.

easy to create/print  
easy to read

doesn't change with device name  
good reference for work instructions

# Prepare – Exception Handling

What about active equipment?

Use logical name as reference, or equipment type and location id

SW-BHAM-01 or Cisco 3750 LON-F1-A1-AH06-U23

What about passive hardware?

Cable management, blanking plates, trays – use location ID

CM LON-F1-A1-AH06-U2

What about cards, plug in modules, blade systems, etc

Parent device and then slot/card number

SW-BHAM-01.Slot05

# Preparation Summary

- For physical infrastructure develop a convention like TIA606B and ISO14763-2 recommends.
- Have a short name for convenience, as the unique administration identifier may be unwieldy.
- For active components it is often best to use the logical name
  - makes it easier to understand
  - easy to import data from other sources
  - other identifiers such as asset tag numbers will result in a lot of work cross referencing if not careful.

# Capture - Audit Process

## Planning

- Scope, depth, schedule of visits
- Develop data capture tools

## Prototype

- Check the process works on a trial building
- Refine data capture tools and process

## Bulk Capture

- Data capture using workbooks / teams
- Upload as soon as possible in case of data or process errors

## Reconciliation

- Check for gaps and inaccuracies across teams and cultures
- Combine with other data source

## Presentation

- Project and site reports
- Produce diagrams, sharepoint portals

# Capture - Inventory

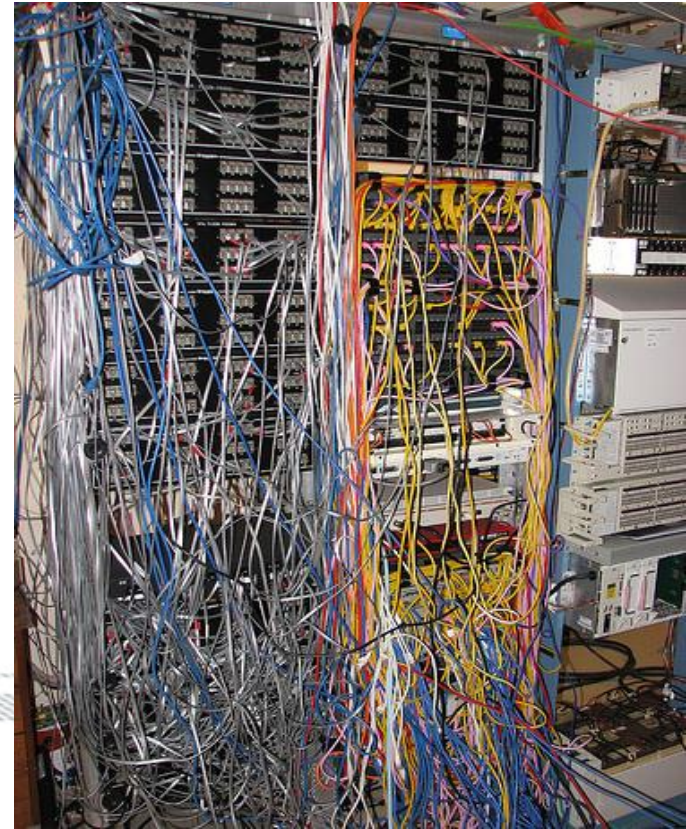
- Defined scope – infrastructure, desktops, printers
- Naming – use existing naming or new?
- Labelling/tagging – required – if so how do you create?
- Categorising equipment
- Exception handling
  - Equipment on top of rack?
  - Still in boxes
  - Surplus bits – disks, panels, cables
  - No name, partial name, wrong name, multiple names





# Capture - Connectivity

- Defined scope – network, voice, power, video?
- Must have completed fixed infrastructure and inventory!
- Labelling/tagging – required? How do you create?
- Exception handling
  - Can't find ends
  - Damaged
  - One end connected – the other not!
  - Multi-cable joins
  - And so on



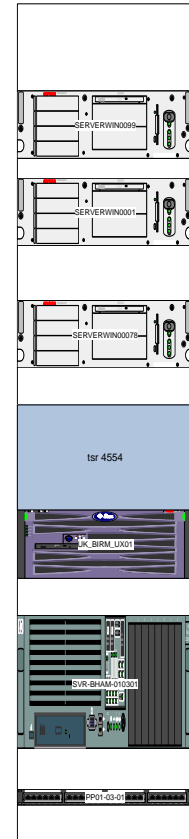
# Capture - Reconciliation

- It is likely that the quality of data capture will vary
  - Expertise increases with each audit
  - Rescheduling and coping with local site/user/team issues
  - Local decision making and exception handling
  - Descriptions will be based on what is seen
  - Comparing inputs before upload often highlights differences
- Other data sources may overcome missing audit data as well as add in additional device data.
  - Choose what is best for ongoing use, not stick with previous format

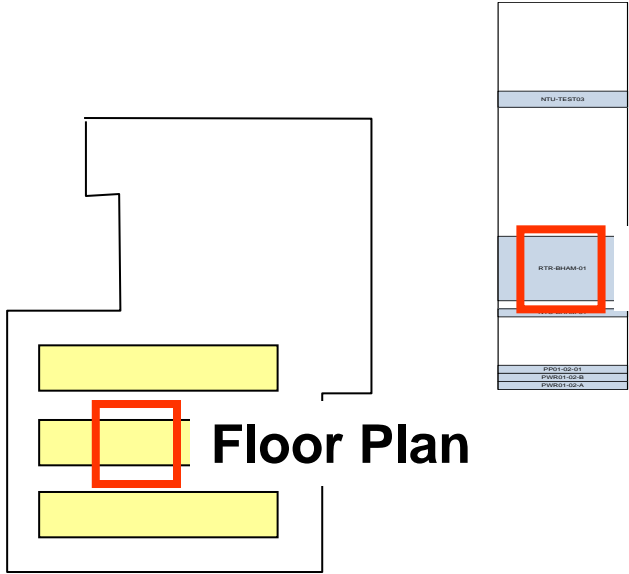
# Presentation - Desired Outputs?

**Are we just recreating the same problem we started with?**

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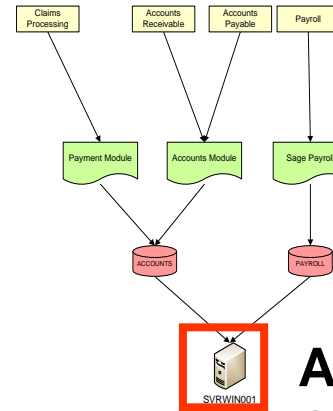


# Support Different Needs

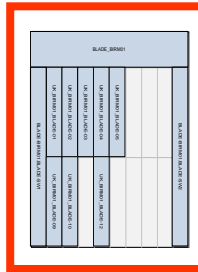


Floor Plan

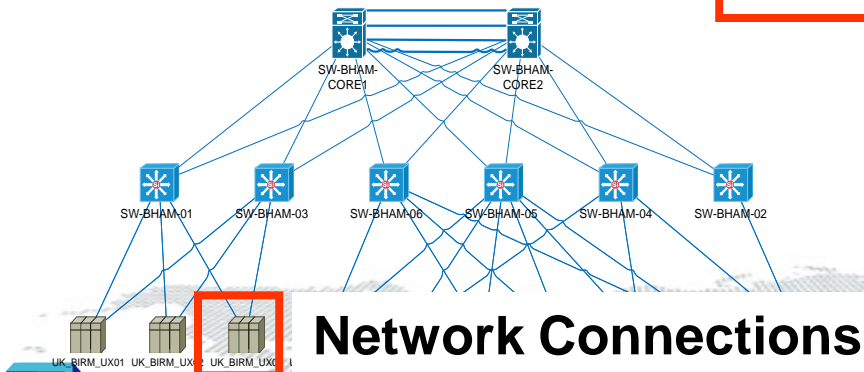
Rack Position



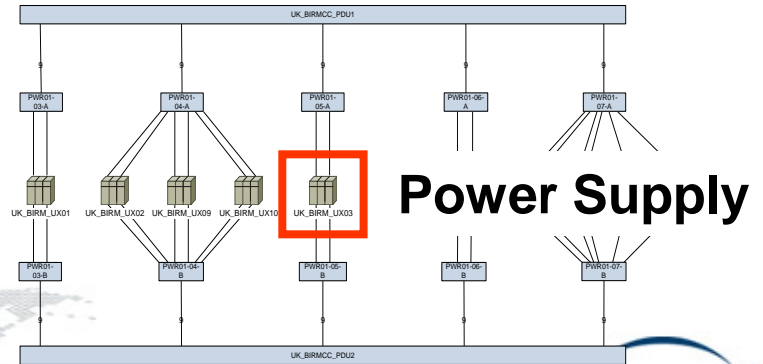
Application/  
Service impact



H/W Build



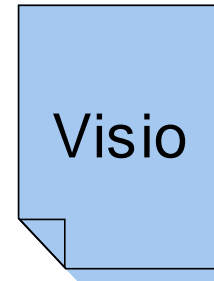
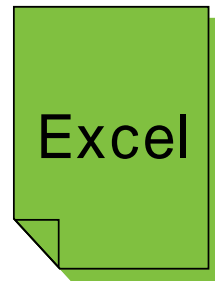
Network Connections



Power Supply



# Reduce The Workload!



Floor box list

Cabinet list

Patch panel list

Inventory

Inventory

Inventory

Floor plan

Equipment room floor plan

Backbone cabling diagram

Network diagram

Rack diagram

Server connectivity diagram

# Capture – Our Data Capture Approach

1. Document / survey buildings and spaces and put into an infrastructure database.
2. Capture racks and enclosures using paper and then into a spreadsheet format.  
Enables production of Visio floor plans and supports audit packs
3. Capture inventory into an upload spreadsheet.  
Creates rack diagrams, floor box layouts, architecture maps
4. Capture connectivity into an upload spreadsheet.  
Create network, path and other topology diagrams

# Capture – Difference In Approach

- Data capture focusses on delivering 3 files



Rack



Device



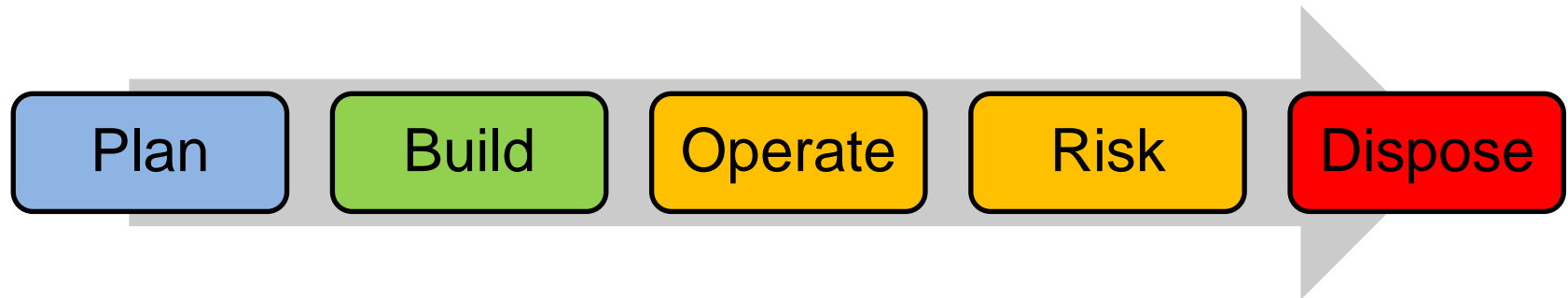
Cable

- Visualisation is either created automatically, or by combining data with existing backdrops - floor plans
- No need to check across multiple documents for consistency and format

A faster, less complex and less costly audit, which doesn't require high skill levels within the audit team

And delivers an operational system that can be maintained easily!

# Maintain - Infrastructure Knowledge



## 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**



# Maintain – Keeping Data Up to Date

- Project teams can assess current state and capacity without the need to survey for every request.
- Design teams can allocate and manage existing infrastructure resource capacity.
- Projects go faster, less change conflicts, reduced cost of meeting infrastructure change requests.
- Operations teams do not have to maintain detailed data, they feed off project updates.
  - Overnight updates of inventory / diagrams
  - Ad hoc query / checking to help resolve service problems
- Management and capacity data is always available
  - Space, connectivity, power, changes, audit trails

# Summary

- Campus infrastructure is physically dispersed, supports multiple services and scale / complexity limits MS office tools suitability.
- Reducing multiple spreadsheets into a database helps, even more so when that same system creates a variety of Visio outputs automatically.
- A systems approach to documentation directly reduces change costs and project delivery times – with the starting point being a baseline!

# Additional Material

[www.squaremilesystems.com](http://www.squaremilesystems.com)



Training/workshops

Technical / management aspects of data centers

Webinars

Visio automation, documenting cabling, etc.

Videos

Free SMS Visio utilities

[www.assetgen.com](http://www.assetgen.com)



Evaluation software

Free "DCIM" evaluation version

Webinars

Data center practices, Visio integration

Videos

Visio automation, change impact analysis

