KnowledgeCentrix – Your Instant I.T. Department

The Poor Man's DCIM

By Darrell Gardner

KnowledgeCentrix™

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- Vice President, Data Center Services for KnowledgeCentrix

- Have helped plan and migrate thousands of servers and applications using the poor man's DCIM

- Managed and operate a Co-Lo hosting facility

AGENDA

- Definition

- Data Center Health

- How does Health pertain to DCIM?

- Formulating your information to track

- Effort is High and drops as change management is part of controls and updates.

- Examples

WHAT IS THIS ABOUT?

Data center infrastructure management (**DCIM**) is the integration of information technology (IT) and facility management disciplines to centralize monitoring, management and intelligent capacity planning of a data center's critical systems. Achieved through the implementation of specialized software, hardware and sensors, DCIM will enable a common, real-time monitoring and management platform for all interdependent systems across IT and facility infrastructures. The evolution of DCIM has led to the creation of DCPM - Data Center Predictive Modeling which is proving to be a more cost effective and accurate solution for many designed data centers.

The efficiencies of having this type of integrated management have led technology providers like Hewlett-Packard, Dell and IBM to build out and complement their product-centric infrastructure and management offerings with Converged Infrastructure environments that converge servers, storage, networking, security, management and facilities. This type of environment allows enterprises to use fewer resources to manage the operations of these independent components.

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WHAT IS DCIM?

Management of your infrastructure via the following:

- Tools
  - Monitoring / Alerting
  - Capacity Management
- Process Management (Methodology)
  - Change
  - Release
  - $N_{ew}E_{nvironment}R_{equest}$

WHAT CONCERNS HAVE YOU PACING THE FLOOR?

- How much room do you have to expand?
- What type of power problem do you have?
- Are you running out of floor space? Power? Cooling?
- How heavy is your change rate?
- Do you know when circuits are near overload?
- Are you concerned about power failures?
- Is your data cabling a maze of confusion?
- Do you know what all those old servers are doing?
- Are you ready for next generation technology?

WHAT IS YOUR CURRENT STATE?

DCIM directly impacts the state of your Data Center

Healthy

Functional

Dire Straits

WHAT IS A HEALTHY DATA CENTER?

- Perfect health is rare

- Enjoys a **strong** alliance between IT and Facilities

- Health is short-lived (unless properly managed & maintained).

ELEMENTS OF GOOD HEALTH

- Comprehensive monitoring
- Structured Cabling
- Power, capacity & reliability
- Cooling where you need it
- Telecomm, bandwidth & reliability
- **Maintenance & Operations**
- **Change Management policies**
- **Facility Tier Levels Cross Checked to Application Tier Levels**

ELEMENTS OF GOOD HEALTH

- As-built Facility Drawings
- **Device Inventory**
- Efficient space plan
- **Space & capacity for growth**
- Fire/Life-Safety
- Green IT strategies
- Energy Efficient Facility

SYMPTOMS OF POOR HEALTH

- Incomplete Monitoring
- Unstructured Cabling
- Power maxed out or not reliable
- Hot spots or not enough cooling
- Many single point failure items
- Service requires shutdown
- Telecomm inadequate
- Poor Maintenance
- Operations lacking Capabilities
- **Unmanaged change**

- Drawings out-of-date or missing
- **Equipment Inventory out-of-date**
- Space plan not efficient
- **Growth constraints**
- Inadequate fire protection
- Water leak risk
- High risk of false EPO shutdown
- IT approach not updated to be Green
- Facility not updated to be Green

CHANGE MANAGEMENT

- Deteriorating health of data centers occurs over time, not initially.

- Naming Conventions – think how your reports will look and sort.

CHANGE MANAGEMENT

- I T Service Management
  - Guidance and best practices
- Change Control
  - Actual controls and processes put in place
- Change Control is a subset of Change Management.

Change Control
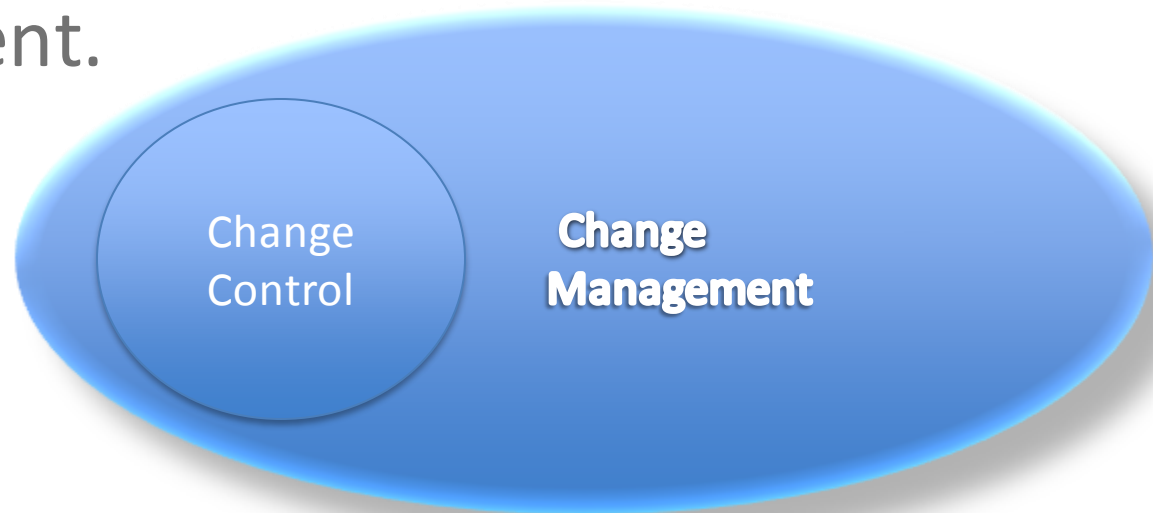
Change Management

CHANGE MANAGEMENT

- Documented, detailed processes
- Follow-through diligence
- IT equipment changes
  - Power, circuiting, cooling needs, drawing & schedule updates
  - Release Management (application releases)
- Facility changes
  - Maintenance
- Personnel changes
 - Training and documentation update

I T SERVICE MANAGEMENT

- Develop your own (if it doesn't exist).
  - What is the goal?
    - The objective of Change Management in this context is to ensure that standardized methods and procedures are used for efficient and prompt handling of all changes to controlled IT infrastructure, in order to minimize the number and impact of any related [incidents](#) upon service
  - Use Common Sense in implementing change as it applies to the Goal

CHANGE CONTROL

- Change Control – Procedures used to insure that changes are introduced in a controlled, coordinated manner

- What it is NOT

  - Good intentions without change control = OUTAGE. Disruption of Service!!!!

WHERE DOES DCIM IMPACT THE IT ORGANIZATION?

DCIM

- Change Management
- Release Management
- Service Management
- Facility Management
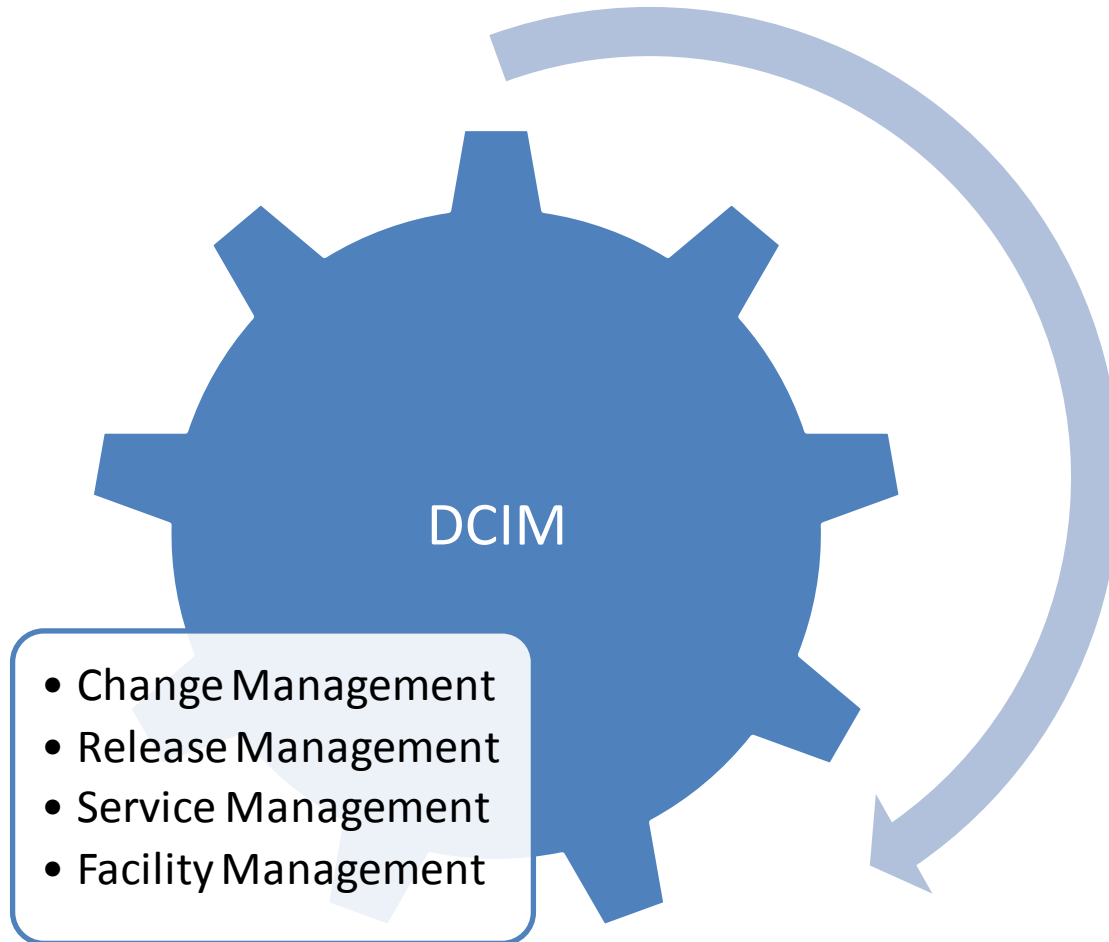
CABLING ARCHITECTURAL DESIGN

- Growth and Capacity
  - Patch panels (at each rack/row?)
  - Switch ports: does the layout of the room allow for Server switches and Core switching?
  - Under floor vs. Above racks

- Rack Elevations
  - Room for growth?
  - Divided by applications?

DRAWINGS: IT

- Often separate from facility drawings
- Kept by IT dept.
- Often in Visio format
- Floor plan
- **Rack elevations**
- Structured cabling design
- Network Diagrams
- Context Diagrams (application)

Power needs & growth

- Determine max usable load for existing equipment
  - Switchgear & circuit breakers typically 80%
  - UPS, PDUs, cooling typically 90%
  - Determine max usable load to maintain redundancy
    - Rack PDU, Circuit Panel, UPS, Generator, etc…

CAPACITIES, CONDITION, NEEDS & GROWTH

- ## Determine growth needs
  - 25% minimum growth capability best practice
  - Load history often predicts future growth needs
  - Understand what may change from past, present to future
    - 1U, 2U servers changing to blades?
   - Consolidating, virtualizing?

  1U, 2U servers   **Blade server**

MIGRATIONS – ARE YOU READY?

- Every X years, xx% of all data centers will have to relocate to new facilities or outsource some applications
  - Uplifting
  - moving
- Strategy
- Virtualization
- Physical
- Over the wire

MIGRATIONS – ARE YOU READY?

- Strategy
  - Allowable Downtime
  - Business needs and requirements
    - Allowable downtime
    - budget
  - Physical vs. Virtual

MIGRATIONS – ARE YOU READY?

- Over the wire
  - Virtualization
    - Moving to VMFarm or like product
  - Physical to Physical (via cable)
    - Tools like PlateSpin, Ghost …
    - Manually build like environments and restore data

- Hot Cut
  - Physically move servers.

MIGRATIONS – ARE YOU READY?

- Is your documentation in order?
  - Do you have a will?
  - Review your docs to make sure that if you had to move you would be successful!

INVENTORY & EQUIPMENT

- You have some sort of inventory of equipment that is in the datacenter. DCIM. This will tie equipment back to applications and owners as well as physical characteristics

- What are the Warranties for all equipment.

- What is the life expectancy of the equipment.

- What licenses for software and OS's are running.

- Are you in compliance with Vendor requirements?

- SAN Health Check.

- Etc...

DCIM

- DCIM / CMDB (Configuration Management Database)
  - Auto Discovery
  - Configurable attributes
    - Technical
    - Ownership
    - Relationship
  - Continued Updating as part of your
    - Change Management
    - Control Control
    - This is where we (IT) fail the most.

DCIM

- Purchase off the shelf systems
  - Asset Management as well as DCIM
  - HP, Symantec, SunView, FrontRange, Aldon, Rackwise, ect…
  - Google "DCIM software"
- Build your own
  - http://www.DCIM.info/pd1/html/index.php?name=Sections&req=viewarticle&artid=2&page=1

- Use Excel
  - Show me…
- What ever you do use something!!!

YOUR DATA IS CENTRAL TO YOUR REPORTING
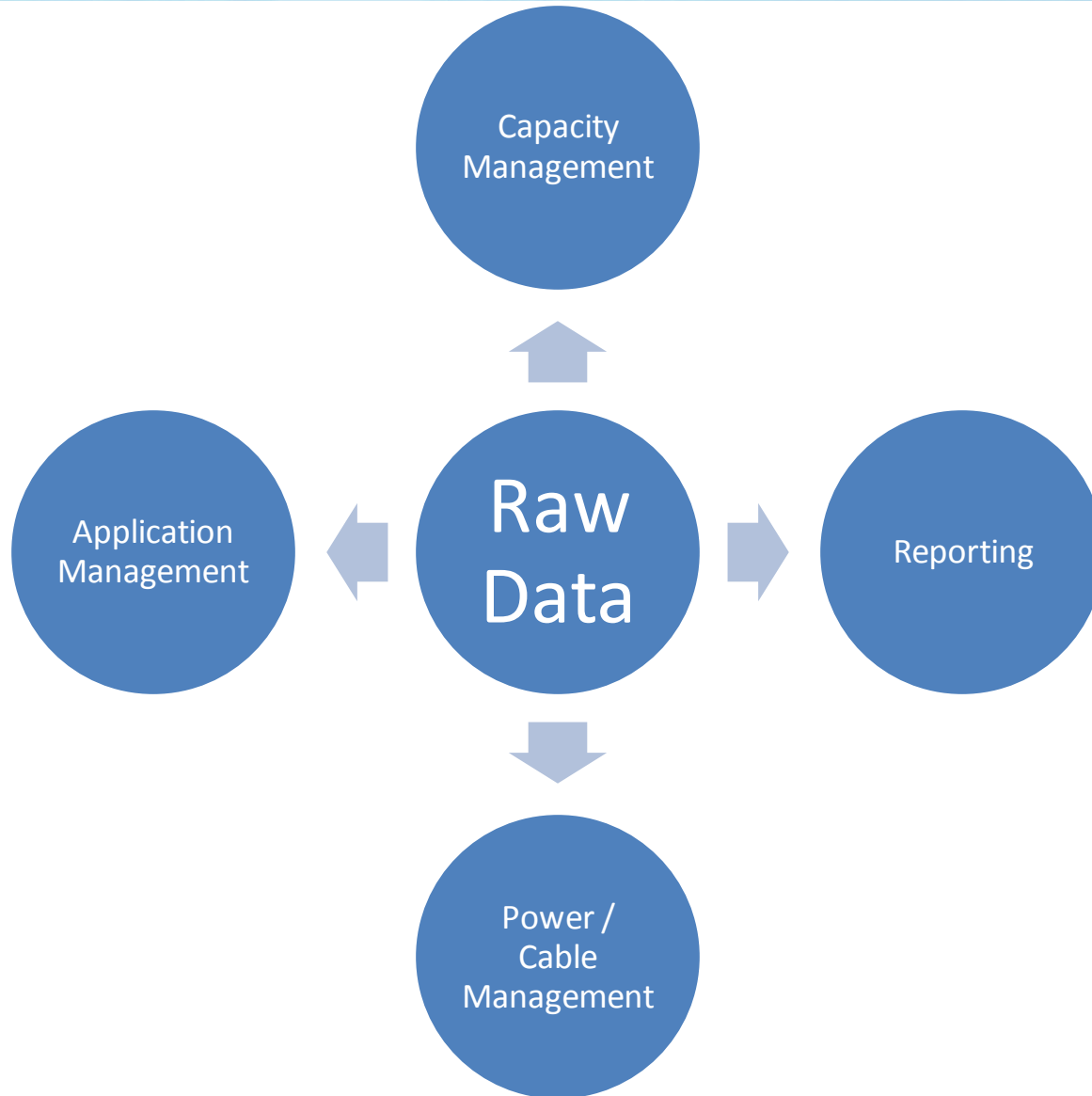
DEVELOPING YOUR TOOL

- ## Understand by defining what to track

Device Info	Move Info	Location Info	Network Info	Storage Info	Compute Info	Support Info
Device Name	Re-Deploy? (calculated based upon filter criteria)	Region	IP Address	Total Storage (Mbytes)	Memory (MB)	Manufacuring Date
Device Type	Move Window	Country	Base IP	# Drives	CPU Type	Ownership (ACS, client)
System Name	Move Phase	Current Physical Location (Data Center)	Current VLAN	IOPS	CPU Speed (mghz)	Install Date
Physical / Virtual	Move Status	Bldg	ILO IP	Drive Sizes and Lettters (Luns if applicable) C:\ = 35GB SU = 18GB	CPU Count	License (version)
High Level OS	Dest. Type (Physical, Phys - NetNew, Virtual, Virt-NetNew)	Room	OOB IP	Space allocated in GB	# Cores	Servicing Location
Category	Device/App Move method	Current Row	Future IP	Storge Location	# CPU Sockets	SERIAL NUMBER
Device Status	Data Move Method	Current Rack	Future VLAN	Drive Usage	Total Cores	Service Tag (ID No.)
Manufacturer / Make	Future Physical Location of the Functional Device (Data Center)	Starting U# (from Bottom of Rack)	# Copper Connections	% Disk Space Used	% CPU Used	Managed By / Vendor
Model	Dest Row	#U	# of Fiber Connections	% SAN used	% RAM (MB) Used	Monitored By 1:
OS (Windows, Linux, Unix, VMS, AS400)	Dest Rack	Enclosure: (ESX cluster name)	Zone	Used Disk Space	Power	Monitored By 2:
OS Version (Version info)	Dest. Starting U# (From the Bottom of Rack)	Enclosure Port / Blade #	Pod	Free Disk Space (GB)	Product ID	Monitored by 3:
OS Patch Level	Future Device Name (if Different)		HBA #1 Speed		Type	Physical Inventory
DNS Name	Future Location Date (available)		HBA #1 Tier		HW Age	Comment
Original app name	Decomm Status		HBA #2 Speed		Voltage	ACS Owner
Function	If Virtual : Dest VM Node/cluster		HBA #2 Tier		Voltage Type	Birth Date
	Application Status		Fiber Switch Connections (List all Destination Connections for each FIC)		Power (Watts)	Weight (lbs)
			Fiber Patch Panel Connections Src NIC -> Dest: Row / Rack /		Power Connection Type (L6 ect...)	Backup Job
					Heat (BTU/HR)	Backup Type (weekly - full, differential etc.)
					# Requested Cores	InventoryDescr
					Memory Requested	Warranty Exp Date
Used in Filter for Re-deploy decision						Support Type (Platinum, Gold, Silver ect...)
Column can be deleted						Hardware EOL Date
						Maintenance End Date
						Maintenance Notes

DCIM - EXCEL

	A	B	C	AM	AN	AO	AP	AQ	AR
1	**Physical**			**Power/Weight**					
2	Current Data Center (CDW, LakeSide, CRDC)	Physical Device name	Type	# Power Cords	Watts	BTU	Weight	Calculated Wieght per 27.4lbs/ U	Electrical Panel Breaker
3	LOC 01	COV03-LT01	Server	1		0	70	54.8	
4	LOC 01	COV2K-DICTATEXT	Server	1		0	70	54.8	Bccp5 25/27
5	LOC 01	COV2K-PRINT1	Server	1		0	55	54.8	BCCP1-16,18
6	LOC 01	COV03-CMCDC1	Server	1		0	70	54.8	BCCP4 9 & BCCP2 30
7	LOC 01	COV2K-DFS1	Server	1		115		54.8	
8	LOC 01	COV03-CTX1	Server	1		0	70	54.8	BCCP4-25,27,26,28
9	LOC 01	COV03-CTX2	Server	1		0	70	54.8	BCCP4-25,27,26,28
10	LOC 01	COV03-CTX3	Server	1		0	70	54.8	BCCP4-25,27,26,28
11	LOC 01	COV03-CTX4	Server	1		0	70	54.8	BCCP2 1
12	LOC 01	COV03-CTX5	Server	1		0	70	54.8	BCCP4 3&5
13	LOC 01	COV03-CTXNEURO	Server	1		0	55	54.8	BCCP4 9 & BCCP2 30
14	LOC 01	COV03-CTXWEB	Server	1		0	41	54.8	BCCP3 28 & BCCP 17

DEPENDENCY MATRIX

Current Data Center (CDW, LakeSide, CRDC)	Physical Device name	Type	App Name	Application 01	Application 02	Application 03	Application 04	Application 05	Application 06	Application 07	Application 08	Application 09	Application 10	Application 11
	Physical		**Application**	BS	BT	BU	BV	BW	BX	BY	BZ	CA	CB	CC
LOC 01	COV03-ASCLUSTDB1	Server	Application 02	x		w	I		w					
LOC 01	COV03-ASCLUSTDB2	Server	Application 02	x		w	I		w					
LOC 01	COV03-ASDICTINT	Server	Application 02	x		w	I		w					
LOC 01	COV03-ASLBWS1	Blade Server	Application 02	x		w	I		I	I	I	I		
LOC 01	COV03-ASLBWS2	Blade Server	Application 02	x		w	I		w					
LOC 01	COV03-ASPRINT	Server	Application 02	x		w	I		w					
LOC 01	COV03-ASSCAN	Server	Application 02	x		w	I		w					
LOC 01	COV03-ASTEST1	Blade Server	Application 02	x		w	I		w					
LOC 01	COV03-ASTRAIN	Blade Server	Application 02	x		w	I		w					
LOC 01	COV03-CMCDC1	Server	Application 16	I			X		w					
LOC 01	COV03-CMCDC2	Server	Application 16	I			X		w					
LOC 01	COVMT-ADM	Server	Application 01	I			x		w					
LOC 01	COVMT-BG7	Server	Application 01	I			X		w					
LOC 01	COV2K-CTX6	Server	Application 11											
LOC 03	COVTP-LTO	Storage System	Application 07											
LOC 03	SMPUX-RS4	Server	Application 07											
LOC 03	SMPUX.CMG1	Server	Application 24								I			
LOC 03	SMPUX.CMG2	Server	Application 24							I				
LOC 03	SMPUX.CMG3	Server	Application 24											
LOC 03	SMPUX-RS2	Server	Application 24							I				
LOC 03	SMPUX-RS3	Server	Application 24											
LOC 03	COV03-HPFCOLD	Server	Application 21							I				

DIAGRAMS
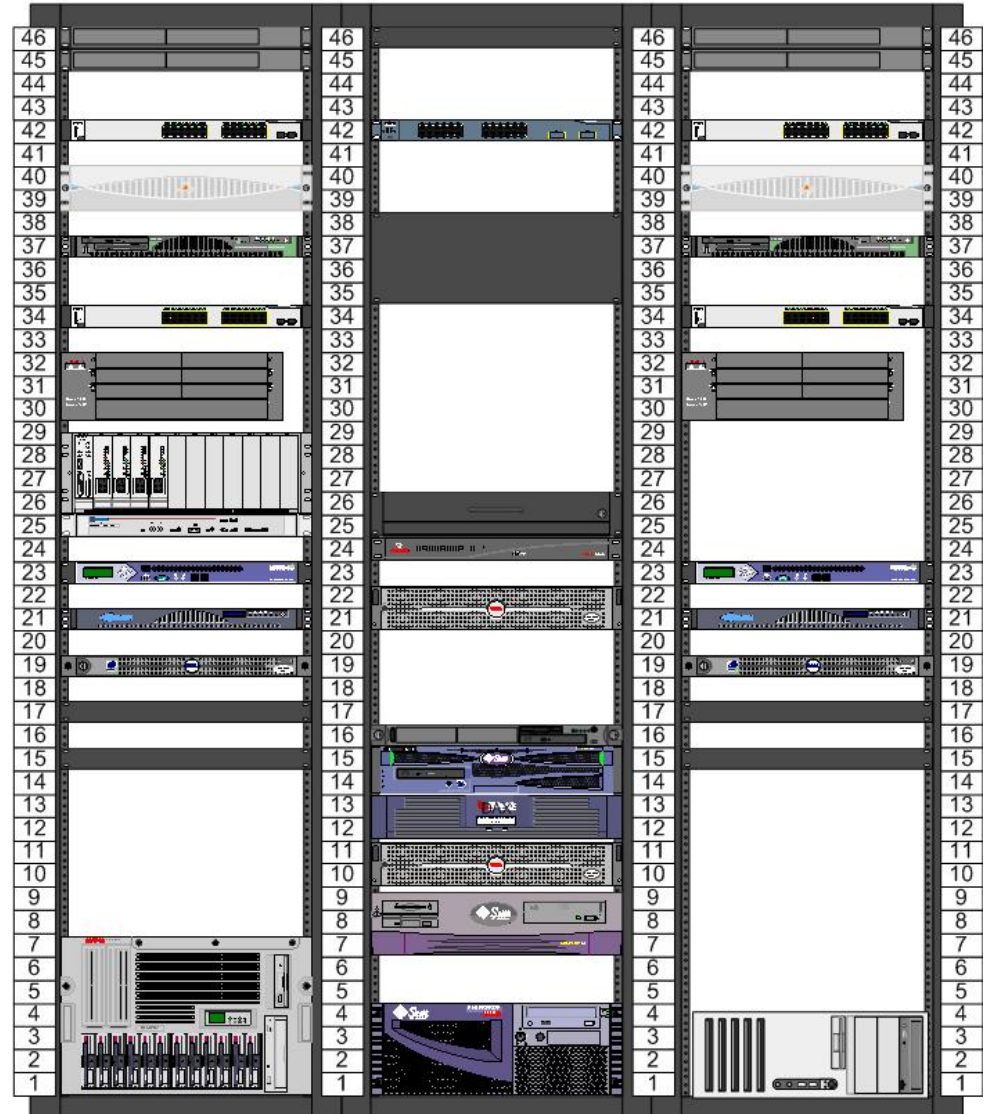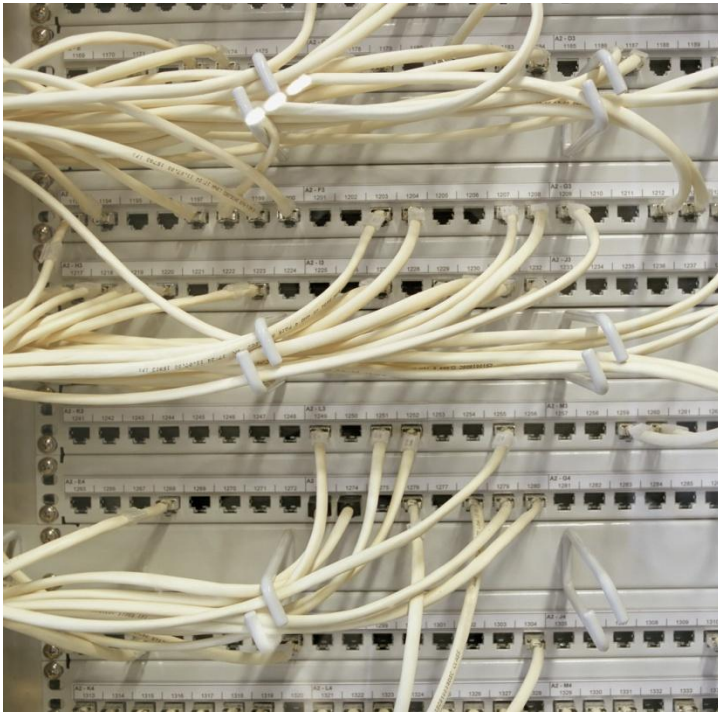
- ## Rack Elevations

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
		Enter BLDG		Loc 2 BLDG 4				Only Filter Table, Do not Sort!											
		Enter FLR-RM:		10-101								14							
		Enter Row		C								42							
		Front or Back		Front															
	Available U:		5		17		14		13		4		21		42		15		12
	Device Co		22	37	15	25	10	28	12	29	13	38	4	21	1	0	10	27	21	30
	RU:	01	#U1	02	#U2	03	#U3	04	#U4	05	#U5	06	#U6	07	#U7	08	#U8	09	#U9
	42	Device 79	1	Device 80	1													Device 2	1
	41																	Device 212	1
	40	Device 123	1					Device 602	2							Device 603	2		
	39	Device 211	1	Device 282	1			Device 624	1							Device 625	1	Device 484	2
	38	Device 497	1																
	37	Device 498	1	Device 406	2													Device 158	1
	36	Device 499	1															Device 159	1
	35	Device 500	1	Device 407	2														
	34	Device 501	1															Device 519	1
	33	Device 502	1	Device 408	2											Device 64	1	Device 260	1
	32	Device 503	1													Device 71	1		
	31	Device 504	1	Device 409	2											Device 716	0	Device 273	2
	30																	Device 261	1
	29	Device 106	2	Device 410	2														
	28																		
	27	Device 107	2	Device 411	2	Device 546	3												
	26							Device 655	5										
	25	Device 345	2	Device 412	2			Device 256	1									Device 234	5
	24					Device 547	3	Device 450	1									Device 160	1
	23			Device 413	2														
	22																		
	21	Device 421	2	Device 414	2	Device 548	3												
	20															Device 479	10		
	19	Device 422	2							Device 682	11							Device 257	1
	18					Device 549	3	Device 251	4	Device 709	0							Device 161	1
	17	Device 94	2							Device 126	1								
	16									Device 710	1					Device 586	3		
	15	Device 95	2			Device 550	3			Device 127	1								
	14					Device 705	0	Device 456	4	Device 128	1	Device 713	1					Device 213	1
	13							Device 707	0	Device 711	1								
	12	Device 733	1							Device 130	1					Device 568	4		
	11					Device 551	3											Device 214	1
	10							Device 553	3	Device 248	2								
	9	Device 494	3															Device 274	2
	8					Device 552	3									Device 569	4		
	7							Device 554	3	Device 124	3							Device 275	2
	6																	Device 162	1
	5	Device 492	4	Device 283	1														
	4			Device 284	1													Device 276	2
	3			Device 285	1							Device 675	10						
	2					Device 589	6	Device 583	5	Device 489	5	Device 714	0	Device 715	0			Device 277	2
	1	Device 493	4	Device 346	2	Device 706	1	Device 708	0	Device 712	0					Device 717	1	Device 718	0

SVRBLD Submission and SVR Delivery Status by Week
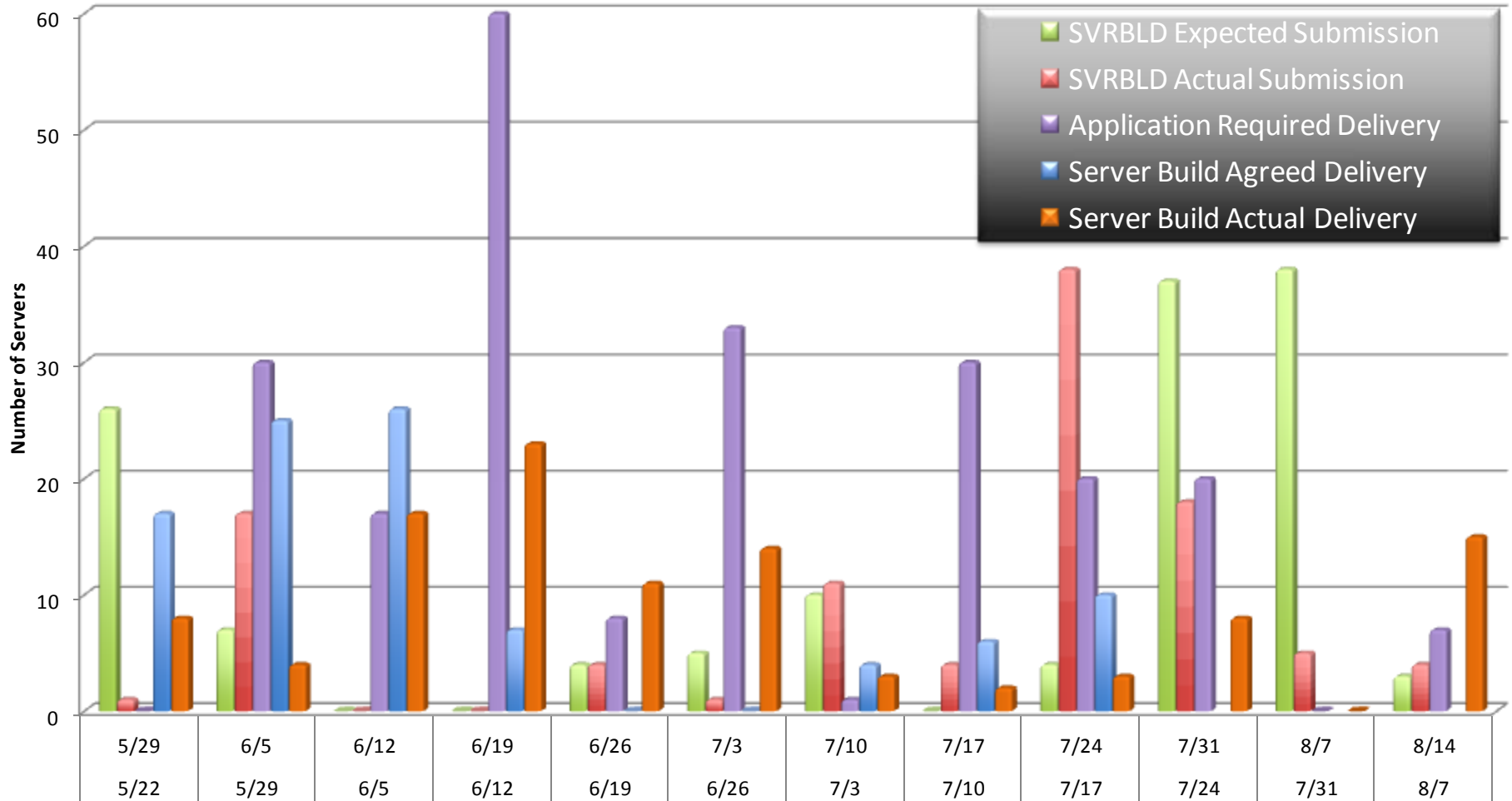
Tower SID = *SAP* and Environment = * and Priority = *

STORAGE CAPACITY MANAGEMENT

In Gigabytes (GB)

Actuals entered as of: (date)

Array Location	CHI						Array 1 - Loc 1

Array Total Storage Size							269.07

Storage	Tier 2 - Boot - Virtual	Tier 2 - Boot - Physical	Tier 0	Tier 1	Tier 2 - Data	Tier 3	GB
Total Storage	**8,197**	**10,937**	**12,540**	**27,520**	**66,050**	**143,830**	**269,074**
Reserved	0	0	0	0	0	0	-
Allocated	-	-	-	-	-	-	-
Used (informational)	9000	9,000	12,540	22,090	5,716	56,650	114,996
							-
Actual Remaining:	**8,197**	**10,937**	**12,540**	**27,520**	**66,050**	**143,830**	**269,074**
Additional Pending:	17,000	7,000	3,200		37,000	27,000	91,200
Adjusted Remaing post BOM:	25,197	17,937	15,740	27,520	103,050	170,830	360,274
Planned	-	-	-	-	-	-	-
Total Planned Available Storage	**25,197**	**17,937**	**15,740**	**27,520**	**103,050**	**170,830**	**269,074**

- It's not always facilities fault
- Does the facility Tiering plan match
- my application up time requirements
 - Business continuity
- Does Facilities work with change management process?
- Is Facilities represented on the CAB?

IF I'M A FACILITIES GUY WHAT DO I NEED TO KNOW ABOUT IT?

- Structured Cabling

- What are NOCC's for?

- What is important to IT?

- Do I have any maintenance windows?

- How much advanced notice do I have to give for planned shutdown or risk of unplanned shutdown during maintenance?

- What is the cost of unscheduled downtime?

- How long does it to recover from a power failure?

- Will you inform me of new equipment?

- Do I know the up/down stream dependencies

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