



Operational Procedures in IT Internet Services

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Internet Services group

- ◆ **Central Infrastructure Services for CERN**
 - ◆ **Electronic Mail**
 - ◆ **DFS File systems**
 - ◆ **Web Services**
 - ◆ **Desktop Computing**



Significant Numbers (2006)

Activity	Significant Numbers	COST KCHF	MANPOWER		
			Staff	Visitor	Total
			0	0	0
Web Server hosting	7.500 Sites (7.200 last year) +10% (despite several deleted sites...)	87	1.3	1	2.3
Verisign	More than 100 trusted certificates distributed	40	0	0	0
Search Engine	New service being built	92	0.5	1	1.5
Server infrastructure (includes Monitoring)	261 Servers stored in 26 Racks (+30%)	54.5	0.7	0	0.7
Server on demand	24 Virtual Servers running, of which 13 are custom servers	57.5	0.1	0	0.1
Custom Server	70 servers hosted and managed	-10	0.1	0	0.1
CERN Certification Authority	158 User certificates, 70 Host certificates in one week	20	0.3	1	1.3
Printing services	> 1100 printers hosted, > 15000 jobs/day printed.	13.5	0.5	0	0.5
DFS space and quota management	Home Directories 14 TB (+16%) , 440 DFS workspaces, 24 TB (+50%)	104.5	0.2	0	0.2
Active Directory, user management, group management, Lightweight Registration, CRA		20	0.5	0	0.5
CMF and NICEFC	36 Activities (NSS), 248 sets (NSC), ~500 packages ←		0.8	0	0.8
OS Installations	~1500 new PC installed / year, 6 new PC Models / year,		1.1	0	1.1
PC hardware procurement	1200 PC/year, 1000 monitors, 800 notebooks, ...	21	2.1	0	2.1
Email service	17.000 mail accounts (+15%) since last year	175	1	0	1
Anti Spam / anti Flood Services	More than 1,200,000 incoming messages / day, 95 % rejected (+25 %)	30	0.5	0	0.5
LDAP Service	> 50000 entries	10	0.1	0	0.1
Listbox Service	5,000 mailing-lists (+25 %) in one year	20	0.3	0	0.3
News / Zephyr / Alerter Service		10	0.2	0	0.2
Fax Service	4 to 6,000 faxes / month, 1150 registered users (+20 %)	10	0.1	0	0.1
Mac Support	1357 Macintoshes (+50 %)	30	1	0	1
Windows Desktop Services (Patches, updates)	6000 Client PCs, >35 patches deployed		1.3	0	1.3
License and Licensing	nearly 100000 licenses managed	400	0	0	0
Windows Application Packaging and distribution (Office)	>20 supported applications	119	1.8	0	1.8
Security (Antivirus)	~10,000 virus blocked / day in mail system, ~200 threats blocked / day on	65	0.6	0	0.6
Terminal Services (Public + Custom)	27 servers (+300%) Public cluster doubled	20	0.5	0	0.5
VPN Service	> 1500 users	10	0.1	0	0.1
Management Overhead, Quality Control			1	0	1
			0	0	0
		1399	16.7	3	19.7



Strategies

- ◆ There isn't an easy recipe.
- ◆ However few indicators can be monitored various areas
 - ◆ Operational Aspects
 - ◆ Technological Aspects
 - ◆ Organizational Aspect
- ◆ Takes years to fix a wrong trend



Operational indicators

- ◆ Ratio of maintenance versus development / investment work
- ◆ Ratio of planned work versus unscheduled intervention / failures
- ◆ Engineers doing unskilled low-level maintenance



Operation and maintenance

- ◆ **Weekly operation meeting**
- ◆ **Fixed agenda, limited duration (15'')**
- ◆ **Review**
 - ◆ **User Support weekly activity**
 - ◆ **Service performance**
 - ◆ Monitoring availability
 - ◆ scheduled operational interventions
 - ◆ Post-mortem of past services interruptions



User Support

- ◆ **1st level: Helpdesk, outsourced**
 - ◆ Simple questions / answers table
 - ◆ Not reviewed during operational meeting
- ◆ **2nd level: Expert, outsourced**
 - ◆ Expert works on the premises of service level agreement and the available service documentation
- ◆ **3rd level: CERN specialist (engineer or specialized technician)**
 - ◆ In theory, no cases should reach 3rd level
 - ◆ In practice, it happens systematically:
 - ◆ Service failure (a server has crashed)
 - ◆ Lack of documentation (it is unclear how to use a service)
 - ◆ Unclear Service level agreement (incorrect user expectations)
 - ◆ Failure of 2nd support line
- ◆ **Our experience**
 - ◆ Just “watching” the process leads to constant increase of 3rd level cases
 - ◆ Follow-up of 3rd level cases keeps the specialist interventions constant



Monitoring & Alarms

Active Directory Status (refreshed 15 minutes ago) [Details] <p>We have 3 domain controllers in total. Their status: All Servers OK</p> <p>Users: 21854</p> <p>Computers: 25787</p> <p>User Account synchronization works fine. Last seen active: 4 hours ago.</p> <p>Computer Account synchronization works fine. Last seen active: 10 minutes ago.</p> <p>Computer Account recreation works fine. Last seen active: 2 seconds ago.</p>	MMM Users (refreshed 14 minutes ago) [Details] <p>Types of clients connected</p> <table><tr><td>IMAP</td><td>3122</td></tr><tr><td>MAPI</td><td>1013</td></tr><tr><td>POP3</td><td>2</td></tr><tr><td>OWA</td><td>896</td></tr><tr><td>Total</td><td>5033</td></tr></table> <p>(Active within last 10 minutes)</p> <table><tr><td>IMAP</td><td>62.03%</td></tr><tr><td>MAPI</td><td>20.17%</td></tr><tr><td>OWA</td><td>17.80%</td></tr><tr><td>POP3</td><td>0.00%</td></tr></table>	IMAP	3122	MAPI	1013	POP3	2	OWA	896	Total	5033	IMAP	62.03%	MAPI	20.17%	OWA	17.80%	POP3	0.00%
IMAP	3122																		
MAPI	1013																		
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OWA	896																		
Total	5033																		
IMAP	62.03%																		
MAPI	20.17%																		
OWA	17.80%																		
POP3	0.00%																		
DFS Server Status (refreshed 4 minutes ago) [Details] <p>We have 16 servers in total. Their status: All Servers OK Total capacity of the servers is: 26.7 TB</p> <table><tr><td>0%</td><td>34.9%</td><td>58.6%</td><td>100%</td></tr><tr><td>0 TB</td><td>9.3 TB</td><td>15.6 TB</td><td>26.7 TB</td></tr><tr><td>Used</td><td>Allocated</td><td>Available</td><td></td></tr></table>	0%	34.9%	58.6%	100%	0 TB	9.3 TB	15.6 TB	26.7 TB	Used	Allocated	Available		Online in Messenger 72						
0%	34.9%	58.6%	100%																
0 TB	9.3 TB	15.6 TB	26.7 TB																
Used	Allocated	Available																	
Terminal Services (refreshed 5 minutes ago) [Details] <p>We have 7 servers in total. Their status: All Servers OK</p> <table><tr><td>Current Sessions</td><td>126</td></tr><tr><td>Active</td><td>54</td></tr><tr><td>Inactive</td><td>72</td></tr></table>	Current Sessions	126	Active	54	Inactive	72	MMM Servers (refreshed 14 minutes ago) [Details] <p>We have 22 servers in total. Their status: All Servers OK</p> <p>They host 17534 mailboxes in total.</p>												
Current Sessions	126																		
Active	54																		
Inactive	72																		
VPN Service (refreshed 3 minutes ago) [Details] <p>We have 1 servers in total. Their status: All Servers OK</p>	MMM Mail Queues [Details] <p>We have 6 mail gateways in total. Their status: All Servers OK</p> <table><tr><td>Queued messages</td><td>4098</td></tr><tr><td>Queued for CERN mailboxes</td><td>0</td></tr><tr><td>Queued for other internal destinations</td><td>1004</td></tr><tr><td>Queued for external delivery</td><td>3094</td></tr><tr><td>Received but not yet queued</td><td>5</td></tr></table>	Queued messages	4098	Queued for CERN mailboxes	0	Queued for other internal destinations	1004	Queued for external delivery	3094	Received but not yet queued	5								
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Service performance

- ◆ **Service availability figures, scheduled operational interventions**
- ◆ **Unscheduled failure and manual interventions are questioned**
 - ◆ **“How can we avoid similar problem in the future ?”**
 - ◆ **“What can be done to avoid the manual intervention ?”**
 - ◆ **following up on these questions is boring ... but it improves working conditions in the long term**



Outsourcing

- ◆ **Outsourcing can be of help in streamlining operations**
 - ◆ **It forces realignment of tools and technology on industry and market standards**
 - ◆ **It forces understanding the processes**
 - ◆ **It forces defining service levels**
 - ◆ **It forces writing operational procedures**
 - ◆ **It forces to measure performances**
- ◆ **Warning: Missing any of the points above will lead to the failure of the contract**



Technological indicators

- ◆ **Number of different vendors to be integrated**
 - ◆ **Adobe, Autodesk, Corel, Microsoft, Oracle, Sun, Symantec, ... and CERN**
- ◆ **Ratio between “Home made” tools versus Commodity / Commercial ones**
- ◆ **Number of different platforms**
- ◆ **Number of different “cultural frameworks”**



Technologies

- ◆ **Best of Breed Vs. Integrated Systems**
 - ◆ Understand the trade between “Best tool for each job” and “Standard tool for everyone”
 - ◆ Each vendor and each home made tool requires dedicated and permanent resources
- ◆ **Question periodically the need for each “home made” tool**
 - ◆ May need to change the “way of working”
 - ◆ Ex: printing, CA, mail, web, ...
- ◆ **Not easy setting strategy and vision:**
 - ◆ Management must understand impact of technical choices on individual’s productivity
 - ◆ Must separate valid technical arguments from subjective/cultural ones



Organizational indicators

- ◆ **Number of projects/priorities/activities versus number of people**
- ◆ **Staff mobility**
- ◆ **Staff skills**



Current management strategy

- ◆ **Reduced number of projects / activities**
 - ◆ Risk of “cultural” barriers, tools proliferations
 - ◆ Activities grouped to reach a minimum granularity of 3-4 persons
- ◆ **Reduce the technological barrier**
 - ◆ Expose cost of unnecessary diversity by rotating job positions
- ◆ **Recruitment and contract review policies**
 - ◆ Multi-platform experiences
 - ◆ Records of achieved flexibility



Analysis of Internet Services numbers



Web

Web Services 1.8 Staff, 3.8 Total

	KCHF	BALBOI	CHC	CHF	NEV	DEL	DEL	GAS	GLA	HEF	ISN	KW	LOS	MAI	MOI	NOF	ORN	OTT	PAC	PEF	TUG	WAGNE	Staff	Visito	Total	
		Chri	Chri	Julie	Mic	Staf	Seb	Ivan	Rub	Ana	Patr	Chri	Mic	Ale	Djila	Jear	Aud	Emr	Raf	Albe	Dan	Evg	Andreas			
Web Server hosting	87	0.6											0.4									1	0.3	1.3	1	2.3
Verisign	40																							0	0	0
Search Engine	92																1						0.5	0.5	1	1.5
Server Infrastructure (includes monitoring)	54.5												0.1					0.4	0.2					0.7	0	0.7
Server on demand	57.5																	0.1						0.1	0	0.1
Custom Server	-10																	0.1						0.1	0	0.1
CERN Certification Authority	20									1								0.2		0.1				0.3	1	1.3
Printing services	13.5																			0.5				0.5	0	0.5
DFS space and quota management	104.5																			0.2				0.2	0	0.2
Active Directory, user management, group r	20			0.1				0.1					0.1					0.1	0.1					0.5	0	0.5
CMF and NICEFC								0.6	0.1									0.1						0.8	0	0.8
OS Installations					0.1			0.2					0.2		0.6									1.1	0	1.1
PC hardware procurement	21	0.5																				1		2.1	0	2.1
Email service	175		0.3	0.4									0.3											1	0	1
Anti Spam / anti Flood Services	30			0.2		0.2							0.1											0.5	0	0.5
LDAP Service	10			0.1																				0.1	0	0.1
Listbox Service	20			0.2	0.1																			0.3	0	0.3
News / Zephyr / Alerter Service	10		0.1						0.1															0.2	0	0.2
Fax Service	10			0.1																				0.1	0	0.1
Mac Support	30											1												1	0	1
Windows Desktop Services (Patches, updates)					0.5			0.1	0.1			0.2	0.3							0.1				1.3	0	1.3
License and Licensing	400																					0		0	0	0
Windows Application Packaging and distrib	119			0.2					0.2			0.3		1						0.1				1.8	0	1.8
Security (Antivirus)	65					0.6																		0.6	0	0.6
Terminal Services (Public + Custom)	20							0.5																0.5	0	0.5
VPN Service	10																			0.1				0.1	0	0.1
Management Overhead, Quality Control												0.2								0.6		0.2		1	0	1
	1399	0.5	1	1	1	0	0.8	1	1	1	1	0.8	1	1	0.6	1	1	1	1	1	1	1	1	16.7	3	19.7

 Activity responsible or backup responsible



Win

Win Services + Infrastructure 3.6 Staff + 0.7 NICEFC

	KCHF	BAL	BOI	CHI	CHF	NEV	DEL	DEL	GAS	GLA	HEF	ISN	KW	LOS	MAI	MOI	NOI	ORI	OTT	PAC	PEF	TUG	WAGNE	Staff	Visito	Total	
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Activity responsible or backup responsible



Mail

Mail Services 2.1 Staff Total

	KCHF	BALBO	CHC	CHF	NEV	DEL	DEL	GAS	GLA	HEF	ISN	KW	LOS	MAI	MOI	NOF	ORN	OTT	PAC	PEF	TUG	WAGNE	Staff	Visito	Total	
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Activity responsible or backup responsible



Some (final) Comments

- ◆ Good service reliability reached
- ◆ Heavy use of commercial solutions, but only on standardized technologies
- ◆ No dependence on single individuals
 - ◆ Holidays possible
 - ◆ Job rotation
- ◆ However ...
 - ◆ The more optimized the more entangled become the services
 - ◆ High skill set necessary