



Certification & Testing

LCG Certification & Testing Team (C&T Team)

Marco Serra - CERN / INFN

Zdenek Sekera - CERN



- *LCG software is:*
 - Globus (subset of the VDT distribution) delivered by iVDGL
 - EDG WP1 (Workload Management System - "Resource Broker")
 - EDG WP2 (Data Management System)
 - Several bits from other EDG WPs (config objects, InfoProviders, ...)
 - GLUE 1.1 (Information schema)
 - MDS based Information System (Globus) with LCG enhancements
 - "StorageElement" (disk based only, gridFTP), MSS via GFAL and SRM soon
 - LCG modifications and developments:
 - Job managers to avoid shared filesystem problems (GASS Cache, etc.)
 - MDS – BDII LDAP
 - Globus gatekeeper enhancements (adding some accounting and auditing features, log rotation, that LCG requires)
 - Many, many bug fixes to EDG and Globus/VDT
 - GFAL lib to access MSS
 -



Certification Process Scope



- the software that LCG is deploying has never been used in a large scale production system!
- the goal of the certification process is to provide LCG with *production quality* software satisfying experiment(s) requirements

"production quality":

- stability, robustness, availability 24h x 365d
- performance, scalability, gracefully degrade
- operability
- maintainability
- user compliant



Certification Process



- feature testing
 - Workload Management System(WMS), Data Management (DMS), Information System (IS),
- different grid architectures / configurations
 - simulating the production service
- stress tests
 - single components, overall system
- destructive tests - error recovery
 - injecting problems to study system behaviour
- security
 - basic issues



Running the Certification

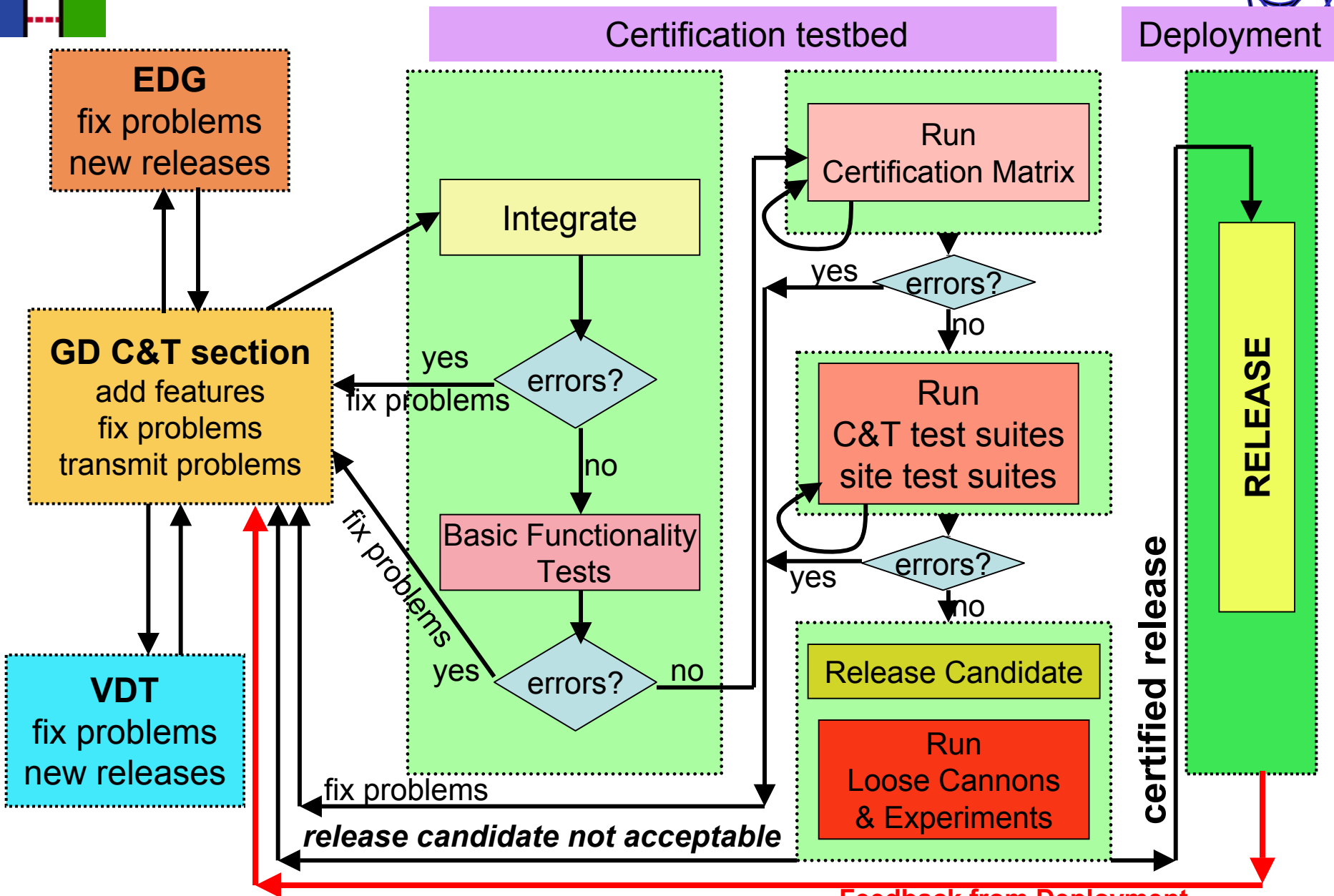


2 major activities:

- integrating components into LCG software
 - verifying its consistency (comes from several sources)
 - defining packaging and installation procedures
 - first level of debugging, testing of bug fixes
- C&T-testbed is “where” LCG release is “made”
- running a matrix of tests to cover all the relevant items
 - functionalities, stress tests, security
- changing the C&T-testbed setup
 - different architectures, destructive tests



Certification is an Iterative Process

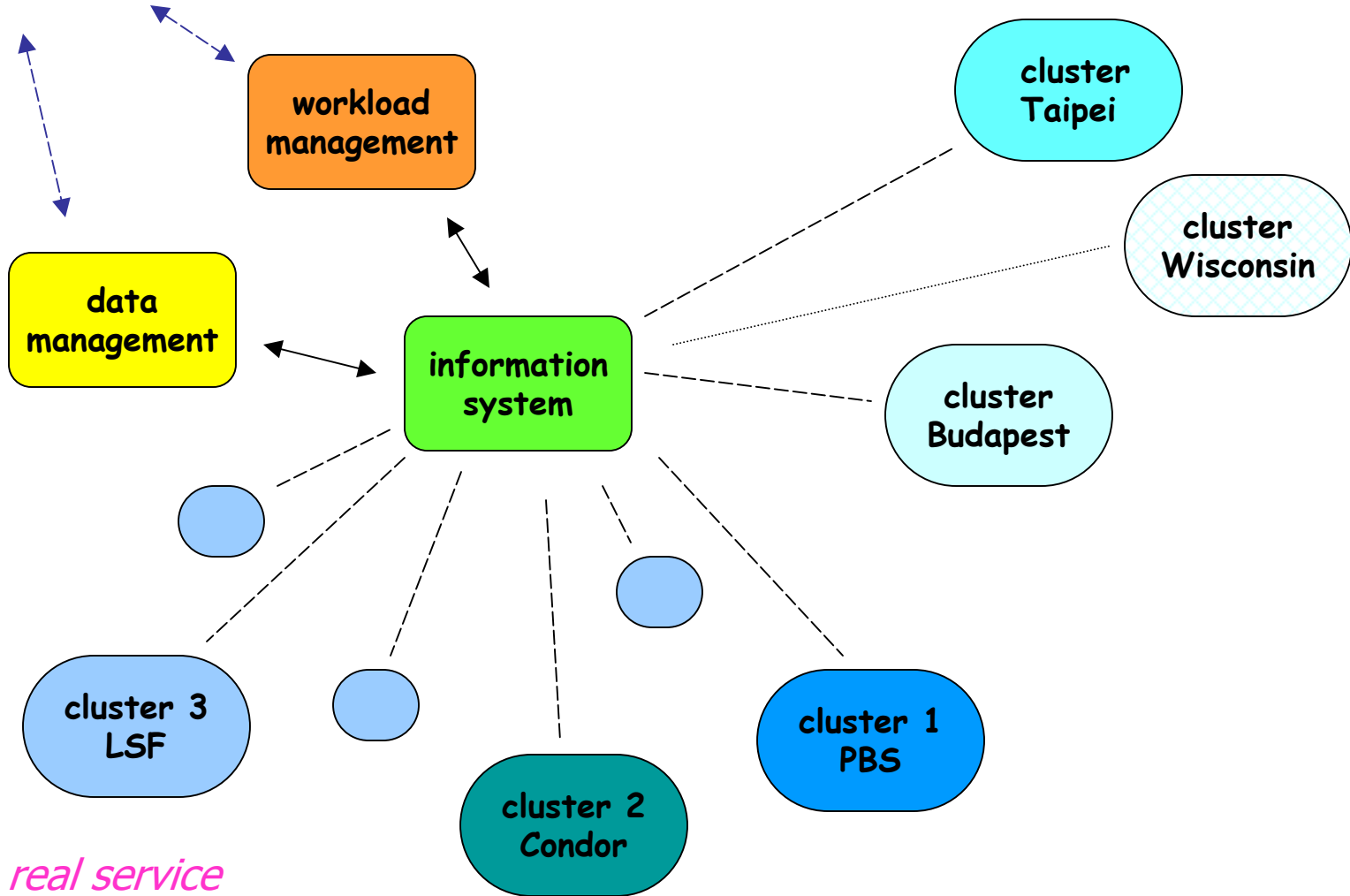




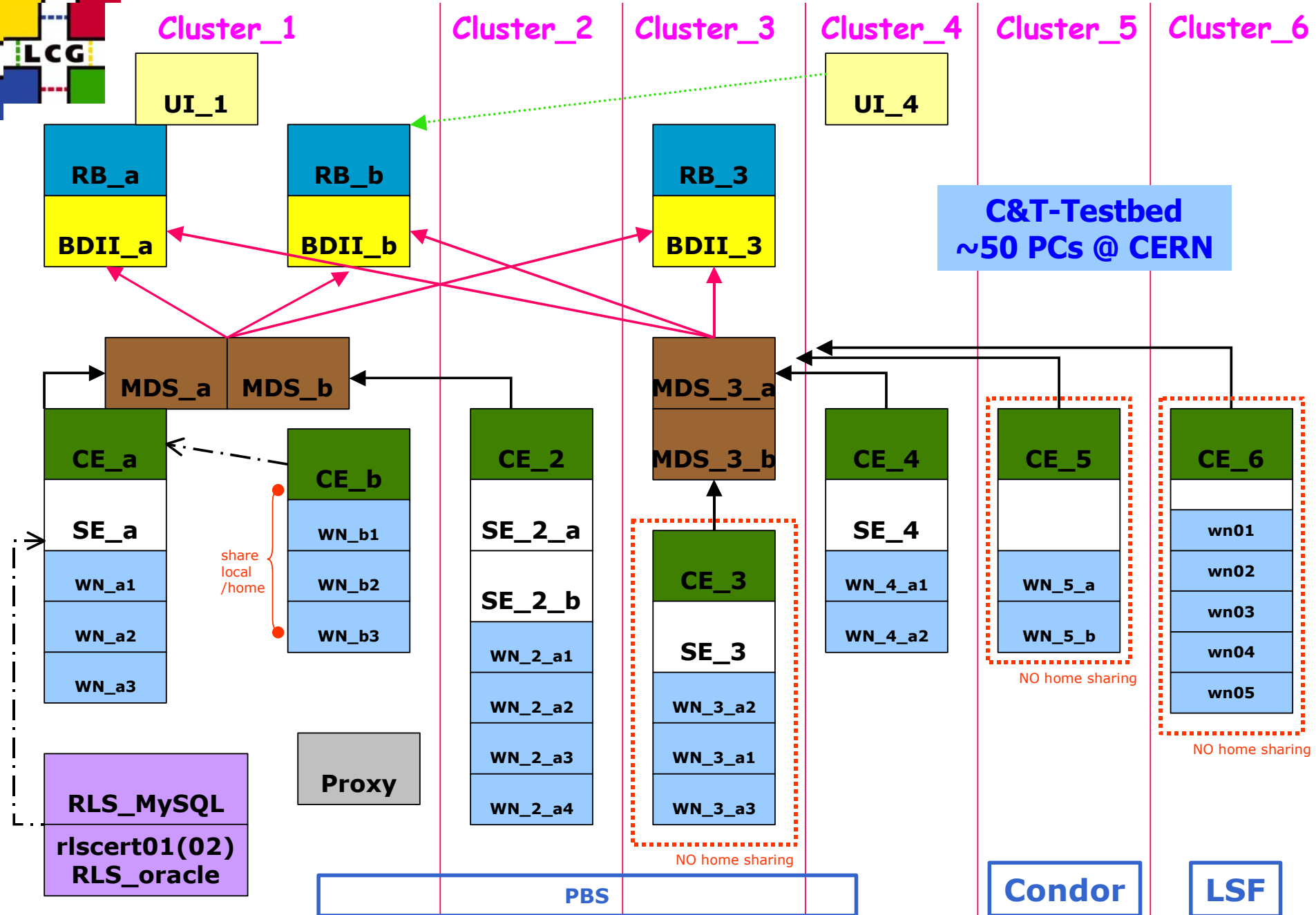
C&T - Testbed



User Interface



simulating the real service





Certification Matrix (main items)



Grid Unit Testing

- globus
 - main functionalities, collaborative activity ongoing with VDT test team
- workload management system
 - load distribution, resources saturation,....
- data management system
 - data access, replication, catalog consistency, ...
- security
 - certificates,

Grid Services Testing

- services interaction
 - jobs with input data, jobs with MSS access,
 - different batch systems (OpenPBS, LSF, Condor)



Certification Matrix (examples)



- job submission tests (single stream of jobs, multiple streams of jobs, single cluster,)
 - ~1000 jobs in the system for 2 days: *ok*
 - successful rate ~97%
 - ~1000 jobs to a single cluster (ComputingElement): *ok*
 - resources fully utilized
 - load correctly distributed: is function of CPUs available in each cluster ...
- data management tests (copy, replicate, register,)
 - single stream, ~2000 files: *ok*
 - multiple streams, ~750 files: *ok*
- proxy renewal
 - long sleeper jobs which need at least 2 proxy renewals: *ok*
- matchmaking with input data
 - to check that jobs are dispatched only to clusters that allow access to specific files with a specific protocol: *ok*



LCG Test Suite



- LCG has produced a “test suite” to allow for:
 - misconfiguration spotting
 - automated test procedure
 - interactive & nightly tests
 - performances evaluation, stress test
 - statistics about problems
- ultimate goal: regression testing for middleware validation
- a subset is the “site certification suite”
 - core functionalities
 - not exhaustive
- test suite is continuously updated to reflect new issues
- simultaneously we test the monitoring system



LCG Test Suite (2)



Row #	Title	Test list	Status	Command	Duration	Available
1	CEGate	01_GlobusGatekeeper	[OK]	command	337 sec.	options
2	CECycle	02_CECycle	[OK]	command	348 sec.	options
3	UI_ST	03_UI_config_test	[OK]	linkNameC	19 sec.	linkNameO
4	FTP_ST	04_GridFTP	[OK]	command	36 sec.	options
5	DNS	05_DNS-ReverseDNS	[OK]	command	0 sec.	options
6	RB	06_RB-BrokerInfo	[OK]	command	191 sec.	options
7	RB	06_RB-CheckVOVars	[OK]	command	192 sec.	options
8	RB	06_RB-Checksum	[OK]	command	168 sec.	options
9	RB	06_RB-HelloScript	[OK]	command	192 sec.	options
10	RB	06_RB-HelloWorld	[OK]	command	161 sec.	options
11	RB	06_RB-Sleep	[OK]	command	161 sec.	options
12	RLS	07_RLS-CheckRMC	[OK]	command	70 sec.	options
13	RLS	07_RLS-TestLRCAAttributes	[OK]	command	53 sec.	options
14	RLS	07_RLS-TestLRMapping	[OK]	command	199 sec.	options
15	RLS	07_RLS-TestRMCAAttributes	[OK]	command	53 sec.	options
16	RLS	07_RLS-TestRMMapping	[OK]	command	199 sec.	options
17	RMCycle	08_RMCycle	[OK]	command	178 sec.	options
18	SEwsCycle	09_SEwsCycle	[FAIL]	command	14 sec.	options
19	MM	10_MatchMaking	[OK]	command	676 sec.	options
20	MM_file	11_MatchMaking	[OK]	command	1584 sec.	options
21	MM_gridftp	12_MatchMaking	[OK]	command	1760 sec.	options
22	MM_rfio	13_MatchMaking	[FAIL]	command	1697 sec.	options
23	MDS	14_MDS-CheckConsistency	[FAIL]	command	1 sec.	options
24	MDS	14_MDS-CheckGRIS	[OK]	command	1 sec.	options
25	JStorm	15_JobStorm	[OK]	command	323 sec.	options
26	JS_sleep	16_JobStorm	[OK]	command	506 sec.	options

GlobusGatekeeper

Test run on Thu Oct 23 00:06:04 CEST 2003

step	lxshare0235.cern.ch	lxshare0241.cern.ch	lxshare0277.cern.ch
Step_0	ok	ok	ok
Step_1	ok	ok	ok
Step_2	ok	ok	ok
Step_3	ok	ok	ok
Step_4	ok	ok	ok
Step_5	ok	ok	ok
Step_6	ok	ok	ok
Step_7	ok	ok	ok
Step_8	ok	ok	ok
Step_9	ok	ok	ok
Step_10	ok	ok	ok

Step_0

```
Trying globus authentication... :
tryAuthentication :
globusrun -a -l lxshare0277.cern.ch/jobmanager
```

Step_1

```
Trying globus-job-run... :
sendRandom :
globus-job-run lxshare0277.cern.ch/jobmanager /bin/echo
```



C&T-Testbed Usage



- *unique resource* ... for many tasks
 - requires careful management to maximize efficiency
 - fast changing environment (upgrades, different tests, bug fixing,)
 - frequently only one activity at a time !

- experiment(s) testing in a controlled environment
 - defined time slots, monitored by C&T team
 - external testing allows early identification of different problems
 - real-time feedback
 - procedure successfully used for LCG-1 release



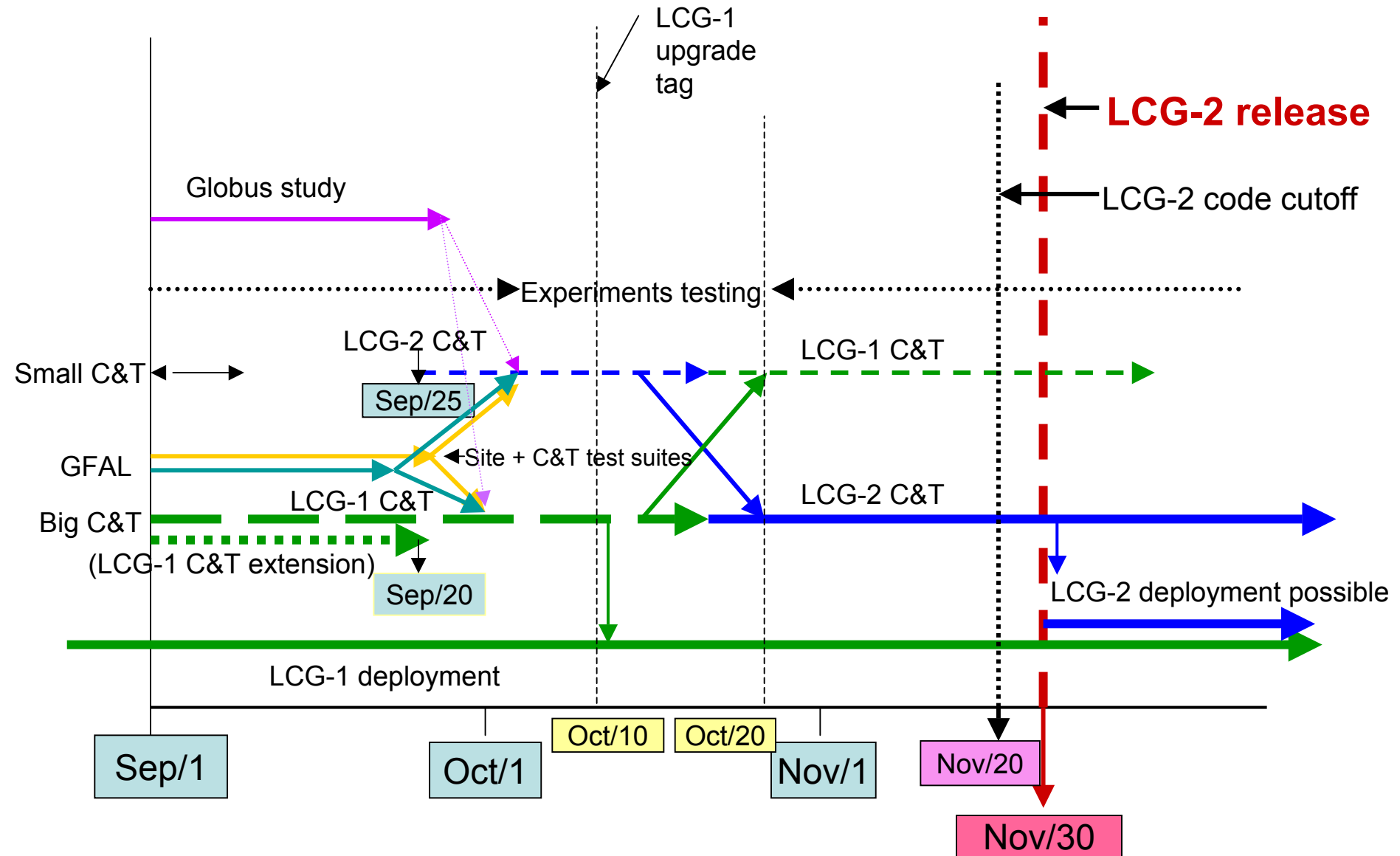
LCG-1 Lessons (C&T-team items)



- packaging/installation is an issue
 - rpm vs tar, pacman vs LCFG,
 - we must minimize the impact on local infrastructure
- configuration is too complex
 - too many interdependencies between different services
 - many parameters hardcoded in the conf files
- testing is a huge issue when technology is still under (heavy) development
 - around 200 bugs(!) open in ~7 months only from C&T-team
 - architecture, interoperability,
- internal team for fast bug fixing (3 people)
- crash of services strongly reduced after the certification & debugging process
- we need to improve operating procedures
 - upgrade/stop systems without draining the service
 - services status checkpointing to restart them on different nodes



Timeline to LCG-2





Summary



- middleware delivery to LCG was late
 - first reasonable set of middleware on the C&T testbed end of July
 - unfortunately short time to turn development software into production software and still a lot to do
- have a certification process for middleware has a demonstrable value
 - proven with LCG-1
- clearly not sufficient
 - we think software is not at production level yet
 - performances
 - we could not solve the configuration complexity yet ... but we did not give up
 - site verification is not exhaustive
- next items
 - operating procedures
 - scalability tests with complex jobs
 - simulating experiment production behaviour

- grid technologies not (yet?) standardized ... *life is not easy*
- requirements = still a moving target



Copyright © 2002 United Feature Syndicate, Inc.