egee

Enabling Grids for E-sciencE

SA3 Report

Markus Schulz
For EGEE-II SA3
IT Department, CERN
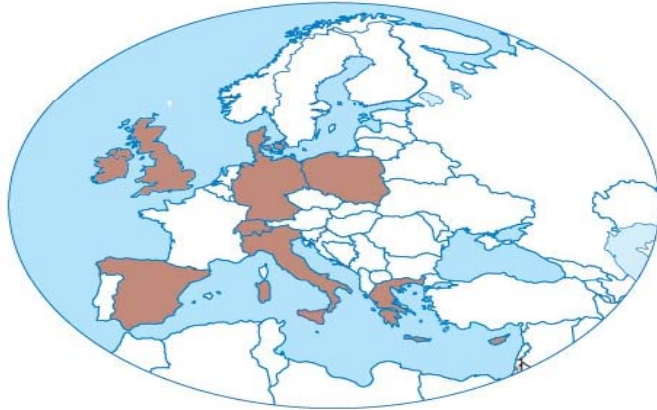**1st EU Review of EGEE-II**   **CERN, 15-16th May 2007**

www.eu-egee.org
www.glite.org

Information Society
and Media

Enabling Grids for E-sciencE

- **Activity Goals**

- **Main Achievements**

- **Status**
  - Integration and Release Management
  - Testing
  - Interoperability
  - Porting

- **Issues for SA3**

- **Future Plans**

- **Summary**

egee

Enabling Grids for E-sciencE

SA3 Partners

Manpower: 12 partners, 9 countries, 30 FTE

EGEE-II Budget

Short Name	Country	Total (PMs)
CERN	Switzerland	432
PSNC	Poland	36
TCD	Ireland	19
IMPERIAL	UK	24
INFN	Italy	60
UKBH	Denmark	12
UCY	Cyprus	34
GRNET	Greece	24
CSIC	Spain	12
PIC	Spain	24
CESGA	Spain	12
FZJ	Germany	36
Total		**725**

JRA1 13% JRA2 1% NA1 5% NA2 5% NA3 5% NA4 16% NA5 1% SA1 46% SA2 1% SA3 7%
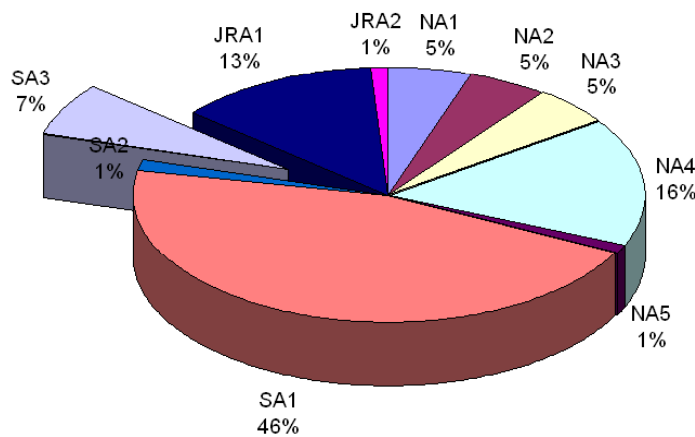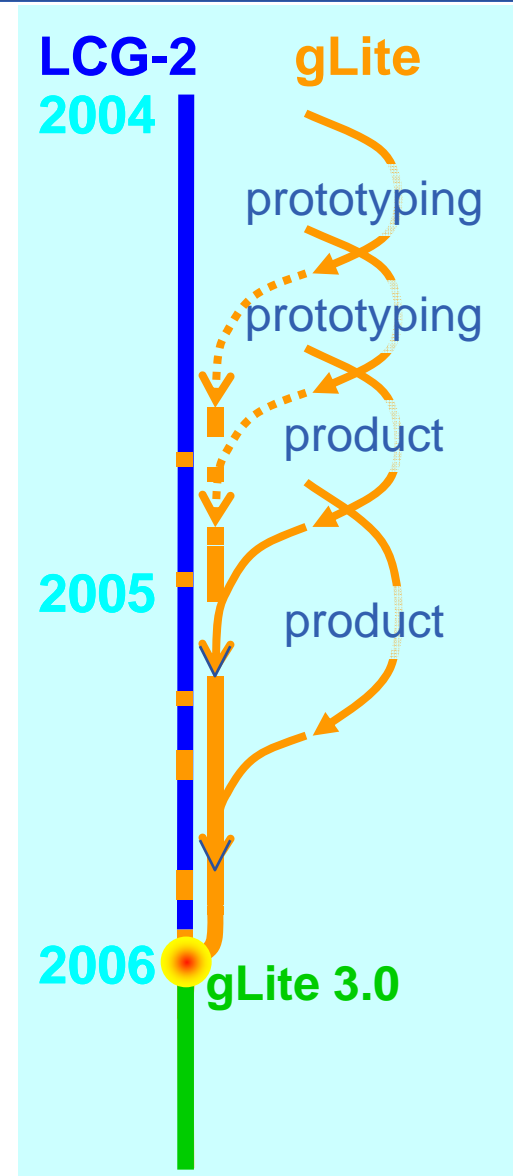
- **Manage the process of building middleware distributions**
  - Integrating middleware components from a **variety** of sources
    - Based on TCG decisions
  - Define acceptance criteria for accepting components
    - Ensure:
      - *reliability, ▪ robustness, scalability, security and usability*
  - Decouple middleware **distributions** from middleware **development**

- **SA3 is a new activity**
  - Tasks had been covered by SA1 and JRA1 during EGEE

Enabling Grids for E-sciencE

- Integration and Packaging

- Testing and Certification

  - *Functional and Stress Testing*

  - *Security, Vulnerability Testing*

  - *Operate Certification and Testing Test Beds*

  - *Project Testing Coordination*

- Debugging, Analysis, Support

- Interoperation

- Support for porting

- Participate in standardization efforts

- Capture requirements

Enabling Grids for E-sciencE

- **Integrated release of LCG-2.7 and gLite-1.5**
  - Different build systems
  - Different configuration management
  - Different, overlapping functionality
  - Different process……
    - LCG-2 process tailored to production
    - gLite process tailored to rapid development

- **Released on May 4th**
  - 4 days later than planned 5 months before

LCG-2   **gLite**
2004

prototyping

prototyping

product

2005   product

2006   **gLite 3.0**

Enabling Grids for E-sciencE

- **Introduced new software lifecycle process**
  - Based on the gLite process and LCG-2 experience

  - Components are updated independently
  - Updates are delivered on a *weekly* basis to PPS
    - Move after *2 weeks* to production
  - Acceptance criteria for new components
  - Clear link between component *versions*, *Patches* and *Bugs*
    - Semi-automatic release notes
  - Clear prioritization by stakeholders
    - TCG for medium term (3-6 months) and EMT for short term goals
  - Clear definition of roles and responsibilities
  - Documented in MSA3.2

  - In use since July 2006

Enabling Grids for E-sciencE

- **Test strategy, process,framework and external testbeds**
  - SAM framework for automated testing (SA1 product)
  - Central repository for tests
  - Formal follow-up `on test development`
  - Increased number of test cases ▪
    - Development of tests mostly by partners
  - Formal process for Patch certification
  - Extended test beds: 8 sites
    - about 100 nodes to cover additional deployment scenarios
  - Extensive use of *virtualized* test beds
  - Introduced concept of "Experimental Services"
    - Massive scalability tests can't be conducted on test infrastructures
    - See JRA1 presentation for details

Enabling Grids for E-sciencE

- **Integration and Release Management**
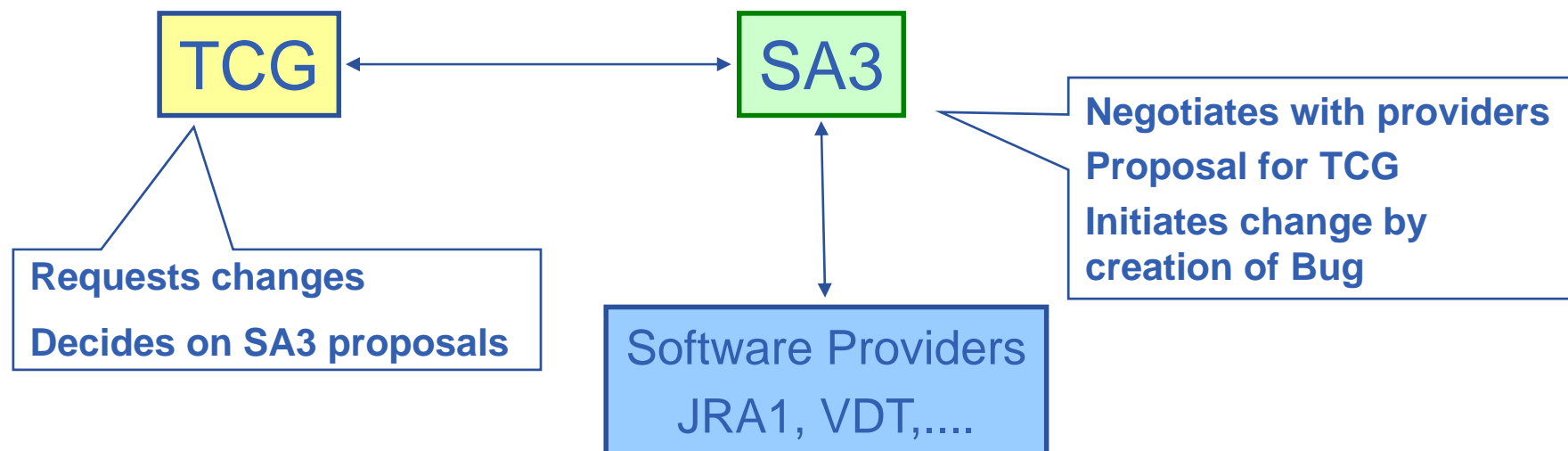
Enabling Grids for E-sciencE

• **Major Changes:**

New components

Significant additional functionality

Changes that require new baseline releases

reference OS, non backward compatible changes

TCG ←———————→ SA3
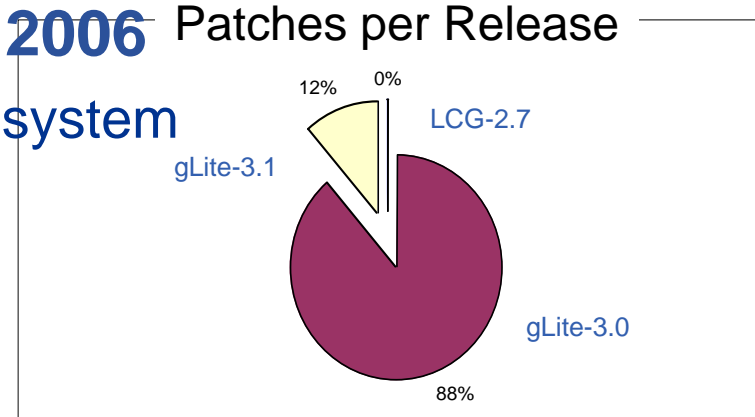
Requests changes

Decides on SA3 proposals

Negotiates with providers

Proposal for TCG

Initiates change by creation of Bug

Software Providers
JRA1, VDT,....

SA3 opens a Bug and Patch to start the integration of change

Continuous, several Bugs and Patches progress in parallel

TCG

EMT

Prioritization:
EMT twice a week
TCG every second week

SA3 Integration

Software Providers
JRA1, VDT,....

Experimental Services
Use production service

SA3 Configuration

Users
Stress tests

SA3
Release Manager
Coordinates

SA3 Test Process

Installation tests

Functional Tests

Patch Specific Tests

Scalability Tests

Tests on external testbeds

Rejected Patches

Every second week
Patches are moved
to Production

Once a week Patches
that pass certification
move to PPS

Users
Test & Reject

SA1 PPS
Updates and Operates

SA1 Production Service
Updates and Operates

eGee

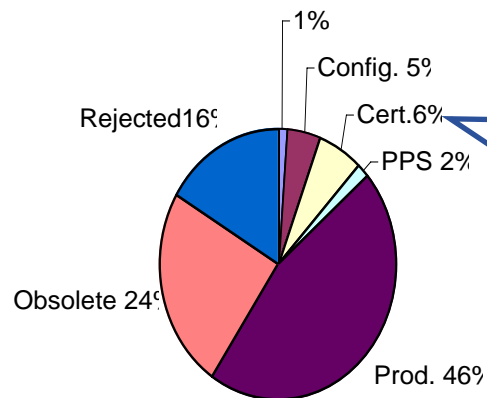Enabling Grids for E-sciencE

- **Process is in active use since July 2006**
  - Produced 23 updates to the production system
    - 26 since May 2006 (status May 6th)
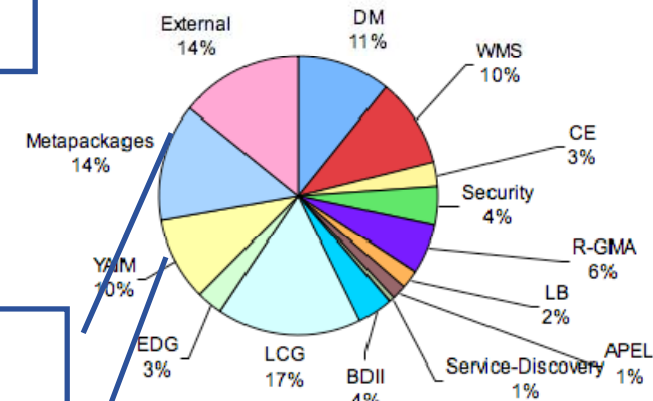 - Processed **269** Patches
    - Addressing 835 Bugs

Patches per Release

12% | 0%
gLite-3.1 | LCG-2.7
gLite-3.0
88%

gLite-3.1 activities are picking up

Patches per final state (Open & closed, gLit

1%
Config. 5%
Cert. 6%
Rejected 16%
PPS 2%
Obsolete 24%
Prod. 46%

Ratio between Config. Cert and PPS indicates that changes are piling up in SA3

Patches per software area (gLite 3.0)

External 14%
DM 11%
WMS 10%
Metapackages 14%
CE 3%
Security 4%
R-GMA 6%
YAIM 10%
LB 2%
EDG 3%
LCG 17%
BDII 4%
Service-Discovery 1%
APEL 1%

New node types, new services, new deployment scenarios (32 meta packages are maintained)

Configuration patches reflect merger

- **gLite-1 configuration based on XML and Python**
- **LCG-2 configuration based on Key-Value pairs + bash**
  - YAIM
  - Easy to integrate with other fabric management tools
- **Site administrators preferred YAIM (result of survey)**
  - Wrappers for gLite components
  - Process started to move to single layer configuration
    - FTS, WN, UI, and WMS are already in single layer mode

- **Installation tool**
  - APT for (semi) automatic RPM updates
    - Standard Debian tool, widely used
  - RPM lists for other tools
  - Tarballs for UIs and WNs

Build Systems

- **Currently 3 systems in use**
  - Complicates dependency management, release management

- **LCG build system for legacy components**
  - To be phased out during the year
- **gLite build system**
  - Used for the gLite-3.0 branch
  - To be phased out during the year

- **ETICS**
  - Used for the gLite-3.1 branch
  - Migration process to ETICS started in early August 06
  - Will be finished around August 2007

Enabling Grids for E-sciencE

- **Test plans and process documented in MSA3.5**
- **Test strategy**
  - Multi level tests (from simple functional tests, to stress tests)
    - To abort as early as possible
  - As much steps in parallel as possible
    - Component based
      - *Install, configure, functional tests, first patch certification*
    - Requires many temporary testbeds
      - *We use virtualization (Xen based) to save time and resources*
  - Automate as much testing as possible
    - But first ensure coverage

  - First local then external testbeds

  - Moved towards testing components against a "Baseline Release"
    - Required significant reorganization of the testbed operation

Enabling Grids for E-sciencE

- **We have chosen SAM as our framework for testing**
  - Maintained and used by SA1
  - Several tests can be used in certification and production
  - Tests need very little modification
    - Concept is compatible with testing in ETICS ---> easy port
  - Provides Web based, customizable views and history

Enabling Grids for E-sciencE

- **Test development mainly by partners**
  - Partners signed up for tests
  - Progress is monitored and documented every 2 weeks

- **New class of tests: Security testing**
  - Done by Posznan
    - Code reviews (VOMS and R-GMA)
    - Penetration tests
    - Independent testbed
      - *Report to the grid vulnerability group*

- **Interoperability tests**
  - Not yet integrated in the tests process
  - In preparation with OSG

- **Number of test cases available now >150**
- **Most components well covered (progressing well)**
- **Patch test process is the first step towards regression tests**

Tests Status

Enabling Grids for E-sciencE

Component	Available tests	Responsible	SAM
BLAH	5 tests for basic functionality	INFN	no
Batch systems	Torque has been tested and scripts developed. Partners should extend these tests to other batch systems	GRNET (Torque), INFN (LSF), PIC (Condor), CESGA (SGE)	no
CE	19 SAM tests	CERN	yes
gLite CE	19 SAM tests & manual test result page	CERN	yes
DGAS	5 tests	INFN	no
DPM	41 tests	CERN	no
FTS	7 tests	CERN	yes
Information System	1 basic test & GIS mon & performance and scalability tests	INFN (until April 2007), CERN	no
LB	4 functionality tests	University of Brussels	no
LFC	2 SAM tests, 2 API tests, LFC performance test page	CERN, LAL	Yes, No
MyProxy	1 SAM test	CERN	yes

EGEE-II INFSO-RI-031688   1st EU Review, May 15-16, 200

Tests Status

Enabling Grids for E-sciencE

Component	Available tests	Responsible	SAM
RGMA	RGMA test results page, source code auditing	TCD, PSNC	no
RB	The old edg-tests suite is used occasionally	CERN	no
SE	3 SAM tests	CERN	yes
SRM v.2	S2 test suite, SRM2 test in DPM tests (30+ tests)	CERN	yes
UI	Extensive test suite testing all commands listed in the LCG User Guide (30+)	CERN	no
WN	Most of the UI tests are also applicable to the WN.	CERN	no
VOMS	28 tests, VOMS source code auditing	CERN, PSNC	yes
WMS	Tests for: bulk submission, interactive jobs, parametric jobs. Glite version of edg-tests, WMS tests result page	CERN, IMPERIAL (since April 2007), CSIC (WMProxy)	partly

EGEE-II INFSO-RI-031688   1st EU Review, May 15-16, 2007   22

eGee

Enabling Grids for E-sciencE

- **Virtual testbeds for individual testers (about 5)**
- **Dynamical allocated test nodes (> 50 nodes)**
- **Central certification testbed**

	a	b	c	d	e	f	g	h	i	j	k	l
0		2033 BDII_top Configured	2020 PX Configured	1B	1xb2017 BDII_top Configured	2	3+sl4	1738 VOBOX Configured		Stable	Config	1774 VOBOX Configured
1				2032 WMS Configured		0744 WMS Configured	6122 WMS OS	1928 VOMS Configured				1912 WMS Configured
2	2057 UIcomb Configured			1765 UIcomb Configured			6119 UI Configured	0714 SAM Configured		1917 UI Configured		1778 UI Configured
3	2016 RB Configured			1762 RB Configured		0730 RB Configured				1794 RB Configured		
4	1xb1776 BDII_site Configured			1xb6121 gLiteCE Configured sl3.arch32.mw32		0743 gLiteCE Configured				1936 BDII_top Configured		1919 gLiteCE Configured
5	2018 CE Configured			2034 CE Configured		2035 CE Configured		LSF		1938 CE Configured		1779 CE Configured
6	0731 WNcomb Configured			6122 WNcomb Configured sl4.arch64.mw32		0741 WNcomb Configured		6115 CE Configured		1758 WNcomb Configured		0718 WNcomb Configured
7	1921 DPM_mysql Configured			1xb6125 WNcomb Configured sl4+arch32+mw32		1716 WNcomb Configured				1916 DPM_pool Configured		0734 WNreloc Configured
8				1xb6126 WNcomb Configured sl4+arch32+mw32		1720 WNcomb Configured	6127 DPM_mysql OS	gCondor	torqueTest	1751 dCache_mysql Configured		1777 dCache_mysql Configured
9				1xb1917 DPM_mysql Configured		0724 SEclassic Configured	6128 LFC_mysql OS	1xm1176 gLiteCE Configured	1920 CE Configured	1915 DPM_mysql Configured		1775 SEclassic Configured
10	2019 MON Configured					1xb2036 DPM_mysql Configured	6129 FTS OS	0738 WNcomb Configured	0739 WNcomb Configured			
11	1941 LFC_mysql Configured	1xb1909 FTS Configured	1xb1543 MySqlDB Configured sl4+arch32+mw32	1782 LFC_oracle Configured	2011 FTS Configured			1xshare0297 WNcomb OS				0727 DPM_pool Configured

Enabling Grids for E-sciencE

- **External testbeds linked to the certification testbed**
  - CESGA (SGE)
  - PIC (Condor)
  - GRNET (Torque)
  - UCY (Torque)
  - INFN (LSF)
  - LAL (DPM,LFC)
  - DESY (dcache)

Setup and coordination took a long time, last site joined end of 2006.

Delayed due to start up of the activity Hiring, training, procurement, etc.

- **Standalone testbeds**
  - Posznan (Security)
  - IMPERIAL (WMS)
  - TCD (Porting)

Enabling Grids for E-sciencE

- **OSG**
  - In production since almost 10 months (extensive use by CMS)
  - Interoperability testbed in preparation
- **ARC (used by NDGF)**
  - Problem has been analysed in depth
  - Plan documented in MSA3.4
  - First proof of principle for some components
    - ARC's focus is on the CREAM CE
    - Progress slower than expected
- **UNICORE (used for super computers)**
  - Problem has been analysed in depth
    - Very complex, minimal overlap between concepts
  - Plan documented in MSA3.3
  - Proof of principle tests have bee successful
    - Progress slower than expected

egee

Enabling Grids for E-sciencE

- **NAREGI**
    - Close contact during 2006
    - NAREGI demonstrated first set of interoperability tools
        - Job submission gateway
        - Info system translator
        - Data management link

- **GIN info**
    - Part of the *OGF GIN* activity
        - Links information systems of many grid infrastructures
    - Google-maps showing GIN grids use the GIN-BDII
    - SA3 developed the concept and helped with translators

GIN BDII → ARC BDII

Generic Information Provider

Provider EGEE | Provider OSG | Provider NDGF | Provider Naregi | Provider Teragrid | Provider Pragma

EGEE Site | OSG Site | NDGF Site | Naregi Grid | Teragrid Grid | Pragma Grid
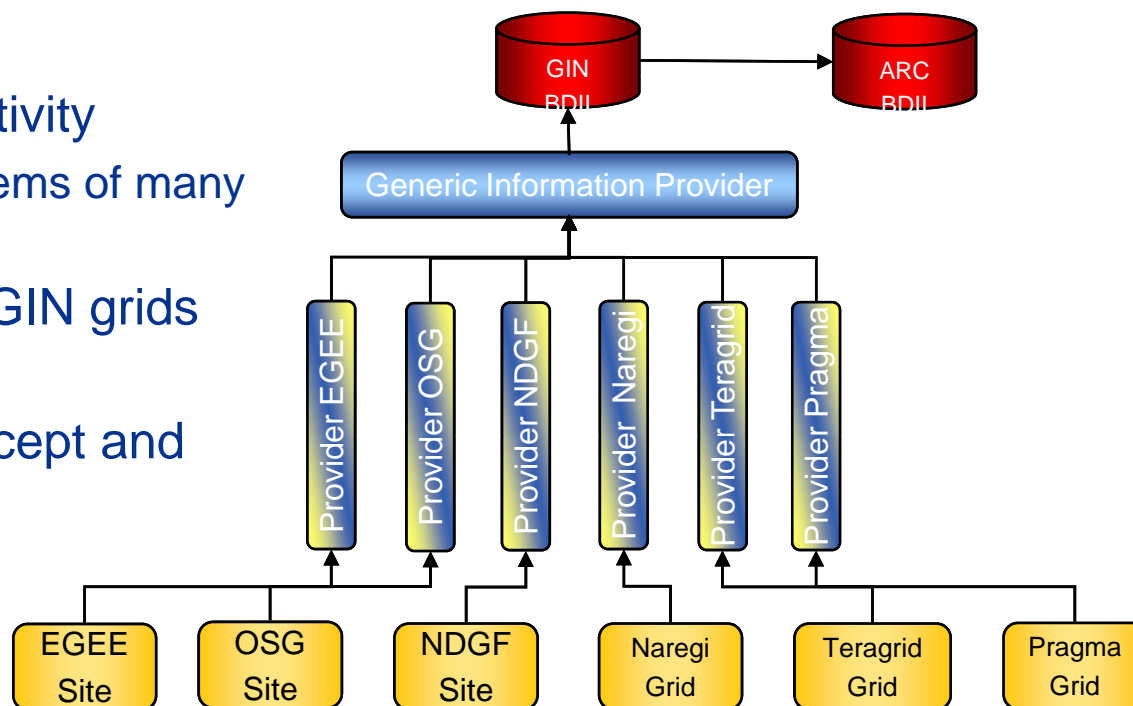
- **SA3 is participating actively in the GLUE standardization process**

- **Process has been moved to OGF**
  - SA3 member is co-chairing the working group

Enabling Grids for E-sciencE

- **Main partners are TCD and Posznan**

- **Problems with porting**
  - Software dependencies and interdependencies
    - See "Plan for glite restructuring"
  - Up to now only "post release" porting
    - Difficult to follow change rate
    - Other platforms have to be supported at release time

- **TCD is moving to ETICS to close the gap**
  - Supports better concurrent multi platform build and tests
    - https://twiki.cern.ch/twiki/bin/view/EGEE/PortingWithEtics

eGee

Enabling Grids for E-sciencE

- **Status table at TCD:**
  - http://cagraidsvr06.cs.tcd.ie/autobuild

Grid-Ireland Local ETICS Build of gLite-WN-3_1_0

Using ETICS pre-production version: 0.8.0-9

ARCH	OS TYPE	VERSION	DISTRO	VDT	deps	torque	Basic	VOMS	RGMA	DM	gfal	Full
			Worker Node Build Status									
ia32	SL	3	yum	3/3	27/28	1/1	4/4	14/14	51/51	17/22	N/A	315/349
	CentOS	4	yum	3/3	28/28	1/1	4/4	14/14	51/51	17/19	31/32	315/349
	SuSE	9	apt	3/3	0/1	0/1	4/4	14/14	36/51	1/19	N/A	215/349
	Fedora	6	yum	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Solaris	10	pkg/tarball	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
x86_64	SL	3	yum	0/1	13/14	1/1	0/0	6/8	1/1	N/A	N/A	N/A
	CentOS	4	yum	1/1	5/16	1/1	N/A	N/A	N/A	N/A	N/A	N/A
	SuSE	9	apt	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Fedora	6	yum	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
powerpc	Mac OS X	10.4	fink/tarball	N/A	11/16	1/1	N/A	N/A	N/A	12/23	N/A	N/A
	Mac OS X	10.3	fink/tarball	0/1	17/22	1/1	0/1	8/14	24/51	12/23	N/A	181/427
	AIX	5	rpm/tarball	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Legend	Colour					
	Meaning	To be Started	Started	DONE	Vendor Built	Not Possible

Enabling Grids for E-sciencE

- **Merging 2 middleware stacks, tool sets and processes**
  - While keeping changes flowing to production
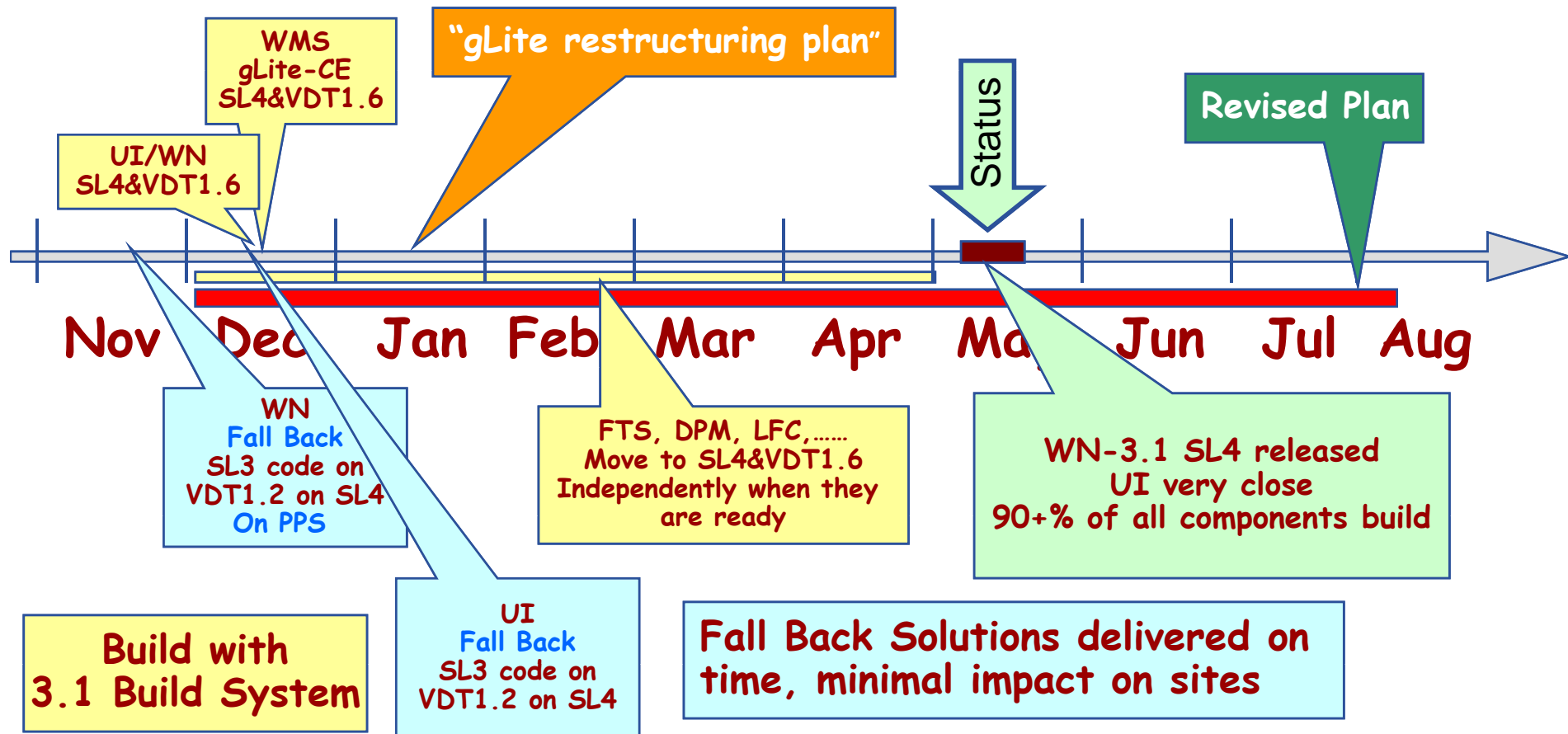 - Was very difficult, done under high pressure by the applications

- **Introducing change while supporting a production service**
  - More than 200 individual updates
  - How to handle major changes
    - new baseline release, tools etc.
  - Too many entities create change
    - JRA1 developers, sites, VDT, security, etc.

  - *Current resource level is adequate to support steady state*

Enabling Grids for E-sciencE

- **Testing**
  - Not as complete as planned
  - Depends still too much on central team
  - Introduced more frequent communication
    - Phone conferences
    - Formal follow-up on status

- **Interoperability**
  - Underestimated UNICORE interoperation complexity
    - Review of plan at the next meeting (3rd week of May)
  - ARC struggled with some technical issues
    - But mainly a partner issue
    - Review of plan at the next meeting(3rd week of May)

eGee
Enabling Grids for E-sciencE

- **Complete the move to gLite-3.1 (including ETICS)**
  - Delayed due to a multitude of reasons
  - Addressed by the PMB endorsed "gLite restructuring plan"

WMS
gLite-CE
SL4&VDT1.6

"gLite restructuring plan"

Status

Revised Plan

UI/WN
SL4&VDT1.6

Nov Dec Jan Feb Mar Apr May Jun Jul Aug

WN
Fall Back
SL3 code on
VDT1.2 on SL4
On PPS

FTS, DPM, LFC,......
Move to SL4&VDT1.6
Independently when they
are ready

WN-3.1 SL4 released
UI very close
90+% of all components build

UI
Fall Back
SL3 code on
VDT1.2 on SL4

Build with
3.1 Build System

Fall Back Solutions delivered on
time, minimal impact on sites

Enabling Grids for E-sciencE

- **Testing: (beside adding tests)**
  - Automate more test cases with SAM
  - Regression testing for all bugs
  - Decentralize Patch certification
  - Move install and configuration tests to ETICS
    - Later all tests
- **Single layer, component centric configuration tool**
  - component YAIM, in certification
- **Support at least 2 additional platforms for all releases**
  - To be defined by TCG
  - Can be restricted to some components (UIs, WN)

- **Implementation of the "gLite Restructuring Plan"**

Enabling Grids for E-sciencE

- **SA3 now a working activity**

- **Integrated LCG-2.7 and gLite-1.5 on time**

- **Defined and implemented Software Life Cycle process**
  - Component based updates work! (269 patches since June)

- **Test process defined and implemented**
  - Many additional tests
  - Common framework with SA1 (SAM)
  - External testbeds to cover deployment scenarios

- **Move to gLite-3.1 is well underway**

- **Interoperation made visible progress**
  - OSG interoperation used on daily basis
  - NAREGI well advanced