JRA1
Middleware Re-engineering

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On behalf of JRA1

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

Information Society and Media

Outline

- **Processes and Releases**
- **Subsystems**
  - Features
  - Deployment Status
  - Short Term Plans
- **Testing Status**
- **Metrics**
- **Summary**

gLite Processes

- **Architecture Definition**
  - Based on Design Team work
  - Associated implementation work plan
  - Design description of Service defined in the Architecture document
    - Really is a definition of interfaces
  - Yearly cycle
- **Implementation Work plan**
  - Prototype testbed deployment for early feedback
  - Progress tracked monthly at the EMT
- **EMT defines release contents**
  - Based on work plan progress
  - Based on essential items
    - So far mainly for H… BioMed and Op…
  - Decide on targ… …gs
    - Takin… …ough time for int… …g
- **Integ… …produces Release C… …ased on received tags**
  - …Smoke Test, Deployment Modules, …figuration
  - Iterate with developers
- **Testing Team**
  - Test Release candidates on a distributed testbed (CERN, RRZN H… …annover, Imperial College)
  - Raise bugs as n…
  - Iterate with … …evelopers
- **Once Re… …date passed functi…**
  - …eam produces documentation, …notes and final packaging
  - …nounce the release on the glite Web site and the glite-discuss mailing list.

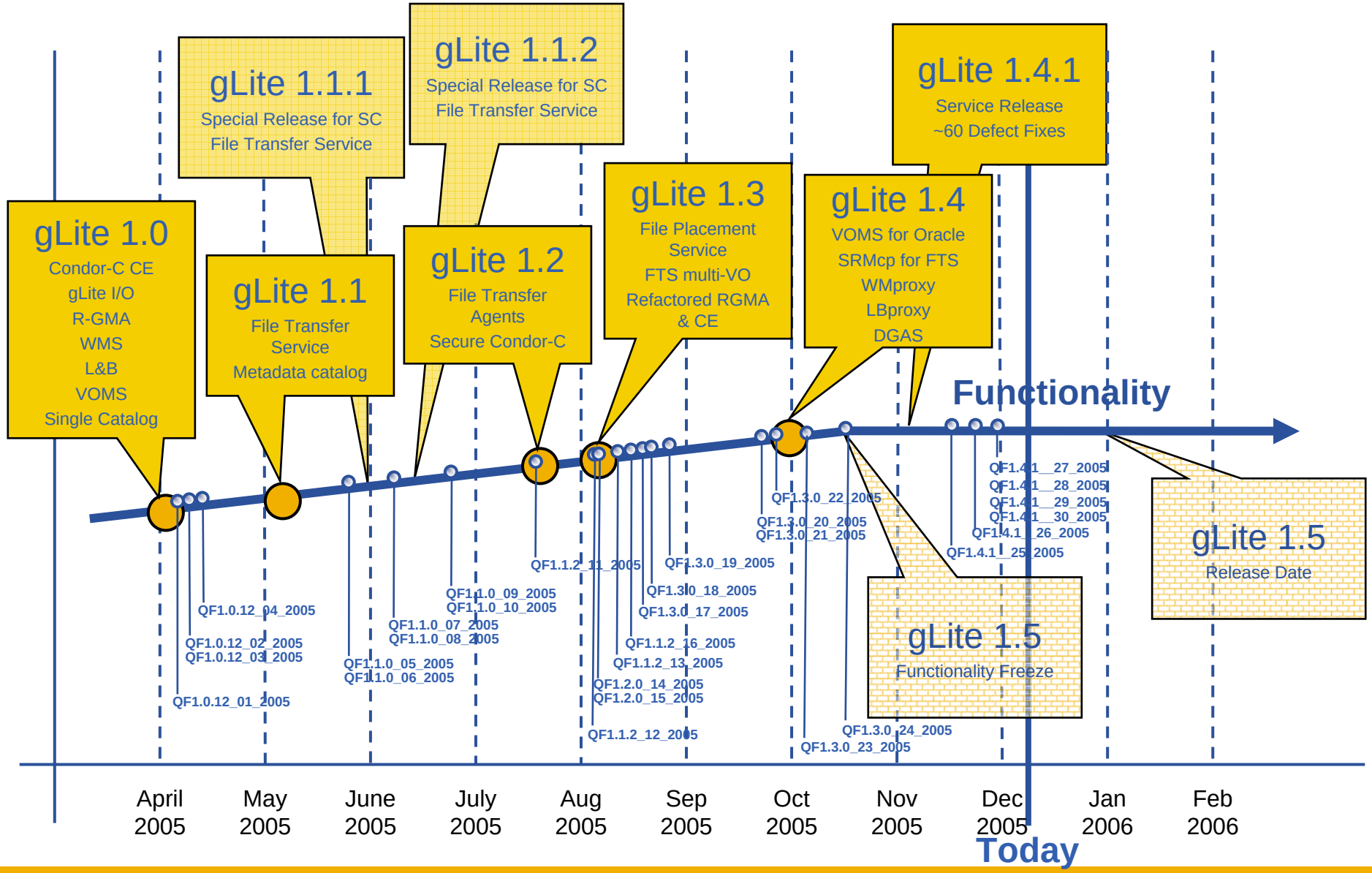
Deployment on Pre-production Service and/or Service Challenges

- Feedback from larger number of sites and different level of competence
- Raise Critical bugs as needed
- Critical bugs fixed with Quick Fixes when possible

- **Deployment on Production of selected set of Services**
  - Based on the needs (deployment, applications)
  - Today FTS, R-GMA, VOMS

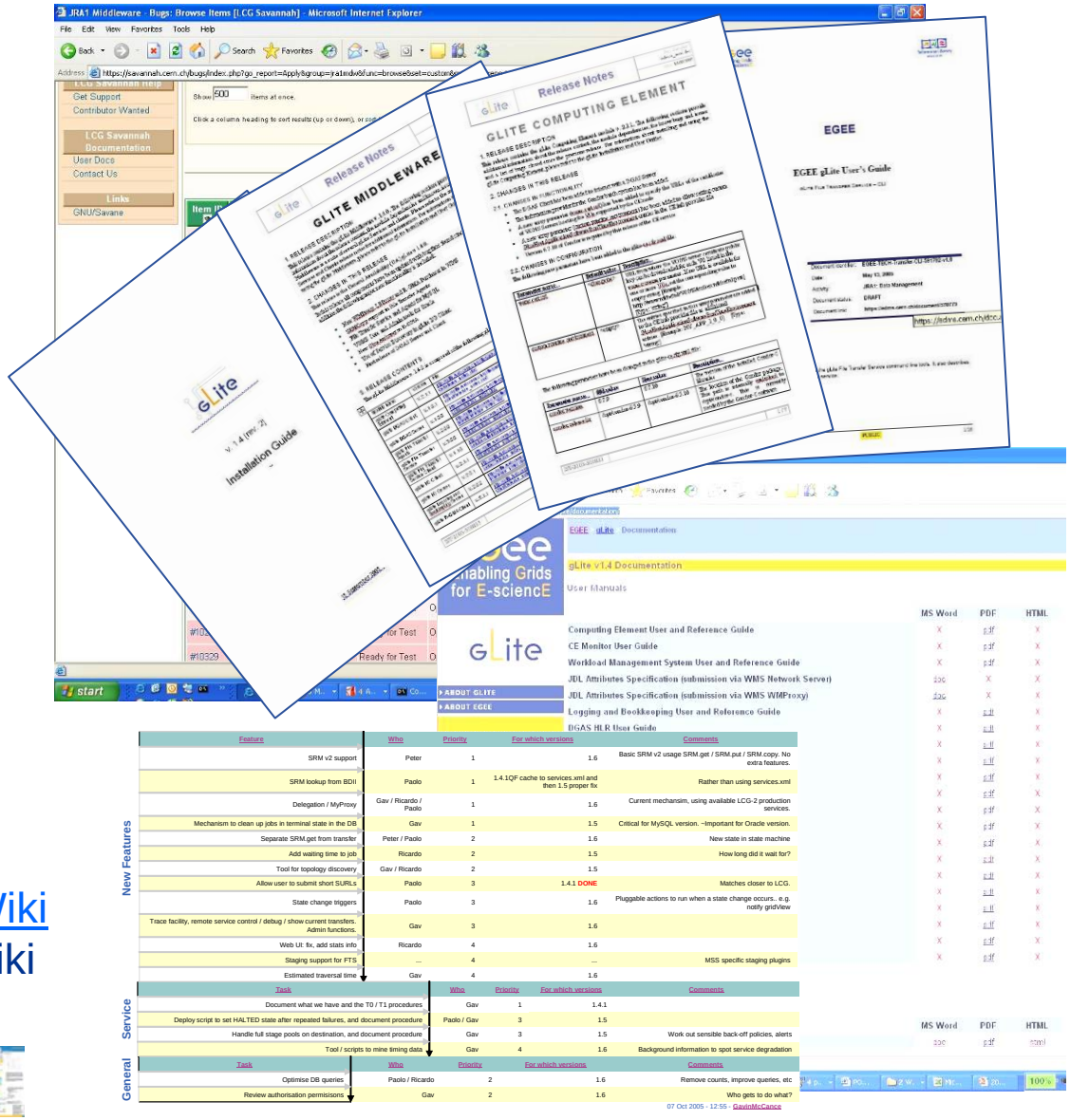
The focus has been on essential (simple) services and defect fixing – e.g. FTS, R-GMA, VOMS

gLite Releases and Planning



gLite Documentation and Information sources

- **Installation Guide**
- **Release Notes**
  - General
  - Individual Components
- **User Manuals**
  - With Quick Guide sections
- **CLI Man pages**
- **API's and WSDL**
- **Beginners Guide**
- **gLite Web site**
- **Bug Tracking System**
- **Tutorials**
- **Mailing Lists**
  - gLite-discuss
  - Pre-Production Service
- **Other**
  - Data Management (FTS) Wiki
  - Pre-Production Services Wiki
    - Public and Private
  - Presentations
  - Posters



Working with Early Adopters

Different strategies depending on potential users:

- **FTS**
  - Working directly with (part of) Service Challenges team
  - Daily meetings
- **R-GMA**
  - Daily reports for Job Monitoring/GridFTP log monitoring
  - Weekly meetings
- **HEP Task Forces**
  - Helping experiments to use gLite from their frameworks
  - Assessing functionality and performance of the components they are interested in
  - Sometimes evaluating unreleased/new components/features
    - From developments environments
  - Weekly (mostly) meetings
- **BioMedical applications**
  - Focused Data Management exercise
  - Weekly phone calls
  - Respective developers working hand-in-hand
- **DILIGENT project**
  - Relatively loose coupling
  - 10 meetings, but very effective collaboration
  - Results reported at the EGEE 4th conference (Oct'05, Pisa)
- **Operations/Pre-Production Service**
  - Assess most critical defects
  - Weekly face-to-face meetings

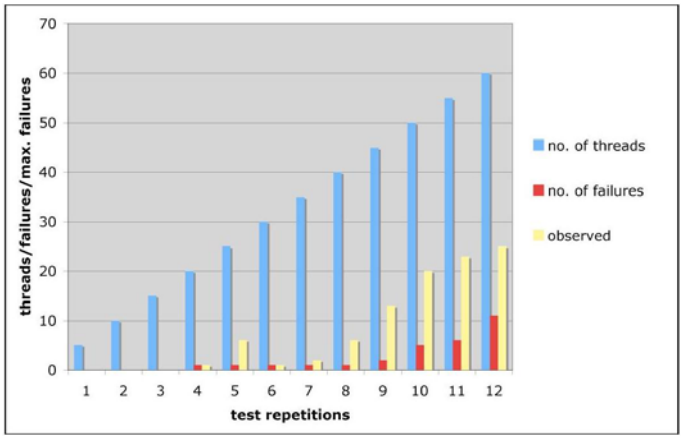
Working with Early Adopters a.k.a. Breaking the Processes

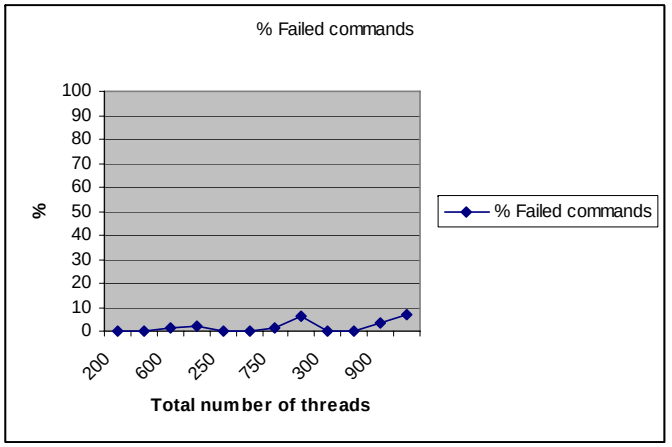
Side effects:

- **Sometimes the formal process is bypassed**
  - E.g. install rpm's instead of using configuration scripts and following installation guide/release notes
  - Example: FTS
    - https://uimon.cern.ch/twiki/bin/view/LCG/FtsServerInstall13
  - Does not always help improving the installation but helps in deploying quickly
    - Defects are usually reported upon deployment on the Pre-Production Service
- **Unreleased components are sometimes exposed as fully functional**
  - While having only been installed in one place
  - Potentially causing frustration for early users
  - However helps in defining useful functionality and improve performance
    - E.g. factor of 12 in matchmaking performance has been identified
- **Costs significant effort in JRA1**

Security Services

- **Most Services rely on GSI and MyProxy**
  - Still using well understood GT2 implementation
  - Authentication can be expensive
    - Several subsystems provide bulk operations
- **VOMS**
  - Manages VO Membership
  - Provides support for Groups and Roles
  - Support for MySQL and Oracle DB backend
  - Included in the VDT
  - Support for many other clients than SLC3
- **VOMS Admin**
  - Support for Oracle and MySQL back ends
    - VOMS ADMIN (Oracle) still problematic
    - Support issues clarified
- **Deployed on the Production Infrastructure**
  - Interfaced with OSG's VOMSRS



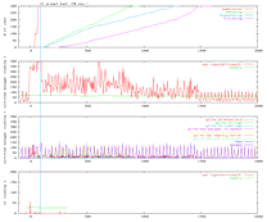


Job Management Services (I)

- **Logging and Bookkeeping (L&B)**
  - Tracks jobs during their lifetime (in terms of events)
  - L&B Proxy
    - Provides faster, synchronous and more efficient access to L&B services to Workload Management Services
  - Support for “CE reputability ranking“
    - Maintains recent statistics of job failures at CE’s
      Feeds back to WMS to aid planning
  - Working on inclusion of L&B in the VDT

- **Computing Element (CE)**
  - Service representing a computing resource
  - CE moving towards a VO based local scheduler
  - Batch Local ASCII Helper (BLAH)
    - More efficient parsing of log files (these can be left residing on a remote machine)
    - Support for hold and resume in BLAH
      To be used e.g. to put a job on hold, waiting for e.g. the staging of the input data
  - Condor-C GSI enabled
  - CE Monitor (CEMon)
    - Better support for the pull mode; More efficient handling of CEmon reporting
    - Security support
    - Possibility to handle also other data
      E.g. a GridIce plugin for CEMon implemented
    - Included in VDT and used in OSG for resource selection
- **GPbox**
  - XACML-based policy maintainer, parser and enforcer.
  - Can be used for authorisation checks at various levels.

Job Management Services (II)



- **Workload Management System (WMS)**
  - Backward compatibility with LCG-2
  - WMProxy
    - Web service interface to the WMS
    - Allows support of bulk submissions and jobs with shared sandboxes
  - Support for shallow resubmission
    - Resubmission happens in case of failure only when the job didn't start running - Only one instance of the user job can run.
  - Support for MPI job even if the file system is not shared between CE and Worker Nodes (WN)
  - Support of R-GMA as resource information repository to be used in the matchmaking besides BDII and CEMon
  - Support for Data management interfaces (DLI and StorageIndex)
  - Support for execution of all DAG nodes within a single CE - chosen by user or by the WMS matchmaker
  - Support for file peeking to access files during the execution of the job
  - Initial integration with G-Pbox - considering simple AuthZ policies
  - Initial support for pilot job
    - Pilot job which "prepare" the execution environment and then get and execute the actual user job

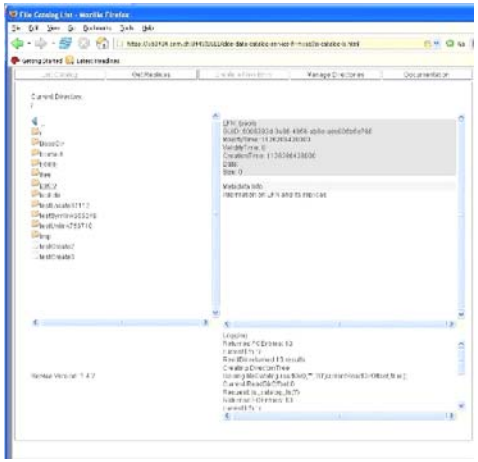
- **DGAS Accounting**
  - Accumulates Grid accounting information about the usage of Grid resources by users / groups (e.g. VOs) for billing and scheduling policies
  - CEs can be instrumented with proper sensors to measure the resources used

- **Job provenance**
  - Long term job information storage
  - Useful for debugging, post-mortem analysis, comparison of job executions in different environments
  - Useful for statistical analysis

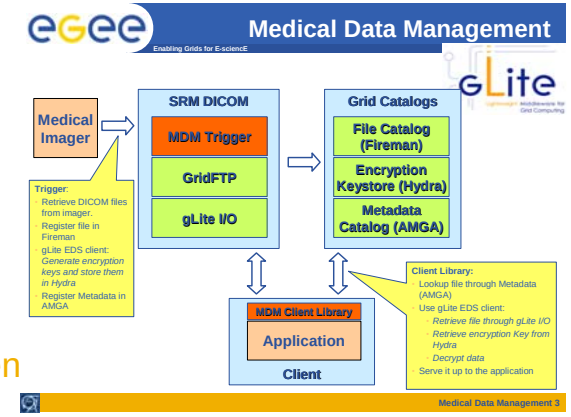
- **WMS, CE, L&B are considered for inclusion in the next LCG-2.7.0 release**
  - Currently deployed on the Pre-production service and DILIGENT testbed
  - Tested on many private instances

Data Management Services

- **FiReMan catalog**
  - Resolves logical filenames (LFN) to physical location of files (URL understood by SRM) and storage elements
  - Oracle and MySQL versions available
  - Secure services, using VOMS groups, ACL support
  - Full set of Command Line tools
  - Simple API for C/C++ wrapping a lot of the complexity for easy usage
  - Attribute support
  - Symbolic link support
  - Exposing interfaces suitable for matchmaking (StorageIndex and DLI)
  - Separate catalog available as a keystore for data encryption ('Hydra')
  - Deployed on the Pre-Production Service and DILIGENT testbed



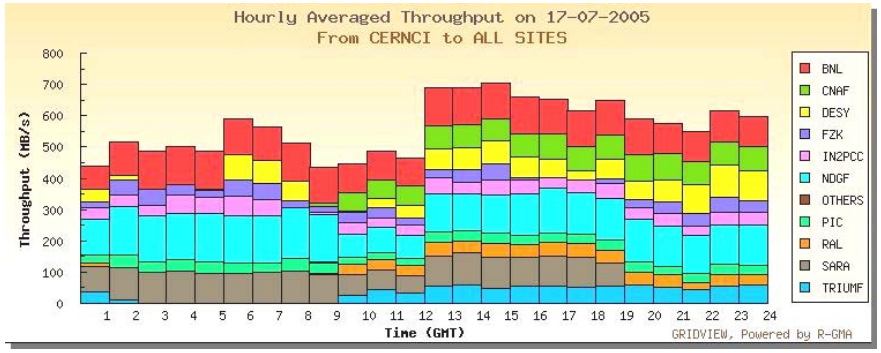
- **gLite I/O**
  - POSIX-like access to Grid files
  - Interfaced to Castor, dCache and DPM Storage Resource Managers
  - Added a remove method to be able to delete files
  - Configuration using the common Service Discovery interfaces
  - Improved error reporting
  - Has been used for the BioMedical Demo in Pisa (Oct'05)
    - Encryption and DICOM Storage Resource Manager
  - Deployed on the Pre-Production Service and the DILIGENT testbed

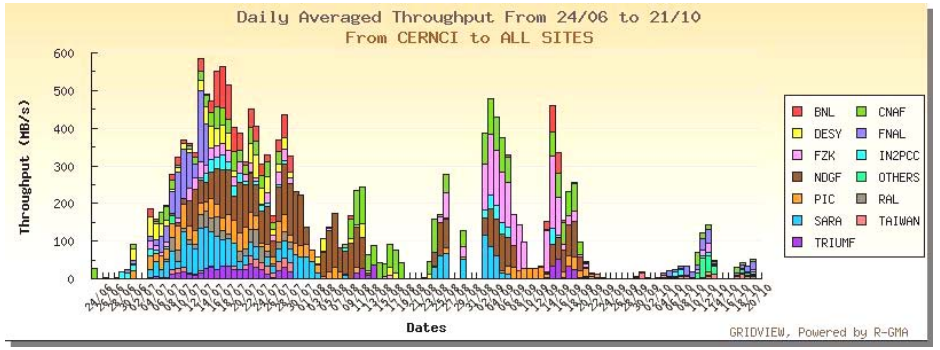


- **AMGA MetaData Catalog**
  - NA4 contribution
    - Result of JRA1 & NA4 prototyping together with PTF assessmen
    - Used by the LHCb experiment
    - Has been used for the BioMedical Demo in Pisa (Oct'05)

File Transfer Service

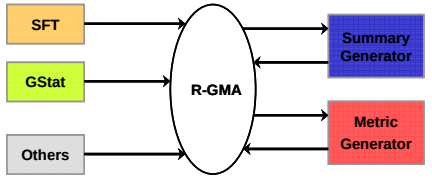
- **Reliable file transfer**
- **Fully scalable implementation**
  - Java Web Service front-end, C++ Agents, Oracle or MySQL database support
  - Support for Channel, Site and VO management
  - Interfaces for management and statistics monitoring
  - Support for Gsiftp and Storage Resource Management (SRM) interfaces
  - Has been in use by the Service Challenges for the last 5 months.
  - Evolved together with the Service Challenges Team
  - Daily meetings
- **FTS evolved over summer to include**
  - Support for MySQL and Oracle
  - Multi-VO support
  - SRM copy support
  - MyProxy server as a CLI argument
  - Many small changes/optimizations revealed by Service Challenges usage
- **FTS workshop with LHC experiments on November 16**
  - Issues, Feedback and short term plans





Information Systems

- **R-GMA**
  - Essentially bug fixes & consolidation
  - Merging LCG & gLite code base
  - Secure version



- **Used in production as monitoring data aggregator**
  - Job status published from Logging & Bookkeeping every 5 minutes
- **Interfaced from the Workload Management System**

- **Service Discovery**
  - Was not part of gLite 1.0
  - An interface has been defined and implemented for 3 back-ends
    - R-GMA
    - BDII
    - Configuration File
  - Command Line tool for end users
  - Used by WMS and Data Management clients

- **Production Services still using BDII as the Information System**
  - Pre-Production Service has started to use R-GMA

gLite Services in Release 1.5 Components Summary and Origin

- **Computing Element**
  - Gatekeeper, WSS (Globus)
  - Condor-C (Condor)
  - BLAH (EGEE)
  - CE Monitor (EGEE)
  - Local batch system (PBS, LSF, Condor, SGE, BQS)
  - DGAS Accounting (EDG/EGEE)
- **Workload Management**
  - WMS (EDG/EGEE)
  - Logging and bookkeeping (EDG/EGEE)
  - Condor-C (Condor)
  - Job Provenance (EGEE)
- **Storage Element**
  - File Transfer/Placement (EGEE)
  - glite-I/O (AliEn)
  - GridFTP (Globus)
  - SRM: Castor (CERN), dCache (FNAL, DESY), DPM (CERN), other SRMs
- **Catalog**
  - File and Replica Catalog (EGEE)
  - Metadata Catalog (EGEE/NA4)
- **Information and Monitoring**
  - R-GMA (EDG/EGEE)
  - Service Discovery (EGEE)
  - BDII (EDG/LCG)
- **Security**
  - VOMS (DataTAG, EDG/EGEE)
  - GSI (Globus)
  - LCAS/LCMAPS (EDG/EGEE)
  - Authorization for C and Java based (web) services (EDG/EGEE/Globus)
  - GPBox (EGEE)
  - WSS (Globus)
- **User Interface (Various)**

Status of gLite Deployment

- **Production**
  - File Transfer Service (FTS)
  - R-GMA (Monitoring & Accounting Data Aggregation)
  - VOMS/VOMS Admin
- **Preproduction Service**
  - 14 sites
  - CERN, CNAF, PIC Computing Elements are connected to the production worker nodes
  - ~ 1.5M Jobs submitted
  - FTS, WMS/L&B/CE, FireMan, gLite I/O (DPM, Castor), R-GMA
- **Others**
  - DILIGENT (Digital Library Project) has deployed a number of those services as well

Other Work Performed

- **Revision of the Architecture, Design and Work plan documents**
  - https://edms.cern.ch/document/594698/
  - https://edms.cern.ch/document/573493/
  - https://edms.cern.ch/document/606574/
- **Advanced Reservation**
  - Architecture proposed
    - https://edms.cern.ch/file/508055/2-2/EGEE-JRA1-AR-508055-v2-2.pdf
  - Integration with WMS prototyped
    - http://agenda.cern.ch/askArchive.php?base=agenda&categ=a052420&id=a052420s3t5/transparencies
  - This is still R&D
- **OMII & GT4 evaluations**
  - https://edms.cern.ch/document/683456/
  - https://edms.cern.ch/document/672123/
- **Interfacing of ProActive to gLite**
  - Demonstrated at the 2nd Grid PlugTests event
  - Hands on with gLite tutorial
- **Development of a new Web Services based CE**
  - CREAM: http://grid.pd.infn.it/cream/field.php

Other Work Performed (II)

- **Tutorials and Schools**
  - gLite Installation & Configuration Training Event (CERN, Switzerland)
    - http://agenda.cern.ch/fullAgenda.php?ida=a053710
  - GRID'05 EGEE Summer School (Budapest, Hungary)
    - http://www.egee.hu/grid05/
  - GGF International Grid Summer School
    - http://www.dma.unina.it/~murli/GridSummerSchool2005/
  - CERN School of Computing 2005
    - Grid Track
    - https://edms.cern.ch/document/605400/1

- **Workspace Services (WSS)**
  - Prototype of the integration of the Globus Work Space Services
  - Joint Globus/Condor/EGEE paper submitted at the IEEE International Parallel & Distributed Processing Symposium 2006

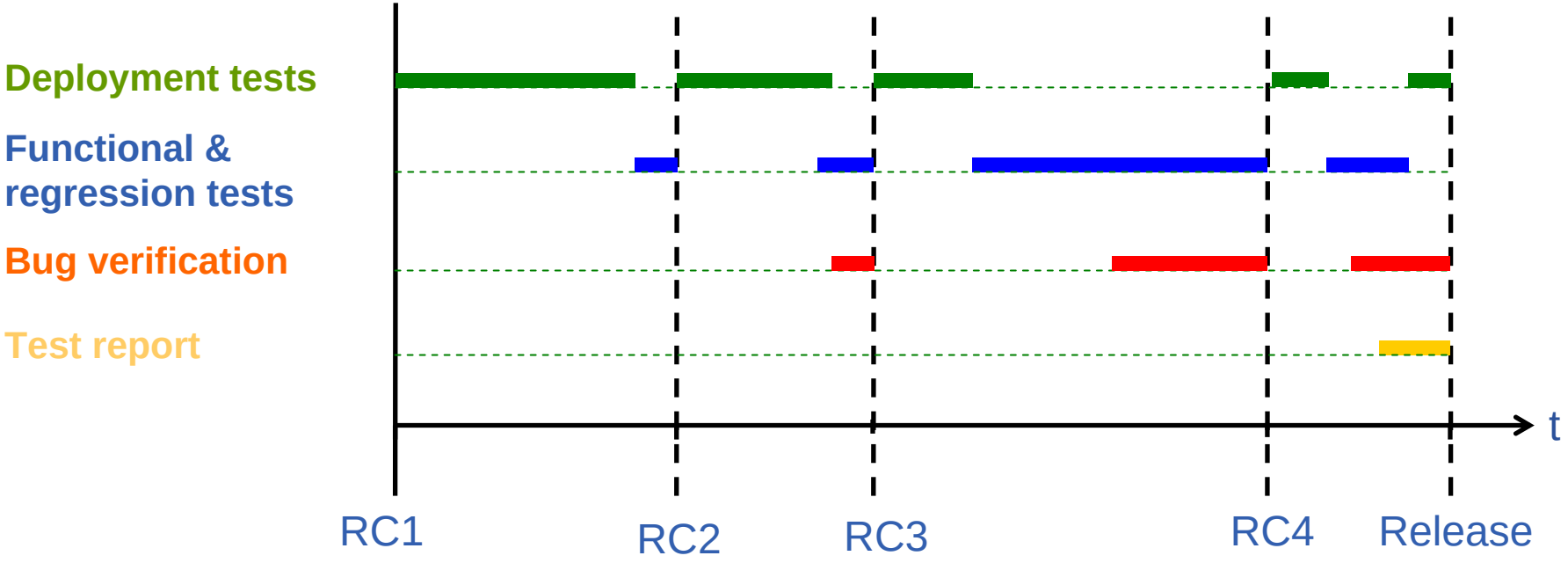
- **glogin**
  - CrossGrid's glogin has been demonstrated with gLite
  - Providing interactive access to Computing Elements and Worker Nodes

- **PGrade Portal (SZTAKI, Budapest)**
  - PGrade Portal interfaced to gLite

- **Continuously managed Prototype testbed**

gLite testing

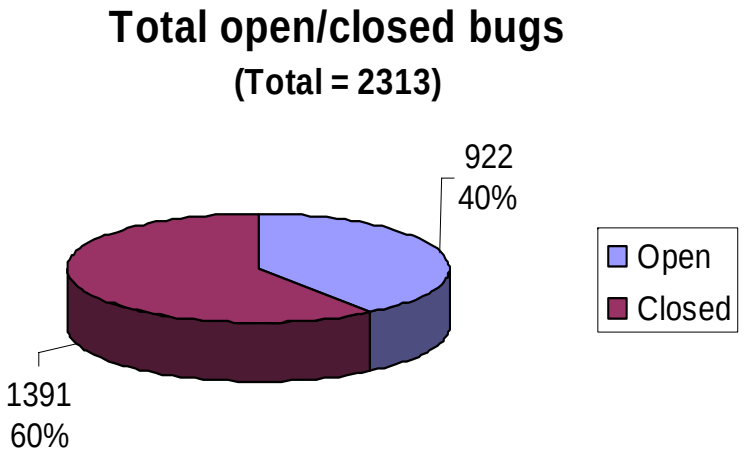
- **Distributed testbed: 3 sites**
  - CERN
  - Imperial College
  - RRZN Uni Hannover
  - RAL and NIKHEF stopped contributing

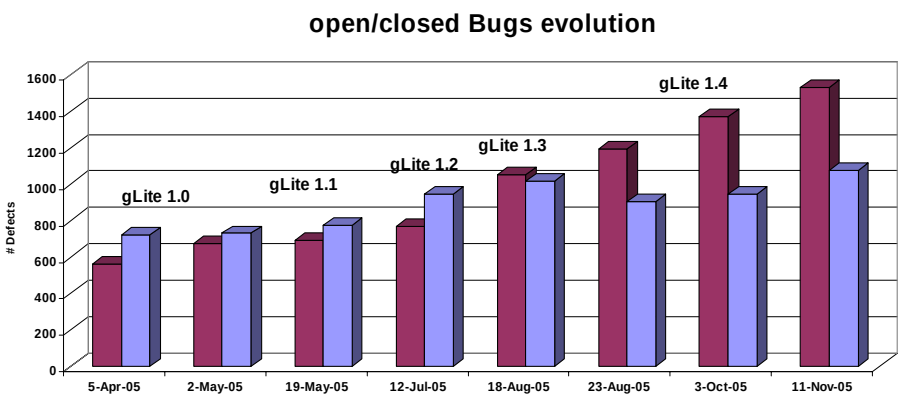


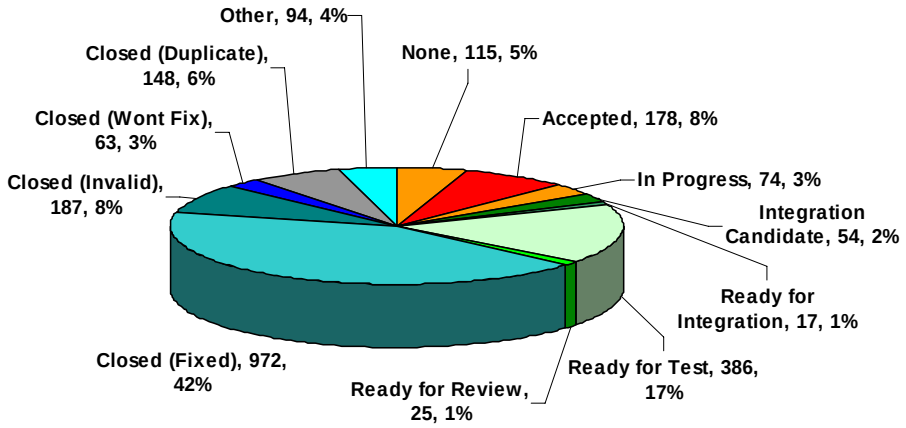
gLite Testing Status

	Deployment	Test suite			Test report
		Automated	*Stress*	*Regression*	
CE	✓	✓	✓	✓	✓
DGAS	✓	×	×	×	✓
Fireman	✓	✓	×	×	✓
FTS	✓	✓	×	×	✓
I/O	✓	✓	✓	✓	✓
L&B	✓	in preparation	×	×	×
R-GMA	✓	✓	✓	×	✓
SD	✓	×	×	×	×
VOMS	✓	✓	✓	×	✓
WMS	✓	✓	✓	×	✓

gLite 1.4 Metrics

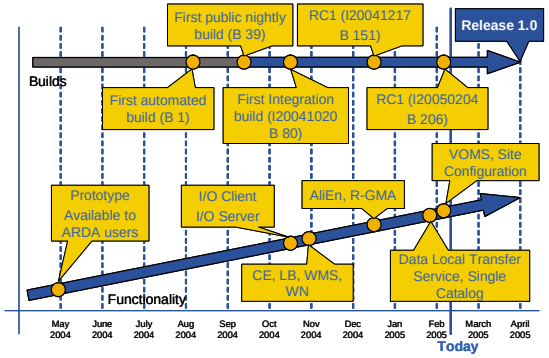




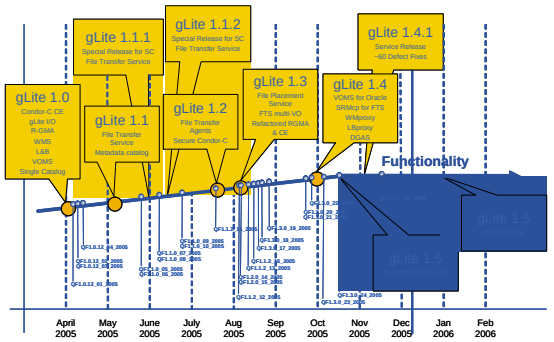


Bugs by status

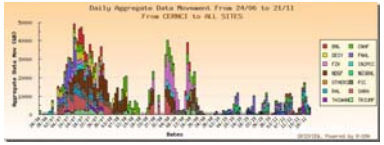
Progress from the First review



- Total complete builds done: 208
- Number of subsystems: 12
- Number of CVS modules: 343
- FTS: Preview in Release 1.0
- Simple Metadata Catalog
- VOMS on MySQL
- Re-engineered WMS
- Manual component Testing



- Total complete builds: 641, 236 (HEAD)
- Number of subsystems: 14
- Number of CVS modules: 454
- FTS



- AMGA Catalog agreed by PTF
- VOMS now on Oracle and MySQL
- Web Services bulk job submission
- Testing semi-automated, reports

Relations with US

- **Design Team**
  - Small international group of competent people understanding each other
    - Including Condor (Univ. Wisconsin/Madison) and Globus (ANL, ISI)
  - Task Queue, Condor-C integration in WMS, Storage Index, Data & Job Management security models, WSS, future VO scheduler, etc…
- **VDT**
  - VOMS, L&B, CEMon are in or scheduled (using NMI processes)
- **Collaboration in particular with University of Wisconsin/Madison**
  - Not only Condor and VDT, also NMI, relations with OSG, etc..
  - Significant (not reported) manpower dedicated to gLite related issues
  - Has been instrumental in the ETICS project proposal

Collaborations & Standards

- gLite uses many external dependencies coming from other Middleware initiatives
- Collaboration on interoperation of Condor-C and GT4
- Prototype of interoperation with the CE and Globus WSS
- gLite makes use of SRM's developed by other initiatives
- JRA1 has proposed Unicore and Shibboleth interoperation in EGEE-II
- Continuous participation in GGF, collaboration with OSG, NorduGrid, CRM Initiative

Standardisation Body	Area	Working Group	Contributor	Role
GGF	Architecture	OGSA-WG, Resource Management Design Team	Sergio Andreozzi	External contributor
GGF	Architecture	OGSA-WG	Abdeslem Djaoui	Member
DMTF	Resource Information Modeling	Core and Devices WG	Sergio Andreozzi	External contributor
		CRM	Massimo Sgaravatto, Luigi Zangrando, Erwin Laure, Miron Livny, Ian Foster,…	Members
GGF	Management	UR-WG and GESA-WG	Andrea Guarise, Rosario Piro	External contributors
GGF	Security	OGSA-AUTH	Vincenzo Ciaschini	External contributor
GGF	Data	GSM-WG	Peter Kunszt	Chair
GGF	Data	OGSA-D-WG	Peter Kunszt	Member
GGF	Data	OREP-WG	Peter Kunszt	External contributor
GGF	Data	INFOD-WG	Abdeslem Djaoui	Member
GGF	Data	INFOD-WG	Steve Fisher	Secretary

Accomplishments and Issues

Accomplishments

- **gLite "brand name"**
- **Services offering significant functionalities required by Applications**
  - Components included in VDT
- **Collaboration with DILIGENT**
- **Collaboration with US**
- **First ever Grid storage encryption solution for BioMedical demonstrated**

Issues

- **Complex software suite**
  - Many fixes and patches
- **Integration & Testing understaffed**
- **Multi-platform support**
- **Multiple reporting lines**
- **Integration & Testing perceived as slowing down the process**

Plans to the end of the Project

- **Continue Defect fixing as required**
- **Complete gLite 1.5 release**
  - Including Documentation, Installation Guide, Release Notes, Testing reports
  - Forming DJRA1.6 deliverable
- **Converge with SA1 the LCG and gLite middleware releases to a single distribution called gLite**
  - Being discussed with Operations
  - EGEE-II startup timeframe
  - Tentatively named gLite 3.0

Summary

- **gLite releases have been produced**
  - Tested, Documented, with Installation and Release notes
  - Subsystems used on
    - Service Challenges
    - Pre-Production Services
    - Production Service
  - Some components included in the VDT
  - And by other communities (e.g. DILIGENT)
  - Special effort to help early adopters in place

- **gLite processes are in place**
  - Closely monitored by various bodies
  - Hiding many technical problems from the end user

- **gLite is more than just software, it also about**
  - Processes, Tools and Documentation
  - International Collaboration

www.glite.org