



ETICS

The Software Engineering Infrastructure

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ETICS Project



- ETICS stands for
 E-infrastructure for Testing, Integration and Configuration of Software
- ETICS started in January 2006 and ended in December 2007.
- ETICS 2 started in March 2008 and it will run until February 2010
- ETICS is not 'just' a build system, it's a complete infrastructure for building, testing, configuring and managing software projects



Partners





What ETICS is



It's a software engineering management system

It's a build and test infrastructure



It provides tools and resources to configure, manage and analyse build and test runs



It provides a common interface to diverse projects to facilitate knowledge sharing and operations management



It has an open repository of configuration metadata, packages, reports. The goal is to share information, but also to reliably store and preserve information



It has a plugin-based architecture and APIs to allow integrating ETICS into existing processes and extending it with custom actions



It's multi-platform and independent from any specific build or test tool



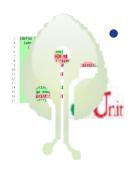
What ETICS is not



It's not a replacement for source code management systems like CVS or Subversion. ETICS uses such systems and can be easily extended with support for more



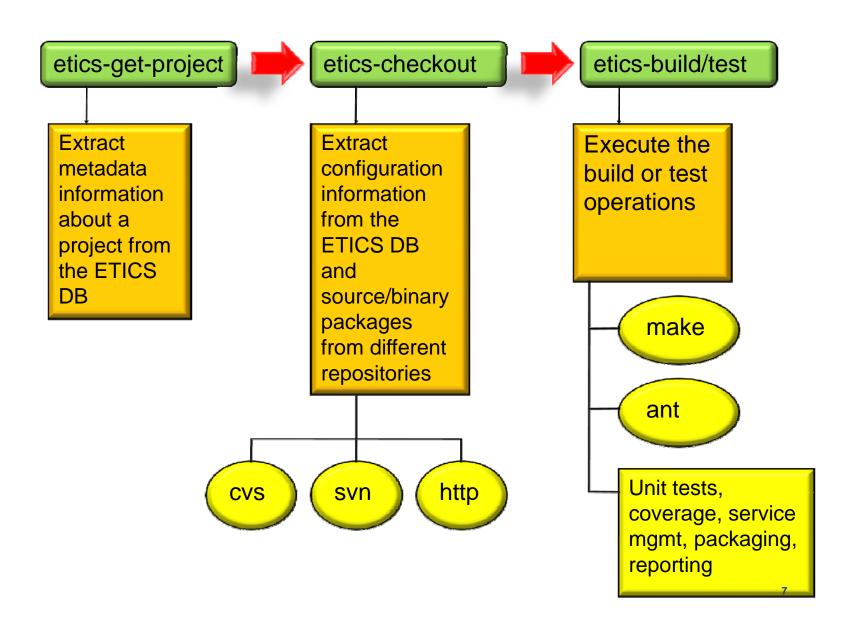
It's not a replacement for build tools like make, ant, etc. ETICS uses whatever native tool a specific project decides to use and doesn't force the usage of any particular tool



It's not a replacement for QA tools like checkstyle, junit, copunit, coverage tools, etc. ETICS provides a rich library of such tools that projects can activate as they wish when running builds and tests

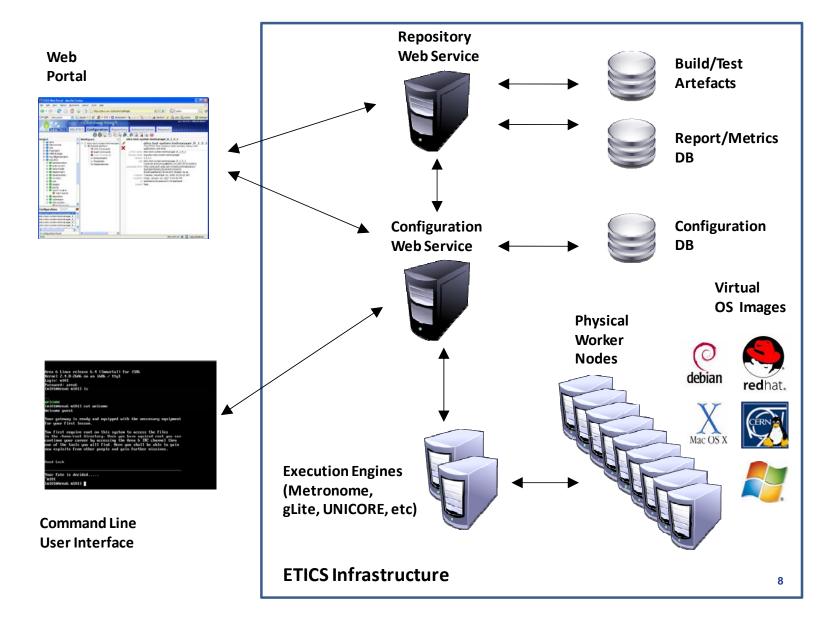


Typical ETICS Execution Sequence





Architecture ETICS is not 'just' a build system





Plugins and Metrics Collectors

- The ETICS system is plugin-based (like for example ECLIPSE)
- It provides a core set of tools and a published specification for developing additional plugins
- Plugins are essentially thin wrappers around existing or custom tools providing very specific functionality like packaging, static or dynamic testing, standards compliance testing, service installation and management, reporting, etc
- Plugins can publish information in the ETICS system in the form of metrics, which can then be used to do data mining or trend analysis using the available ETICS reporting tools



Examples of metrics collectors

Metrics	Туре	Programming languages/ technologies	Tool	ETICS Plugin
Complexity	static	Java Python	Javancss	JCcnPlugin PyComplexityPlugin.py
Design quality	static	Java	Jdepend	JDependPlugin
N of potential bugs	static	C/C++ Python Perl PHP Java	Flawfinder, RATS PMD Findbugs	CFlawfinderPlugin CPyPhpRatsPlugin JPmdPlugin JFindbugsPlugin
N of potential bugs	dynamic	C/C++	Valgrind	CValgrindPlugin
Lines of code	static	All	SLOCCount	SLOCCountPlugin
Coverage	dynamic	Java	Emma Cobertura	JUnitemmaPlugin JCoberturaPlugin
Unit tests success rate	dynamic	Java Python	JUnit PyUnit	JUnitPlugin JUnitreportsPlugin.py PyUnitPlugin.py
Compliance with standards	static	IPv6 WSI		IPv6Plugin WSInteroperabilityPlugi n
Profiling	dynamic	C/C++ Java	Jrat Valgrind	JRatPlugin CValgrindPlugin 10



The 'Distributed Testing' Feature

- One of the last features to be added, still in experimental mode
- It allows designing complex tests involving several services and test applications to be deployed on separate nodes
- ETICS analyses the definition and deploys the services on the necessary nodes
- A synchronization mechanism orchestrates the start/stop of services and the execution of the test applications
- At the end the results are collected and reported as a single report
- It is not yet usable by 'any user', it requires some deep knowledge of the system to be tested
- It has been successfully used in a number of cases by the **DILIGENT** project
- It has the strong prerequisite that the services to be deployed have to be managed without user intervention, which is not always the case 11

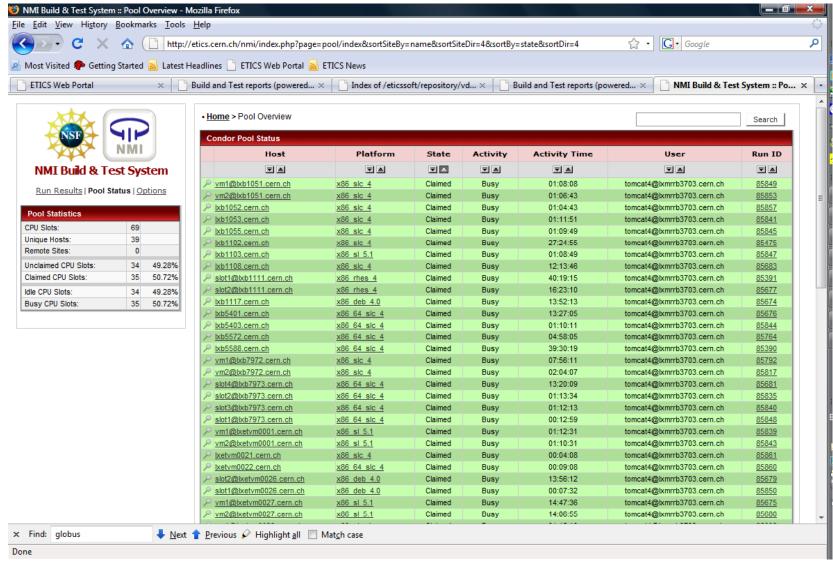


The ETICS Infrastructure

- The ETICS Infrastructure is currently based on three resource pools managed by Condor, at CERN, UoW and INFN
- There are about 450 cores available in the three sites with more than 40 different types of platforms
- At CERN in particular there are 120 cores and 12 different platforms (a platform is a combination of operating system, CPU architecture and compiler, ex: slc4_ia32_gcc36, deb4_x86_64_gcc412, etc)
- Additionally various nodes are attached to the CERN pool from third-party projects or organizations for specific use (4D Soft Ltd for DILIGENT in Hungary, GARR for EUChinaGrid and EGEE/SA2, IN2P3 for EGEE/SA2)



The CERN Resource Pool



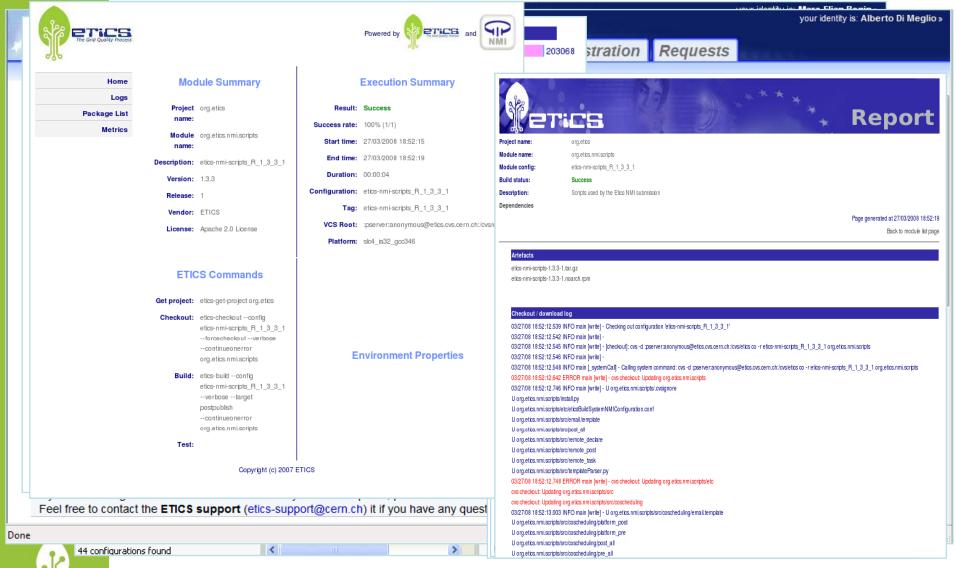


Real-world example: EGEE – gLite Building

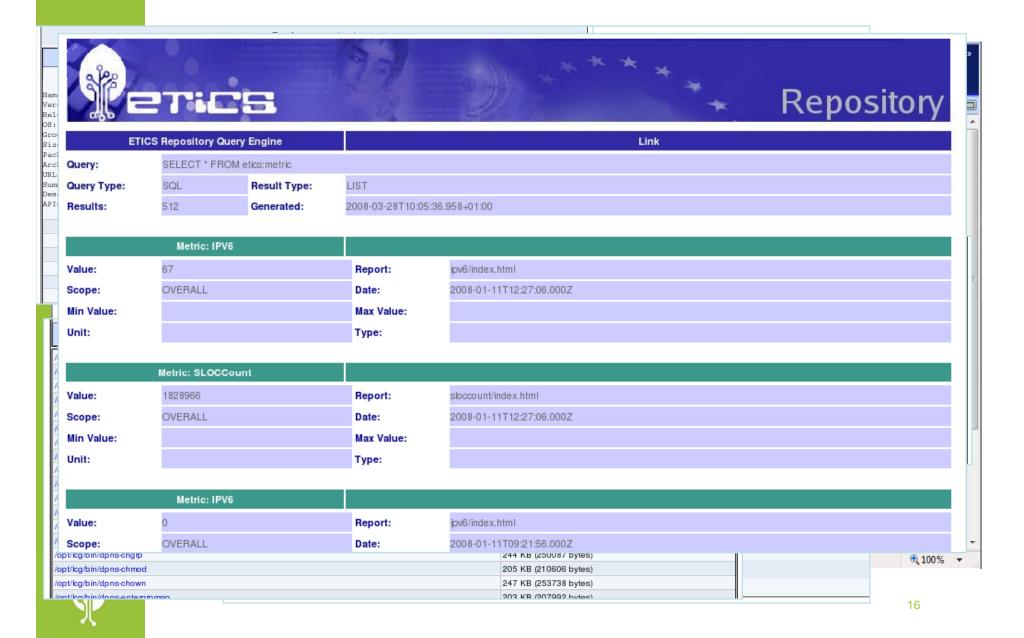
- **org.glite**: 371 Modules, 9507 Configurations, 531 Main Reports, 1058 Metrics, 1.6 M lines of code
- The project has two main configurations, one for production (glite_branch_3_1_0) and one for development (glite_branch_3_1_0_dev) and several private, experimental or custom configurations
- All other configurations are versions of the 371 modules inside the org.glite project
- It is automatically built four times per day on 5 different platforms (slc4 32/64, sl5 32, deb4 32, rhel4 32). SLC3 has been dropped recently
- Many on-demand builds are performed by individual developers on the same and additional platforms (sl5 64bit for example)
- The porting of several services is managed with ETICS. At the moment development gLite builds are run on several different platforms



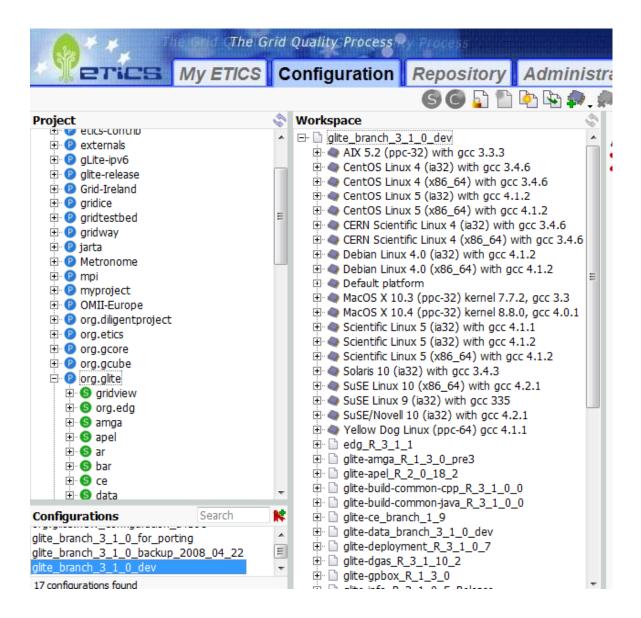
Screenshots



Screenshots



Screenshots





Performance

- The system was designed for integrators and managers and the speed of execution of individual commands was not a priority compared to support for multiple platforms, reporting, common interfaces
- Over time it's been used more and more by individual developers, whose primary concern is performance of single builds or tests, rather than quality evolution over time
- The original XML-based implementation did not scale, new implementation is based on sqlite, the de-facto standard in multiplatform embedded database engines
- New requirements have been analysed and a new version of the tools is being deployed that improves performance from 200% to 900% depending on the task to be executed and the available hardware



Recent ETICS Improvements

Performance

	Old client	New client	Speed-up	Modules
gLite	~35h	~4h	875%	384
WMS	1h 43m 41s	14m 16s	735%	110
DM	1h 12m 18s	10m 34s	720%	104
Security	29m 38s	5m 45s	483%	65
LB	14m 32s	2m 51s	460%	42

In addition, other commands such as:

- show structure commands
- listing or editing commands

have been improved and they are almost instantaneous.

The new ETICS Repository has a new scalable architecture, new cache engines and volatile automatic cleaning to boost the performance.



Subsystem Structure

- Currently each project in ETICS can be organized in a tree hierarchy (Project – Subsystem – Component)
- Subsystems can be considered **groups of components** for common metadata storage, group builds and permission assignment.
- This hierarchy has been proven to be a limitation in some cases when multiple fragmentation is needed for the same project.

EXAMPLE:

By Software

- org.glite
 - DM
 - Security
 - WMS
 - LB
 - ...

By Node Type

- org.glite
 - U
 - WMS
 - WN
 - ...



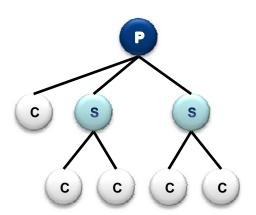
Subsystem Structure

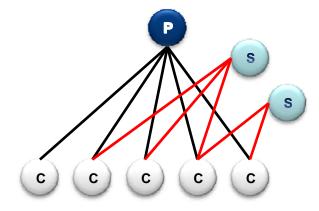
WORKAROUND:

- Use project configuration including only the needed component configurations
- The subsystem configurations become Cartesian

PROPOSED SOLUTION:

- Transform the subsystems to become independent groups of selectable components
- Allow a component to be in multiple Subsystems
- From "Folder" paradigm to "Tag" paradigm







Multiple packages per configuration

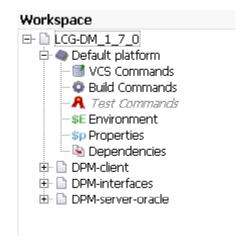
- Currently only one package (different package formats but with the same content) can be created per configuration
- With custom SPECFILE it is possible to create multiple packages but it is not possible to address them separately as dependency.

WORKAROUND:

Use what we call virtual-packages

PROPOSED SOLUTION:

- Allow a component configuration to have package subconfigurations.
- The checkout can be defined in the parent configuration
- Each package can be created in each subconfiguration





User friendliness

- The system has some learning curve, although it depends on the user background and experience
- In part this is due to the fact that the scope of the system is quite broad and there are many different commands and options to be used
- But it is true that the interfaces (both web and CLI) will benefit from a number of techniques to make their usage friendlier (wizards, templates, etc)
- User documentation is extensive, but not in a format that developers like to use. We are moving now from a single Word document to lightweight web-based help pages and tutorials



Dynamic APT Repositories

Permanent APT repository for the registered repository



 On-the-fly generation of repositories per volatile area or even per build



Dynamic Deployment of Virtual Images

- A common repository of official images will be set up and maintained
- The ETICS client will download and start a virtual machine directly on the worker node



 Custom-configured virtual machines can be set up by users for testing purposes



Workflow management

- ETICS will provide advanced release management and patch management tools with proper responsibility transitions
- It will have connectors to several tools such as Savannah, VCS, ETICS Build and Test System to gather all the required information.

EXAMPLE:



DATE1: New CVS component by cvsuser USER1

DATE2: Commit by USER1

DATE3: Tag TAG1 by USER1



LCG Savannah

DATE4: Configuration created C1 with tag assigned tag TAG1

DATE5: Build Successful with registration. Packages: P1, P2

DATE6: Bug submitted in Savannah, package P1, config C1

DATE7: Patch created by USER1, sent to certification User 3

DATE8: Patch certified by USER3, package set as Beta(PPS)



User and Project dashboards



ietics

Advanced Search Search Preferences Language Tools

Google Search I'm Feeling Lucky Search:

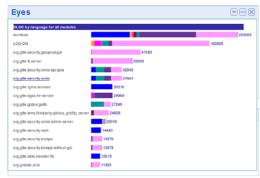
the web

pages from Switzerland Google.ch offered in: Deutsch Français Italiano

Please sign in to save your page

Home page ▼ Add a tab

New! Select theme | Add stuff »



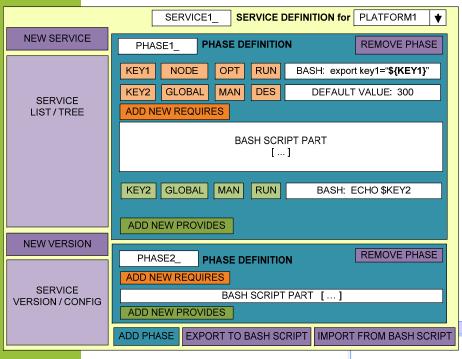
Namespace	Project	Module	Configuration	Platform	Date	Status	Reg
detaut	erg goube	org grube information system manager- maider	org grube information-system manager- master HEAD	deb4_(a)2_gcc412	19/44/49	Faled	
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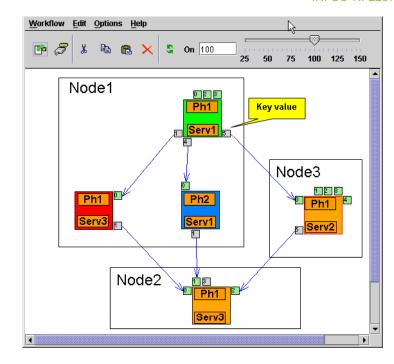
service	SL4/SLC4//386	SL4/SLC4/x86_64	Debian4/i388 Comments
glite-WN	Released	Released	Build
glite-Ul	Released	Build	Build
glite-AMGA_postgres	Released	Integration	n/a
glite-AMGA_oracle	Released	integration	n/a
glite-BDII	Released	Configuration	n/a
lcg-CE	Released	Build	n/a
glite-CONDOR_utils	Released	n/a	n/a
glite-CREAM	PPS	n/a	n/a
glite-FTA_oracle	Released	Released	n/a
glite-FTS_oracle	Released	Released	n/a
glite-FTM	Released	Integration	n/a
glite-LB	Released	Build	n/a
glite-LFC_mysql	Released	Released	n/a
glite-LFC_oracle	Released	Released	n/a
glite-MON	Released	Build	n/a
glite-PX	Released	Integration	n/a
glite-SE_dcache_*	Released	Released	n/a
glite-SE_dpm_disk	Released	Released	n/a
glite-SE_dpm_mysql	Released	Released	n/a
glite-SGE_utils	Released	n/a	n/a
glite-SLCS_client	Released	n/a	n/a
glite-TORQUE_utils	Released	Build	n/a
glite-TORQUE_client	Released	Released	n/a
glite-TORQUE_server	Released	Build	n/a

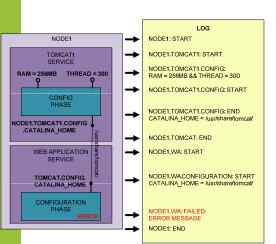


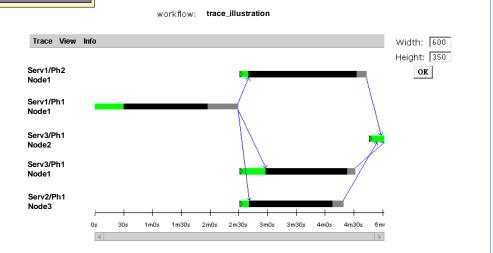


Test System









Tracefile visualization

Extension to new communities

 Two new communities have started evaluating ETICS for helping them building and testing their applications:

• ESA SLE API

Aerospace community

• SCOS-200

• UNICORE

GridBean

• AMBER

High-Parallel Computing community

- Other projects have shown intersted in using ETICS
 - StoRM
 - VDT
- Resource and License requirements have been collected and analysed from new applications
- A couple of new applications or projects will be integrated into ETICS for the middle of November



Extension to new infrastructures

- ETICS plans to be included as a general service in the major European infrastructures (EGEE, DEISA, SeeGrid, etc)
- ETICS support is already a standard unit within GGUS.





















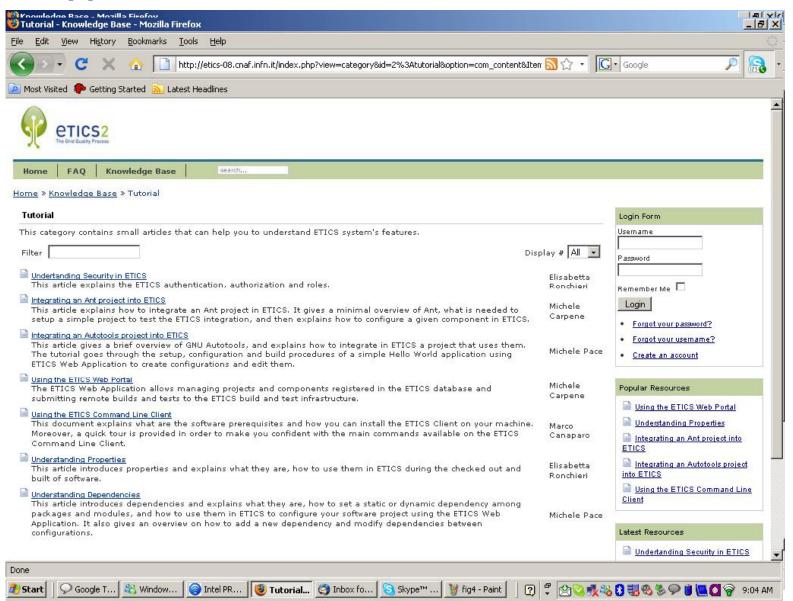


Support

- Characterised by several Web forms
 - a Web Portal at http://support.eticsproject.eu), containing:
 - a set of Frequently Asked Questions
 - a set of Knowledge Bases (i.e., Tutorial and Use Cases Resources)
 - a Ticketing System based on GGUS with two Support Units, ETICS Infrastracture and ETICS Experts respectively for the first-level and second-level supports
 - please do not use the etics-support mailing list for issues, but the ticket system
 - a Request form for external components
 - a Request form for new project

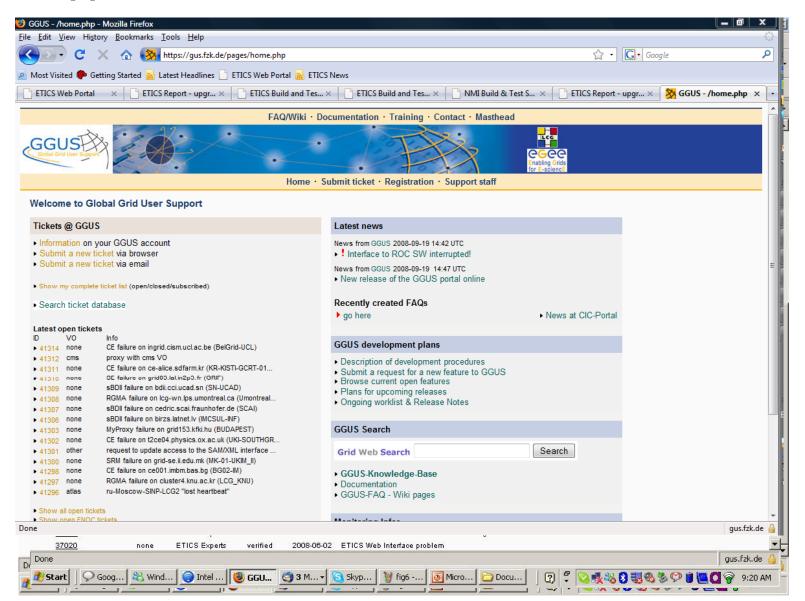


Support





Support





ETICS Web Site





Conclusions

- ETICS is not 'a build system'
- ETICS is a complete infrastructure for configuring, building, testing and managing the software development process
- The current system is the result of two years of requirements analysis, design, implementations and deployment with many projects and developers
- It is currently effectively used in production tasks
- We are actively and proactively supporting our users, providing timely solutions to common problems and new features
- Where we go from here depends on how we can evolve the system and how many more projects decide to adopt ETICS

