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Deliverable DS4.3.2: Report on Development Infrastructure Usage and Adoption



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Abstract

This deliverable reports on the usage and adoption of the software development infrastructure that was specified in DS4.3.1 "Specification of Software Development Infrastructure".

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Executive Summary

To enable the multiple international GN3 software development teams to work together effectively, a software development infrastructure was created at the start of the GN3 project. To determine what tools this infrastructure should comprise, the different roles and responsibilities of all stakeholders involved were considered. The results of this process were recorded in the deliverable DS4.3.1 "Specification of Software Development Infrastructure" [DS4.3.1].

This deliverable follows up the introduction of the development infrastructure, assessing how it has been received within the GN3 software development community by reporting on its usage and adoption. This includes identifying where previously recommended tools have not been adopted and why they have been replaced with other tools instead. Conclusions are also drawn on where additional tools may be introduced in the future to improve the operation and interactions of the infrastructure, and on considerations for further development.

The document comprises the following sections:

- Introduction
Establishes the context of this follow-up report by listing the tools identified in DS4.3.1 "Specification of Software Development Infrastructure" [DS4.3.1].
- Development Infrastructure Usage and Adoption
Summarises the usage and future development plans for each of the tools listed in the Introduction.
- Conclusions
Offers an evaluation of the points made in the document, and identifies factors to consider when developing the infrastructure.

1 Introduction

This deliverable reports on the usage and adoption of the software development infrastructure that was specified in DS4.3.1 "Specification of Software Development Infrastructure" [DS4.3.1]. DS4.3.1 identified the different parties involved in GN3 software development in order to determine what tool infrastructure would be required to enable them to meet their responsibilities and collaborate effectively with each other.

The factors considered in producing a list of recommended tools included tool usability and compatibility, feedback on tool usage in GN2, and the usefulness of the tools in aiding collaboration. As a result, DS4.3.1 identified the following tools:

Required Tools	Recommended Solutions
Version Control System	Subversion [SVN]
Bug Tracking System	JIRA [JIRA] (potentially extended with Crowd [CROWD])
Release Planning Tool	JIRA [JIRA] and Confluence [CONF]
Build Management System	For Java projects: Maven [Maven] For Perl projects: Build [BUILD] For C or C++ projects: Autotools [AUTO]
Continuous Integration Server	CruiseControl (and later other servers on request) [CRUISE]
Developer Portal System	Microsoft SharePoint [SHARE]
User Portal System	Microsoft SharePoint [SHARE]
Wiki	Confluence [CONF]
Mailing List System	Mailman [MAILMAN]
Virtual Machines Software	VMware Server {VMWS}

Table 1.1: Tools recommended in DS4.3.1

This deliverable reports on the usage and adoption of these tools, and identifies where additional tools have been introduced or may need introducing in the future.

Note that the procedures and processes for using infrastructure tools are outside the scope of this document. These are designed by SA4 (Software Governance) T1 (Best Practices).

2 Development Infrastructure Usage and Adoption

This section reports on the usage and adoption of the tools that were identified as being needed to build and operate a software development support infrastructure for all software development teams within GN3.

2.1 System Development Tools

2.1.1 Version Control System

Subversion 1.4.2 (SVN [SVN]), which had already been used successfully in GN2, has been implemented as a Version Control System.

2.1.1.1 Usage

SVN has been adopted by the following projects and activities.

User Groups	Projects
JRA2: Multi-Domain Network Service Research – T2: Hybrid Network Provisioning	Stitching framework prototype
JRA3: Multi-Domain User Application Research – T3: GÉANT Multi-domain Bus (GEMBus) – Composable Network Services	No specific projects – SVN is used across the Task.
SA2: Multi-Domain Network Services – T5: Workflow Tools	<ul style="list-style-type: none"> • Common Framework • AutoBAHN • AMPS • cNIS • I-SHARe

User Groups	Projects
SA2: Multi-Domain Network Services – T3: Monitoring	perfSONAR
SA4: Software Governance – T1: Best Practice	No specific projects – SVN is used across the Task.
SA4: Software Governance – T3: Software Development Infrastructure	No specific projects – SVN is used across the Task.

Table 2.1: SVN adoption

Further projects and activities are expected to adopt SVN as they are getting ready to start code development (not all projects have entered this phase yet).

2.1.1.2 Further Development

It has been recognised that the access rights and privileges that project members use to access Subversion repositories should be connected to their Intranet accounts and privileges. This will be implemented by SA4 T3 by the end of September 2010.

The Subversion server is upgraded only to fix security issues.

2.1.2 Bug Tracking System

JIRA 4.1.1, a browser-based bug, issue, task and defect tracking system developed by Atlassian Pty Ltd [JIRA], has been selected as a bug tracking system. It has been adopted both as a ticketing system for service desk activities (like the SA4 activity itself), and as a bug tracker in development projects. It has been successfully connected to the GÉANT Active Directory, via the Atlassian Crowd service [CROWD], which provides a single user base for both SharePoint-based websites and services provided by SA4 T3.

2.1.2.1 Usage

JIRA has been adopted by the following projects and activities.

User Groups	Projects
JRA2: Multi-Domain Network Service Research – T2: Hybrid Network Provisioning	No specific projects – JIRA is used across the Task.
JRA3: Multi-Domain User Application Research – T3: GÉANT Multi-domain Bus (GEMBus) – Composable Network Services	No specific projects – JIRA is used across the Task.

User Groups	Projects
SA2: Multi-Domain Network Services – T3: Monitoring	perfSONAR
SA2: Multi-Domain Network Services – T5: Workflow Tools	<ul style="list-style-type: none"> • Common Framework • AutoBAHN • AMPS • cNIS • I-SHARe
SA4: Software Governance – T2: Quality Assurance	No specific projects – JIRA is used across the Task.
SA4: Software Governance – T3: Software Development Infrastructure	<ul style="list-style-type: none"> • GÉANT Forge • GÉANT Download • Service Desk
NA1 Management	<ul style="list-style-type: none"> • GÉANT Intranet • GÉANT Project Office

Table 2.2: JIRA adoption

More projects and activities are expected to adopt JIRA once they are advanced enough to require bug tracking.

2.1.2.2 Further Development

JIRA is upgraded only to fix security issues.

2.1.3 Release Planning Tool

A release planning tool based on Confluence [CONF] and JIRA [JIRA], both developed by Atlassian, has been implemented. However, it has not been adopted to date. Instead dotProject [dotPro] is being used (e.g. by SA2 T5) as an alternative. This application has previously been used successfully by PSNC who have the largest user base.

2.1.3.1 Usage

Confluence+JIRA is not currently being used. SA2 T5 decided to use a separate product called dotProject [dotPro], an open-source, web-based project management application, for release planning.

2.1.3.2 Further Development

JIRA seems to fulfil most of the requirements for a release planning tool on its own. However, Confluence is also used as a user portal system and wiki (see 2.2.2 *User Portal System* and 2.2.1 *Wiki*), so remains a key element of the infrastructure.

As dotProject has proved popular with a large section of the user base, SA4 T3 is assessing the feasibility of deploying dotProject for all GÉANT participants (there is a possibility that dotProject could also be used as a project management tool). A key factor is whether it is possible to manage its user base in Atlassian Crowd [Crowd]. PSNC is currently investigating the integration of Crowd and dotProject.

2.1.4 Build Management System

SA4 T3 provides a repository for Maven [Maven] (version 2.0 onwards), an Apache software project management and information tool. Maven requires the repository as a central location for storing and retrieving artefacts created by the projects. Other build management tools, such as Build for PERL or Automake for C/C++, do not require a similar facility, and are therefore outside the scope of SA4 T3.

2.1.4.1 Usage

Maven has been adopted by the following projects and activities.

User Groups	Projects
SA2: Multi-Domain Network Services – T3: Monitoring	perfSONAR
SA2: Multi-Domain Network Services – T5: Workflow Tools	<ul style="list-style-type: none"> • Common Framework • AutoBAHN • AMPS • cNIS • I-SHARe
SA4: Software Governance – T3: Software Development Infrastructure	eduGAIN

Table 2.3: Maven adoption

Although SA4 T3 recommended Maven as the best build management tool, it is currently mainly being used in SA2, the main development activity. That the tool has not been adopted more widely may be due to it requiring some usage training. Also, not all activities and projects need to build software (often builds are done by SA2).

2.1.4.2 Further Development

It has been recognised that the access rights and privileges that project members use to access the Maven repository should be connected to their Intranet accounts and privileges. It will be implemented by SA4 T3 by the end of September 2010.

2.1.5 Continuous Integration Server

Hudson 1.360 [HUDSON], an open source build system, has been implemented as a continuous integration system, in place of the originally proposed CruiseControl tool [CRUISE]. CruiseControl lacked access control, and required one installation per project. After consultation with SA2 T5, Hudson was selected instead because it allows multiple projects to be hosted with separate rights management and administration.

2.1.5.1 Usage

Hudson has been adopted by the following projects and activities.

User Groups	Projects
JRA2: Multi-Domain Network Service Research – T2: Hybrid Network Provisioning	Stitching framework prototype
SA2: Multi-Domain Network Services – T5: Workflow Tools	<ul style="list-style-type: none"> • Common Framework • AutoBAHN • AMPS • cNIS • I-SHARe

Table 2.4: Hudson adoption

Continuous integration ensures that quality control processes are frequently applied as software is developed, so that at release time the software's quality is ensured. As this is good practice, SA4 T3 expect that more activities and projects will adopt Hudson over time.

2.1.5.2 Further Development

SA4 T3 is currently considering whether to add Atlassian's continuous integration server Bamboo [BAMBOO] to Hudson, as it integrates with JIRA. A test instance will be deployed and evaluated by the end of August 2010, after which a decision will be taken on whether to put it into production.

Hudson is upgraded only to fix security issues.

2.1.6 Developer Portal System

A developer portal system has been implemented in SharePoint as part of the GÉANT Intranet. As such it is outside the scope of the SA4 activity and is managed by the GÉANT Project Office as part of NA1 Management.

2.2 User Interaction Tools

2.2.1 Wiki

The GÉANT project provides two wikis. One is part of the Intranet, implemented in SharePoint; the other is Atlassian Confluence 3.0.1. Only the latter is within the scope of SA4 and has been adopted by SA2 T5.

2.2.1.1 Usage

The Confluence wiki has been adopted by the following projects and activities.

User Groups	Projects
SA2: Multi-Domain Network Services – T5: Workflow Tools	<ul style="list-style-type: none"> cNIS I-SHARe

Table 2.5: Confluence wiki adoption

The Confluence wiki has not been widely adopted as most activities and projects use either the SharePoint Intranet or their own legacy wikis instead. SA4 T3 is considering replacing the Confluence wiki with GÉANT Forge which offers similar functionality (see 2.2.2 *User Portal System*). This would make the infrastructure more streamlined.

2.2.1.2 Further Development

Confluence is upgraded only to fix security issues.

2.2.2 User Portal System

Due to a lack of resources to implement a user portal system in SharePoint, it has instead been implemented in Atlassian Confluence 3.1.2, and is known as GÉANT Forge. Although this is a recent addition to the infrastructure, it has been well-received by projects eager to present their work to the general public.

2.2.2.1 Usage

The Confluence user portal system has been adopted by the following projects and activities.

User Groups	Projects
SA2: Multi-Domain Network Services – T3: Monitoring	perfSONAR
SA2: Multi-Domain Network Services – T5: Workflow Tools	<ul style="list-style-type: none"> • AutoBAHN • cNIS

Table 2.6: Confluence user portal adoption

Interest in GÉANT Forge is increasing and SA4 T3 expect that its usage across activities and projects will increase significantly.

2.2.2.2 Further Development

To promote the wider adoption of GÉANT Forge by the GÉANT community, SA4 T3 is planning to announce it to Task Leaders and Activity co-ordinators.

Confluence is upgraded only to fix security issues.

2.2.3 Mailing List System

The GNU mailing list management system Mailman 2.1.12rc2 [MAILMAN] has been implemented.

2.2.3.1 Usage

The Mailman mailing system is the most widely adopted system, used by most GN3 activities.

2.2.3.2 Further Development

Mailman is upgraded only to fix security issues.

2.2.4 Virtual Machine Software

VMware Server 1.0.4 [VMWS], which had already been used successfully in GN2, has continued to be used as a virtual machine system.

2.2.4.1 Usage

VMware Server has been adopted by the following projects and activities.

User Groups	Projects
SA2: Multi-Domain Network Services – T3: Monitoring	perfSONAR

Table 2.7: VMware Server adoption

2.2.4.2 Further Development

The virtual machine software is in high demand. However, since the end of GN2, sufficient resources – i.e. hardware capable of running multiple (>16) virtual machines simultaneously – have not been available. SA4 is currently applying for the budget necessary to buy new machines capable of running VMware Server.

VMware Server 1 is to be upgraded to version 2, to resolve various problems with perfSONAR's virtual machines, which are running Linux distributions with the latest version of the operating system. Otherwise the virtual machine software is upgraded only to fix security issues.

3 Conclusions

The infrastructure has been adopted most widely by SA2 Multi-Domain Network Services, especially by Task 3, Monitoring, and Task 5, Workflow Tools. The JRAs have been slower to adopt the development infrastructure but take-up is spreading and is expected to increase over time. Some tools, such as the mailing list system Mailman, are used across the project; the bug tracking system JIRA is also used across all three Activity types – networking, service and joint research.

Where there are plans to develop a tool further, the rationale is primarily to secure the benefits of integration. For example, users' access rights and privileges for the repositories of the version control system Subversion and for the build management system Maven are being linked to their Intranet account rights and privileges. Similarly, the benefits of integration (with JIRA) are the reason for investigating the possibility of adding a second continuous integration server, Bamboo, alongside Hudson.

For the most part, upgrades are implemented only to fix security issues.

Where appropriate, SA4 T3 has adjusted the initial infrastructure specification in response to subsequent events or knowledge, the lack of take-up of the release planning tool Confluence+JIRA, for example, and the technical unsuitability of the continuous integration server CruiseControl. In both cases, project members were instrumental in identifying alternatives (dotProject and Hudson, respectively).

Implementing the software development infrastructure has required a level of effort that was not anticipated. For example, it proved crucial to set up a Service Desk within SA4 T3, to handle developers' infrastructure requests. Information Technology Infrastructure Library (ITIL) training was very useful in outlining the benefits of a Service Desk and how it should be managed.

In addition, development effort was necessary to create unplanned infrastructure elements such as the user portal system GÉANT Forge. Currently, most of the project's developers are members of SA2; only limited development resource is available within SA4. This constraint should be borne in mind if new or existing tools within the software development infrastructure need to be enhanced or adapted in the future.

Where insufficient hardware resource has limited the take-up of the infrastructure, as with the virtual machine software VMware Server, investment is being sought.

SA4 T3 will continue to maintain and improve the software development infrastructure throughout GN3, and actively promote its usage and adoption.

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Glossary

AMPS	Advance Multi-domain System
AutoBAHN	Automated Bandwidth Allocation across Heterogeneous Networks
cNIS	Common Network Information Service
GEMBus	GÉANT Multi-domain Bus
ITIL	Information Technology Infrastructure Library – a set of concepts and practices for IT services management, development and operations
JRA	Joint Research Activity
NA	Networking Activity
perfSONAR	Performance Service Oriented Network Monitoring Architecture
SA	Service Activity
SVN	Subversion
T	Task