**Notes of CTA science gateway technology integration meeting**

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**NOTES**

There are two technologies considered for creating the CTA Science Gateway, and these are already supported in the CTA project:

* WS-PGRADE
* InSilicoLab

Both of these are extensions of the Liferay portal framework with services and tools for distributed, scientific applications and collaborations. The representatives of the two technologies participate in the EGI Virtual Team project. The face-to-face meeting was focussed on how these two technologies can be integrated into a single ’CTA gateway technology’ that could be used to offer a central CTA gateway. Choosing only one of the technologies would cause damage to existing CTA users who already use one or the other technology, and would be risky for CTA. The integration would bring innovation from two strong communities, yet it would provide a single entry point and a coherent look-and-feel for both existing and new CTA users and members.

The main outcome of the meeting is the recognition that the integration of these two technologies is possible, and requires only about 2 Person Month effort in total. This effort can be allocated from the SCI-BUS project. The Virtual Team project therefore recommends the CTA community to proceed with requesting this integration and then to setup a central CTA gateway supported by the two technology provider communities.

Once setup, the central CTA gateway should be promoted for the CTA community to gather applications and scientific workflows that can serve the broader community. The gateway is expected to trigger additional, more refined requirements for the ‘‘CTA Very High Energy gamma-ray Science Gateway’’. Through various projects that already support WS-GRADE and InSilicoLab, and through new funding opportunities that are expected to become available from 2014 in Horizon 2020, the CTA gateway can then gradually evolve into the production gateway that will serve the CTA community in the next decades.

**WS-PGRADE technology overview**

* WS-PGRADE has a set of portlets that provide tools to develop workflows, and to create 'application specific portlets' that control and orchestrate these workflows on clusters, grids, clouds.
* The portlets use a set of 'high level services', called gUSE, that are shared across the WS-PGRADE portlets and are required for the WS-PGRADE portlets to function.
* The portlets and the gUSE services are integrated into Liferay
* The gUSE services and WS-PGRADE portlets can move together into a ’central’ Liferay installation.

**InSilicoLab technology overview**

* Integrates two core CTA applications
* Offers middleware services (such as SAGA, DIRAC)
* Has portlets for data management and infrastructure monitoring
* All components are integrated into Liferay

**Current users**

WS-PGRADE:

* 50 groups build/built production gateways, these serve ~80 scientific collaborations/groups worldwide (mostly in Europe). Several thousand users are served with these.
* In the SCI-BUS project WS-PGRADE is used by the international heliophysics community and an international astrophysics community. This astrophysics community created and set up 5 gateways in 3 countries. These gateways are intended to be used by a part of the CTA community. They are forming an alliance now, called StarNET (the one mentioned above). Strasbourg and Observatory of Paris have recently expressed their interest to join the alliance. Astrophysical groups from Spain (Instituto de Astrofisica de Andalucia and Instituto de Fisica de Cantabria) are also considering joining with two gateways.
* From the 1st of Oct a new 2.5 year long EU FP7 project, called VIALACTEA, will start. VIALACTEA will study galaxies and the formation of stars and star clusters in a global galactic context. The project will use WS-PGRADE.
* The Italian members of CTA are operating a WS-PGRADE based gateway with the following applications already integrated into it: Ftools, FV, Proﬁt, Xanadu, Xspec, Xronos, Ximage, DS9, Sextractor, Tempo2, IRAF, IRAF Ximtool (X11IRAF Tools), Topcat, Aladin, ROOT, EUTelescope, Geant4.
* Other WS-PGRADE gateways provide even more applications for astronomical scientists: VisIVO (INAF Catania, IT), Planck Simulations (INAF Trieste, IT), FRANEC/BaSTI (INAF Teramo, IT), LasMoG (University of Portsmouth, UK), COMCAPT and MESTREAM (Slovak Academy of Sciences, Bratislava, SK).
* Other large EU FP7 projects also recently choose WS-PGRADE as the basis of their gateway: DRIHM (hydrometeorology), VERCE (earthquake and seismology research).

InSilicoLab:

* Technology framework comes from PL-Grid infrastructure and related project – PLGrid Plus projects.
* Integration of CTA applications (sim\_telarray, read\_hess, eventdisplay) and other CTA-specific portlets was funded by Polish funds related to the CTA project.
* The InSilicoLab framework serves as a basis for production gateway instances for two other communities: Computation Chemistry community in PL-Grid and AstroGrid-PL community (Magneto-Hydrodynamics simulations)
* Prototype gateways are being developed for the Bioinformatics and Geophysics community

**Technology integration**

Basic integration:

The integration of the two technologies based on Liferay seems very easy to do: the two middleware service sets and the two portlet sets can be hosted in a single Liferay installation. Existing users of the two system then can use the services they are already familiar with. New users can decide which service stack to use (WS-PGRADE or InSilicoLab).

Strong integration:

An even stronger integration seems possible: In this case the results (or pointers to results) could be passed between applications/workflows of WS-PGRADE and InSilicoLab. This would result reusability to applications among the two technology stacks, and would enable complex simulations that are partly built with WS-PGRADE tools, partly with InSilicoLab tools. This strong integration needs some development, in the range of a few person-months effort (around 2-3 PM).

**Maintenance**
Both the InSilicoLab and the WS-PGRADE community has to provide the same level of support guarantees for the maintenance of their service stack for the CTA science gateway that is built with the integrated technology package.

WS-PGRADE:
MTA SZTAKI, the largest members of the WS-PGRADE community can guarantee maintenance for at least three years from now based on three EU FP7 projects (SCI-BUS, CloudSME, VIALACTEA). WS-PGRADE itself is open source, with Apache 2.0 license. Furthermore, a gateway alliance (called StarNET, http://www.oact.inaf.it/STARnet) is now forming within the WS-PGRADE community, and this would guarantee maintenance and further development for the technology for at least 5 years in the astronomical sciences domain.

InSilicoLab:
Currently, 5 years maintenance period is guaranteed for the current InSilicoLab CTA technology based on PL-Grid infrastructure and Cyfronet obligations.

The EC would very probably support a project under Horizon2020 that would integrate portal technologies from two communities to serve CTA, a large ESFRI community. Such a project could provide funding for additional functional extensions and user support in the integrated technology.

**Identity federation considerations:**

WS-PGRADE:

* CTA uses an LDAP server. Alessandro Costa in Italy developed a WS-PGRADE based gateway that acts as a Service Provider in the IDEM-GARR national academic identity federation of Italy. The same gateway instance will be integrated with the CTA LDAP server. In this new setup the identity providers of IDEM-GARR will be used by the gateway for user authentication, and the LDAP server for user authorisation. Application developers will have to continue using the grid resources from this gateway with personal certificates, but application users (scientists) will be able to use robot certificates, and login with federated accounts from IDEM-GARR. In the same way how IDEM-GARR is integrated, other academic identity federations can be also connected with WS-PGRADE.

InSilicoLab:

* InSilicoLab CTA gateway is connected to the LDAP server used by CTA
* The system uses personal certificates. (Every user of InSilicoLab applications has to have a personal certificate.) Support for robot certificates is planned.

**Conclusion of the meeting - recommendation to CTA**

CTA should sign an Memorandum of Understanding with the FP7 SCI-BUS project. This would enable SCI-BUS to allocate 2PM effort from their project for CTA and to use this effort to complete the strong integration of the WS-PGRADE and InSilicoLab technologies as it is described above (under the Strong integration hearing). Such an integrated gateway would allow to create simulational workflows that use CTA applications from the InSilicoLab software and also, for example, galaxy visualization applications from the WS-PGRADE side.

This would be a technology that's stable, proved its applicability and is ready to host scientific and observatory control/monitoring applications.