**Virtual Research Environments IG**

**Case Statement**

Increasingly researchers who are not co-located are seeking to work dynamically together at various scales from the local to the international. These researchers want to share data, models, workflows, best practice, publications, management and administration of their research etc. This is to address either local challenges which are also potentially of direct relevance to researchers in other geographical areas, or they have a shared interest in addressing a common issue such as the grand challenges currently being faced by society on a global scale e.g. climate change.

Virtual research environments (VREs), synonymous with science gateways in the USA and virtual laboratories in Australia, are increasingly being used to support this more dynamic approach to collaborative working. This has led to a number of regional VRE/SG/VL initiatives such as VRE4EIC, whose goals include to increase the VRE usability for multidisciplinary research and quality of VRE user experiences. Although these systems are seeking to share some of the same resources and common infrastructure services e.g. EUDAT, GEANT, etc., there is no coordination of the development of the underlying architecture that would allow these individual VREs to interoperate.

The proposed VRE IG will explore all aspects of existing and planned future VRE/SG/VLs with the aim of moving towards common policies and best practices, such as those being promoted by the US Science Gateways Community Institute (SGCI), the Australian Research Data Services (ARDS) and common reference architectures as well as specifications for components and interfaces

**Objectives**

The proposed VRE interest group would bring together those initiatives actively developing VRE/SGs/VLs and also the representatives of the common infrastructure services e.g. EUDAT, ARDS. It will also seek to engage with those seeking to make use of these technologies in an effort to identify the necessary technical aspects, governance issues and best practice required to support a more coordinated approach to the development of the collaborative environments.

The proposed IG will bring together this experience and evolve towards

1. Reference architectures for a VRE based on superposition over e-RIs e-Research Infrastructures) and e-Is (e-Infrastructures);
2. The definition of a set of components (software and interfaces) for use in a VRE;
3. The definition of interfaces between a VRE and e-RIs;
4. The definition of best practice in constructing VREs; and
5. Recommendations for policies in e-RIs and e-Is.

***Value Proposition***

VRE/SG/VLs are relatively new concepts and the associated technologies have matured in the last 10 years as evidenced by novel developments of these frameworks. If the objectives outlined above for the VRE IG can be achieved it will lead to interoperating VRE/SG/VLs (themselves supported by integration of heterogeneous e-RIs that are in turn supported by e-Is). The alternative is divergent and heterogeneous systems incapable (or only capable with great effort) of interoperating.

**Activities**

The VRE IG will aim to act as a longer-term organization responsible for tracking and contributing to the evolution of VRE/SG/VL technologies. To achieve these objectives the VRE IG will:

1. Review the state if the art;
2. Ensure associated relevant technologies are known and understood;
3. From (1) and (2) propose canonical architectural models for VREs;
4. Propose specifications for standard components (software and interfaces) for a VRE/SG/VLs;
5. Propose best practices for VRE/SG/VLs development and implementation;
6. Contributing to the SGCI’s scientific software collaborative to build a central information hub for researchers and developers; and
7. Suggest policies to stakeholders of e-RIs and e-Is in close collaborations with existing projects and initiatives e.g. VRE4EIC, EVER-EST, SGCI, XSEDE, OSG, ARDS, etc..

**Relationships with other WG/IGs**

The proposed VRE-IG will engage with the relevant IG/WGs that will include:

* Big Data IG
* Metadata IG: definition of packages of metadata elements appropriate for the VRE/SG/VL
* Metadata catalogue WG which will potentially provide a resources for documenting the metadata used in different VREs
* Preservation Tools, Techniques and Policies IG
* Research Data Provenance IG
* Reproducibility IG
* Federated Identity Management IG
* Data Fabric IG
* Domain groups for use cases, requirements and possible later validation

**Participants**

There are currently 56 members of the VRE IG identified on RDA portal (<https://www.rd-alliance.org/groups/vre-ig.html>). Current membership includes those directly engaged with the development of VRE/SG/VL technologies but also representatives of those responsible for governance structure of existing individual VRE/SG/VLs and their respective user communities.

The proposed group is co-chaired by:

* Keith Jeffery (UK)
* Helen Glaves (UK
* Lesley Wyborn (Australia)
* Sandra Gesing (USA)