

MAMS Testbed Federation Mini-Grant Application for Round Two

1. PROPOSAL SUMMARY

This proposal requests AUS\$40K from the MAMS project, as part of the round two mini-grant program. Its purpose is to implement a Shibboleth based data repository and high-performance computing (HPC) access system for the Australian Laser Interferometer Gravitational-Wave Observatory (LIGO) effort at the University of Melbourne. In the spirit of the MAMS testbed federation, this application forms part of a cohesive and coordinated approach to ‘kick-start’ and accelerate the uptake of Shibboleth university wide, with the LIGO project as a high profile service provider use case.

2. PARTICIPATING INSTITUTION, PERSONS, GROUP; PROJECT STRUCTURE

Melbourne University will be the participating institution, with collaboration and execution of tasks amongst people and groups at various levels of, as well as externally to it. For which, a tiered organisational structure will be employed. The organisation will be governed internally as a project within the school of physics and the University Information Services division.

At the project level, for specific LIGO activities:

Dr. Andrew Melatos (and students), Assoc. Prof. School of Physics, Melbourne Uni

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Dr. Steven Melnikoff, School of Physics, Melbourne Uni

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At the departmental level, for integration with the School of Physics research programs (particle physics, astrophysics, Australian Synchrotron, Quantum Computing):

Dr. Lyle Winton, School of Physics, Melbourne Uni

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At the university level; state, national and international levels (the Victorian eResearch Strategic Initiative, VPAC):

Mr. Dirk van der Knijff, Manager, Research Computing Services, Melbourne Uni

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Ms Nicki McLaurin Smith, Director, Information Management, Melbourne Uni

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3. PROJECT GOALS, OBJECTIVES AND DELIVERABLES

3.1. Goals and Deliverables

The Australian LIGO program has been awarded an ARC eResearch pilot grant to realize a suite of software tools for facilitating the efficient exchange and utilization of data between geographically disparate (i.e. Australia, the US and EU) gravitational wave observatories, and associated data analysis groups. In particular the pilot will produce a complete data/metadata portal for retrieving and correlating experimental data from the observatories.

The portal will be based on the GridSphere framework, with authenticated access to services and data to be enabled by using the Shibboleth architecture as a concrete deliverable. For this proposal the LIGO pilot will then serve as both a service provider (SP) and use case.

Another deliverable will be to establish a development and production environment, within the MAMS Testbed Federation, to support the LIGO pilot and potentially other University of Melbourne groups (e.g. computer science) and services.

Melbourne University, through LIGO, has the opportunity to take delivery of a 97-node, 194 CPU high performance computing cluster (Brecca), with order terabyte disk storage and Globus grid computing capabilities. Initially this facility is to be shared with the Australian high-energy physics program (for the ATLAS experiment), with a long-term strategy of university-wide utilization (e.g. radiotherapy planning with the Peter MacCallum Cancer Institute).

Investigating and developing of production level Shibboleth based access management for Brecca will be another project and service deliverable.

3.2. Long-term Objectives and Proposal Impact

At the University level there are a number of initiatives underway that have a critical need for production level, robust, identity and access management (IAM) technology. These include:

- Themis Research – linking information about scholars and their areas of research
- Core Network Renewal Project – implementation of Grid and other emerging computing technologies, depending on low latency network facilities with multicasting capability
- Enterprise Architecture Project – enterprise information management of all digital objects, of which research data and scholarly works are a part or subset
- ePrints repository (UMER) – current digital repository for scholarly works, under assessment for upgrading or replacement
- DAM Digttool Project – candidate digital repository framework for eResearch raw data and scholarly works
- University Web Redevelopment Project – external web services for profiling Melbourne scholars and their research
- APSR Testbed Partnership – providing knowledge and tools sharing and opportunities for collaboration from national and international partners
- Melbourne University eResearch pilots – Tsunami detection, ICCR, Kidneyome, etc.

As part of the MAMS Testbed Federation, a vital first step will be taken in fulfilling four core facets of the Universities Information and Communication Technologies (ICT) strategy:

- Recognition that *information* is a strategically important resource
- Requirement that University information will be accurate
- Enterprise information will be centrally managed

- Information and information systems will be easily accessible

At the state level, and beyond, there is the Victorian eResearch Strategic Initiative (VeRSI). VeRSI has been recently approved as a AUS\$4.75M multi-phase program of five projects to be jointly carried out by Monash and Melbourne Universities. VeRSI focuses on essential ICT and infrastructure for eResearch, the development of expertise germane to eResearch and communications, support, training, awareness and outreach.

One of the initial VeRSI projects will be in the area of security and access, underpinning concepts of trust and utilization of shared resources. VeRSI will implement the policy and technology frameworks necessary for supporting shared environments, the requirements for which the MAMS Testbed Federation will be superb.

This proposal has the potential to have real impact as an enabler for the University during its shift from traditional 'PI-centric' research to collaborative 'eResearch'.

4. SELECTION CRITERIA

4.1 Within the timeframe of the Testbed Federation mini-grant program (December, 2006), the aim of this proposal is to successfully achieve a combination of both: valuable SP and part of institution IdP in Federation level 2.

4.R1 The School of Physics is representative of the community of active research groups at Melbourne University who can, and will, promote the growth of the Testbed Federation. The LIGO project (and, in association, the University Astrophysics research group) will function as a successful use case to quickly extend the adoption of the Federation to other parts of the University.

Specifically at Melbourne, there are a number of large-scale informatics programs (e.g. [Bio21 Institute](#)) in the medical faculty, neurosciences, as well as groups in Engineering (i.e. environmental sciences). Each of these will benefit of membership within the MAMS Testbed Federation

4.R2 This proposal is relevant in addressing the goals of the government's "Backing Australia's Ability & Systemic Infrastructure Initiative". Specifically the Australian Consortium for Interferometric Gravitational Astronomy ([ACIGA](#)), in collaboration with the world gravitational wave community has objectives that include:

- Undertake research and development aimed at improving the performance of present laser interferometer gravitational wave detectors through advanced designs to ultimate limits set by mechanics, quantum mechanics, lasers and optics
- Transfer this R&D into practical designs for inclusion in existing and future detectors including the High Optical Power Test Facility at Gingin, Advanced LIGO and the Southern Hemisphere component of the world wide observational network
- Transfer the R&D where appropriate to the Industrial partners for the production of commercial products

These objectives are directly in line with the themes of the government's initiative: the generation of new ideas, the commercial application of ideas, and developing and retaining skills.

4.R4 The project team has extensive technical experience in the various areas essential for the proposal:

- Dr. Melatos – providing general scientific direction for LIGO requirements; international lead on calculations of gravitational wave signal forms from neutron star sources
- Dr. Melnikoff – general scientific, technical and interface support; having delivered one of the initial [GridSphere portal projects](#)
- Dr. Lyle Winton - general technical and programming support; as lead for the particle physics grid computing effort
- Mr. Dirk van der Knijff – general technical support; as manager of the University research computing services

4.R5 Three of the project members: Dr. Melnikoff (SM), Mr. Van der Knijff (DVK), and Ms McLaurin Smith (NS) have wide ranging experience in all aspects of project management. These include small-scale scientific investigations (SM), University wide projects (DVK, NS), and corporate/industrial sector undertakings (SM, NS).

4.R6 To date the project team’s engagement with MAMS has been informal, and informational in nature. With the launch of the LIGO eResearch pilot project, there has been a strong interest in the MAMS IAM technology, resulting in correspondence with Dr. Vullings over the past months.

4.R7 There is a definite commitment by all parties involved at Melbourne University to contribute to the Testbed Federation, and remain active in its development for the foreseeable future (well beyond 2006), and its adoption as vital university infrastructure.

4.R8 The LIGO project has received funding for portal development, but no work is expected, or funding been received, for identity and access management.

5. PROJECT SCHEDULING AND RESOURCING

Execution of the proposal is divided into four phases or stages. Each providing, or demonstrating core services for subsequent phases:

Phase 1 – month 1

- Initial installation and testing of MAMS Testbed Federation infrastructure software on University HPC (research computing) group supplied server.
- Preliminary testing and performance evaluation of infrastructure by HPC group

Required EFT and associated support resourced via \$10k initial funding

Phase 2 – months 2 to 3

- Integration of MAMS Gridsphere/Shibboleth module into LIGO data portal
- Testing of ‘Shibboleth’ data portal with ANU
- Commencement of LIGO portal as a SP
- Level 2 MAMS federated IdP from part of existing University directory services
- Initial report preparation and presentation to University Information Division and research community at large
- Planning for Testbed Federation ‘uptake’ and integration into wider University community (eResearch pilots) and access/authentication system(s)

Required EFT and associated support resourced via \$20k funding

Phase 3 – months 4 to 5

- Detailed planning for implementation of Brecca access system
- Design and planning of outreach and training effort
- Implementation of ‘uptake’ plan
- Testing of Brecca Shibboleth access system

Required EFT and associated support resourced via \$20k funding

Phase 4 – months 6 onward

- Assessment of planning success, commencement of outreach and training
- Presentation to external groups, universities and agencies (VPAC, VeRSI, Monash University, APAC, ARC)
- Preparation and delivery of Federation activity report
- Preparation of system and associated documentation
- ‘Operationalizing’ of Testbed Federation infrastructure as a sustainable university resource

Final \$10k funding to be applied to achieving ‘sustainability’ goals

6. RISKS AND CONTINGENCIES

It is recognized that there are numerous risks that can impact on maximizing the potential for success of this proposal. While there are a few technical issues, most of the identified pitfalls are business process related:

- Project fails to deliver a useable system
- Suitable (external to project) support personnel are not identified or available
- The developed systems don’t align with common usage or standards already present at the University
- The systems do not scale well for use at the university wide level
- Lack of uptake by the wider university research community
- Legal or copyright issues
- Unworkable business model for sustainable operations

In order to minimize these risks the guiding principle taken has been to identify the relevant stakeholders, and then to engage with them as much as possible to understand their issues and agenda. In this way a clear path forward will be known to most, if not all, concerned and questions systematically addressed beforehand.

A second strategy is the ‘buy-in’ and commitment of senior staff advocates or champions for the proposal. For instance, Professor Rachel Webster within the School of Physics and Director McLaurin Smith for the University Information Division. This ensures having the appropriate support to alleviate skepticism, bring in early adopters, and provide the necessary ‘ownership’ for long-term management.