

# Platforms for Collaboration Cover Note – Appendices

## Commentary

The platforms for collaboration investment plan proposes six major activities of which four require the establishment of organisations and three require NCRIS contractual arrangements for implementation.

### Australian Research and Education Network

DEST investment in the AREN does provide research institutions with early access to world class high bandwidth research connectivity. Research traffic volumes need to rise further to demonstrate clearly that such access is provided at a below market price by virtue of the investment in that infrastructure.

As well, a bedding down of the existing infrastructure in terms of its service offerings, and their policy and price integration with campus infrastructures and service policies needs to occur. Many research benefits could be achieved by a better alignment between campus and regional infrastructures and policies and the AREN.

Finally, as communication is a normal cost of any business or activity, the investment plan has also taken the position that any direct subsidisation of the AREN's operational activities would be a form of cost shifting.

Various options for network extension do exist and a technology refreshment for an AARNet4 will be required at some stage. Nevertheless, the investment plan has focused on connectivity investments into the higher level services that provide value over the top of the AREN rather than in investments into the AREN backbone itself.

The basis for this has been the view that connecting researchers and resources and increasing traffic levels is needed to establish a clear business case for further timely investment.

If more funding were available, approximately \$10M of upgrade options could be applied to the network layer. Perhaps twice that order of investment is likely to be required in the next investment period.

### Australian Access Federation

In authorisation systems, the lack of harmony at a policy level and the lack of interoperation at a technical level across research institutions, is a major impediment to collaboration. While manageable by work-arounds in human timescales, the situation must be remedied if electronically mediated collaboration is to be the norm.

DEST have provided funding through the SII to trial various solutions and have provided a further \$4.8M in 2007-09 to develop a trust federation, the best means currently available for tackling the problem.

The predominant cost in implementing the trust federation involves harmonising policies and technical infrastructures across the sector, which will therefore require investment by participating institutions. Fortunately there are good reasons for institutions to re-work their authorisation systems for their own business reasons and so the trust federation can be treated an integration requirement within those institutional investments rather than as an add-on. No specific extra federal funding should be required for this.

The other major cost arises when applications need to be adapted to interface to the trust federation, which again fortunately is under way for many applications; and it has already been achieved for the basic web server technology used world wide.

Like the AREN, the investment plan has adopted a preference for the ongoing operation costs to be shared amongst the institutions that gain value from them, as the services should deliver real cost savings into those institutions. The plan allows some support for the start-up phase of the servers that implement the trust federation as these will need to be located and managed in a machine room somewhere with suitable expertise around them, well before the value of the services will be fully realised.

Further additional funds could be provided to enhance use of AAF services, however this should be one of the items for consideration by NEAT (see below) and not treated separately.

## Computational Infrastructure

The most striking overall consensus of positions across the entire consultation process has been that the APAC National Facility should continue. There is also general support for the use of federal dollars in providing that service. Consequently I invited APAC and the APAC Partners to propose an implementation plan for high end computing which is attached in Appendix I.

The invitation included the view that governance might need to be modified in light of the development of NRIC and the development of separate arrangements around the grid and data and that the issue of regional and application specific computing support should be addressed.

APAC have requested that guidance be provided for changes in governance to limit the range of options that might be evaluated to those likely to be acceptable.

The overall envelope of funding that should be provided is of course a matter for priority assessment however there is a minimum funding level below which a capability solution is not feasible and a central system becomes unattractive from a research community perspective.

The floor is probably \$4M pa on the system itself, and about the same again in operating and staff costs. To this some technical support to adapt codes to the systems and some management is also needed so that about \$10M pa is required to operate a national capability computing service. This level of investment is only possible by aggregating investment with others, and even though their shares are for their own use, if funds can be doubled the compute power purchased will be more than double, representing gains all round. The upper bound on capability computing is difficult to assess, as the question is related to the most effective use of funds in support of research, however the APAC review suggested about \$6M pa from DEST was needed.

Significant discipline or application specific facilities may yield a greater return than an ever increasing investment in a generic capability services. Such systems if situated regionally should enjoy the benefit of state or local institutional investment and therefore should be more highly leveraged. The lower bound here is none and the upper bound derives from an assessment of the number of discipline or capability areas that command specialised high end computing services. Cases could be made for geo-sciences, physics, energy, bioinformatics, climate, water, eco-systems, characterisation, and perhaps general engineering. A reasonable bound on investment in each system would be \$2M per annum of which DEST might contribute a third, so that allowing for no more than ten such systems, a further \$7M per annum could be applied if funds were available.

So the options for investment in national computational infrastructure are in the range \$5M to \$12M per annum of federal funding and \$10M to \$30M per annum total, with the mix between capability and speciality systems to be determined. The plan has placed the investment towards the lower end of this range at \$6.5M pa from DEST and \$14.6M pa overall, with three specialist shoulder systems proposed at about \$1.5M per annum each.

## Interoperation and Collaboration Infrastructure

The effort level required to develop, implement, install and operate the middleware services that can integrate the very large number of research resources that might be integrated is large.

The plan presented here is a lower bound approach, where development and implementation of middleware is left for others and a hub and spoke model is used to limit the number of entities that must have relevant expertise levels for the solution to be feasible.

If further funding were available, the most obvious manner in which to improve the investment plan would be to fund major resource owners and research institutions as hubs and to add outreach services to researchers, as opposed to resource owners, into the investment. Indeed, it would be entirely appropriate to have a hub per significant research region counting Clayton and Parkville separately and North Ryde and Kensington separately and so on. However, it is not possible, and may not be necessary, to grow the expertise available at such a rate that every research institution could be its own hub. A doubling of hubs is likely to be more than needed and indeed more than can be staffed in the short term, giving an upper bound estimate of about \$7M per annum.

The need to provide e-Research consulting which could be added to the hub model was covered by the eRCC which suggested funding of the order of about \$15M per annum for that purpose. However much of this support would be related to data management and only a minority to the services supported here, suggesting an overall

upper bound in this category of about \$10M per annum.

Given that the APAC National Grid is an already operating national inter-operation infrastructure and houses a large portion of our expertise in this activity, I invited the operators of that infrastructure to propose a generalisation of their current services with an enhanced focus on data and web services.

In addition, and in light of the fact that significant parts of the required expertise falls out of funding on June 30, I requested APAC consider its willingness to host the first year of this activity in case a new governance arrangement and related contacts could not be agreed by July 1.

## **Data Management Infrastructure**

The effort level and the integrated system investment required to deal with the growing data management problem is immense.

The plan presented here is also close to a lower bound approach. Although, an even more minimalist position would be to eliminate the provision of stewardship services.

However the mix of activities identified in the plan is strongly endorsed by institutions with relevant experience and the provision of the proposed stewardship services adds substantial value to some under supported communities and more importantly provides a base from which an alternative future can grow.

The upper bound on spending is very large if consideration were given to providing a national infrastructure, as in the case of the AREN, that might hold all research data of national significance. The investment plan has been compelled to place this possibility into the 'landmark infrastructure' class and therefore out of scope.

If further funding were available, the e-Research support suggested by the eRCC should be provided as an extended outreach activity and the provision of an enhanced stewardship service should be provided.

The extended outreach might need a further \$10M per annum while the stewardship appears on first sight to be open ended. However, the availability of well curated data with a demonstrated community dependency is quite low, outside of the organisations that have a mission to manage data in that fashion. Nevertheless, there is ample evidence that many agencies and researchers routinely collect primary natural observations that are unrepeatable and which are not collected, which would be a high priority area to remedy. Assuming the outreach activity was also funded (the extra \$10M above) and therefore support was available to improve the research and data management practice of relevant organisations, the increment to the stewardship service itself might be as low as \$5M per annum.

Therefore, while the upper bound on data management would exceed \$50M per annum if the whole problem was to be addressed, a further \$15M per annum would provide very substantive gains as identified by the eRCC and in the form of improved collection and retention of data that can be categorised as inherently valuable and which is currently lost.

Unfortunately, attempts to arrive at an implementation plan have faltered under the time pressure imposed, which is understandable given the scale of the problem. More time is required for the community to come to terms with what can be done and what must be left undone, and who can and should contribute.

Also, the possibility that an ANDS badge might exist and be acquired by an institution significantly destabilised the agreement process. A second consultation process is proposed based on an agreement around the investment and then the identification of the participants and their roles.

A very high level of interest in investment in ANDS is present, as is evidenced in the CSIRO proposal attached in Appendix III.

While the budget allowed for in the plan is known to be able to implement the proposed services, the continued consultation process is likely to arrive at a much larger activity if those willing to co-invest can be marshalled.

## **National E-research Architecture Taskforce**

Early in the planning a fourth component was included, initially known and "tools" and later recast as

“Application and Discipline Services”. This component was intended to address the problem of supporting new e-Researchers which was thought to be well connected to the problem of developing the next generation of services in the infrastructure.

The expertise to do that is of course not separable from the other investments and so this activity is really about bringing a focus across expertise and organisations to develop new services relevant to identified research collaboration needs.

The plan therefore proposes the establishment of NEAT, to include the nations leading practitioners in collaboration technologies and services. There about a dozen people in that category all of whom can be included in this activity to provide the developing PFC investments with strategic technical leadership.

The funding provided to the activity of \$2.5M per annum is only acceptable because the various participants in other investments are willing to co-invest at highly leveraged rates. My expectation is that about \$8M per annum of direct effort in the activity could be leveraged from the \$2.5M allocated by NCRIS.

If further funds were provided, this activity could be doubled or trebled, however, the leverage will fall as the expertise pool is limited, so there are natural scales beyond which we cannot proceed. I believe no more than an extra \$5M per annum from NCRIS could be applied in this activity.

## Summary

In response to the main body of the Investment Plan, an implementation proposal for the computational infrastructure and an initial implementation plan for the interoperation infrastructure have been developed. Governance arrangements for both need to be agreed.

An implementation plan for data management infrastructure will require a further consultation process.

The establishment of NRIC and NEAT, even in interim form, is recommended as a matter of urgency as some clearer authority will need to be applied to resolve outstanding issues.

Overall, the potential investments are expertise rather than need limited.

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