

Introduction

A study of network provision to internationally rated UK research departments shows that researchers may be suffering as a result of inadequate or problematic network provision. This briefing paper highlights these issues and their consequences and suggests steps to be taken. It also looks at Grid technology take-up and provides an overview of how researchers' work patterns might be improved if unlimited network bandwidth and adequate resources were available.

1. The key issues

1.1 Network infrastructure

Issue

There is an alarming amount of legacy networking in institutions. As a result of under-resourcing, around one third of institutions still use the oldest and most basic kind of network technology that allows connections at less than a tenth of the speed possible. As about 80% of institutions have many of their research users connected at these slow speeds, there is appreciable scope for upgrading these links.

Consequences

Maintaining an association between network upgrades and building refurbishments in order to try to save money has had a long term negative impact on research workers and hence on research competitiveness. The consequences extend from poor responsiveness when accessing web pages to influencing users to operate poor data backup procedures in order to minimise network use.

Recommendation

The budgets needed to upgrade departmental networks to current speed norms are not large so this issue should be examined by institutional senior management wherever legacy networking is present. Institutions in which researchers are served by old-style, slow cables and by shared network access should ensure that they possess and implement plans to replace this with current technology.

1.2 Data backup and storage

Issue

The vast majority of researchers use personal external media

(such as CDs and DVDs) to back up and store data because of inadequate quotas offered on institutional resources, or the cost of central storage and backup. Information and communications technology (ICT) service departments appear to overestimate considerably the role played by central servers to back up research data and to underestimate the level of use of personal media for this purpose by researchers.

Consequences

Until the overall situation improves a lot of valuable research data must be considered to be at unnecessarily high risk.

Recommendation

Institutions must recognise the value of the data being produced by their researchers and should ensure that institutional policies on the protection and preservation of informational assets establish systematic approaches to backing up research data. The potential for shared services for research data archiving is a useful development currently being explored by some organisations, while establishing data centre services is another area for consideration. Currently, under full economic costing, unless there is an exceptional demand on resources, it is assumed that the storage requirements for research projects are met out of the overheads for the project. Institutions may need to re-examine this assumption and allocate further resources accordingly.

1.3 Firewalls

Issue

Centrally managed firewalls are the norm in institutions but can cause difficulties of varying seriousness, including constraints upon laptop use by visitors.

Recommendation

There is already comprehensive guidance on network security design produced by JISC and JANET CSIRT (JANET's Computer Security and Incident Response Team). Institutional firewall policies should be determined by an appropriate assessment of risk, bearing in mind the growing body of roaming workers. Being able to successfully host a flow of visitors is an important capability of a modern research department, and a key part of this is an ability to rapidly make visitors productive by allowing their laptops to access the resources they need.

1.4 Management/planning

Issue

Responsibility for network provision differs between institutions, and perceptions of who is responsible may also differ within institutions, from department to department. Arts and humanities departments and ICT service departments tend to view managing and funding the network as a central responsibility, whereas science and engineering departments tend to believe responsibility is concentrated in the department.

Consequences

These differences suggest a lack of communication or a lack of clarity about what arrangements are in place and highlight the difficulty of implementing an effective and coherent planning process.

Recommendation

The network should be considered to be part of the infrastructure of an institution. It follows that central planning is required to ensure that network provision needs are adequately planned for. These planning needs include scheduling a replacement cycle for networking kit and ensuring that the network is considered at the design stage of any new builds and refurbishments.

2. Clustered computing and the Grid

Awareness of the existence of the Grid is largely associated with science and engineering departments. Typically these Grid-aware departments possess their own support staff, their own servers with developed storage and backup regimes, and a wider variety of technical needs.

Among these departments there is wide use of locally clustered computing and, while around a third of the Grid-aware departments expect to make appreciable use of the Grid within two to four years, a substantial number of potential Grid users have consciously decided to hold back from involvement because of the learning curve involved and the availability of their own clusters.

These departments can be expected to continue to develop their own high powered computing (HPC) clusters, although they suffer from inadequate resourcing. The growth of HPC will inevitably tend to lessen the comparative attractiveness of Grid resources. The latter will therefore need to grow at least at the same rate if they are to remain as an attractive option in the short or medium term.

Other issues with the Grid include:

- The Grid community can appear rather closed to those outside it
- As the Grid is basically a concept, it remains imprecise to some

- Unless a balanced cross-section of information is available about Grid computing, some potential adopters will delay putting time into it, while others may experience disappointment if it turns out to interrupt research output

Recommendation: JISC recognises that more education is required to assess Grid technology and plan for its adoption and plans to address this issue.

3. 'Blue sky' thinking

Access to unlimited network bandwidth would change researchers' working patterns, with improvements including:

- High resolution viewing of artefacts held remotely
- Improved working from home
- Enhanced video conferencing services
- Access to specialist facilities that are linked in real-time over the network
- Wireless access to the network
- Allowing specialists to be part of several projects in several institutions simultaneously
- Improved teleworking by researchers in non-UK universities

Implication: There are support needs to be met if the capabilities of SuperJANET to deliver improved bandwidth are to be realised within the contexts of these new working patterns. These support needs will require adequate resourcing if the benefits of SuperJANET are to be fully exploited.

Further information and resources

This briefing paper draws on a JISC report: *Review of Network Provision for Research Needs* by Jon Duke and Andy Jordan. The study was conducted in the context of the imminent commissioning of SuperJANET 5 and considered the quality and performance of the network infrastructure between the SuperJANET 5 Points of Presence and 284 5* rated departments.

Duke, Jon and Jordan, Andy, *Review of Network Provision for Research Needs Final Report*, May 2006
www.jisc.ac.uk/aboutus/committees/sub_committees/jsr/jcsrendtoend

Best Practice Guide to *HE Access to e-Resources in Visited Institutions*
www.ucisa.ac.uk/haervi/haervi.aspx

JANET
www.ja.net

JANET CSIRT
www.ja.net/csirt

JISC Information Safety
www.jisc.ac.uk/publications/publications/pub_infosafetybp

UCISA
Information Security Toolkit
www.ucisa.ac.uk/ist

