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23 April 1993

Dear Colleagues,

I have developed for CSIRO-DIT a document that provides a snapshot of the prevailing technology now available for the support of distributed collaboration. The intent is for the Division to trial a sample of the identified products through real use in support of some of our activities.

Dr John O'Callaghan thought that the review may be of some interest to you and your colleagues. I enclose a paper copy of the document. If it is of any assistance, I can provide a version in Mac Word 5 electronic format.

Regards

Melfyn Lloyd

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5 MAY 1993

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COMMERCIAL - IN - CONFIDENCE

CSIRO - DIT
Collaboration Technology
Review

Document Control

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1 Introduction

The Division would like to trial one or more forms of collaborative technology - in support of operational activities. The expectation is that these trials would be useful in determining the appropriate application of collaboration technology within the Institute and beyond. This document is an attempt to catalogue the different forms and sources of such technology that are accessible on the 'market' today.

Given the multi-site nature of the Division, the external collaborative activities of many programs, and the technical direction of the Division it seems appropriate for the Division to take a lead/active role in this area.

It is the intention for Laboratory and Program Managers to make proposals for trialing one or more types of technology. Evaluation of the technology in an appropriate, defined context should result in a report available to the Division indicating the outcome of the trial and any recommendations that the participants regard as appropriate.

By necessity, this document only provides a brief overview of the range of technology available. Please inform the Editor of any gross errors or omissions. If any specific product is of interest to you, then it is likely that further information is available from the Editor. It should be noted that the area is extremely dynamic, with new products being announced on a daily basis.

If a more complete and detailed survey of this type of technology, copies of a European (RARE Project) document titled 'A Survey of Distributed Multimedia Research, Standards and Products' is available from the Editor.

Section 2 of this document provides a simple categorisation and overview of the various technologies relevant to this subject.

Section 3 of this document adopts the technology categorisation from the previous section, and identifies a number of specific products that may be used within the Division.

Section 4 summarises the range of technologies and the underlying information content type in tabular form.

Section 5 lists contact points for a number of the products identified in this document.

It is recommended that this document be discussed at the next CSIRO-DIT Computer Infrastructure Coordination in order to submit relevant recommendations to the Chief.

Fax at the Terminal/Workstation

Fax systems for transmission and receipt are now available for both Sun and Mac domains - either for single user systems or acting as servers for all users on a networked site. Providers are now claiming OCR (Optical Character Recognition) and conversion to WP format (eg Word) in their next releases. Reception of faxes at a server would require administrative procedures for the appropriate distribution of incoming faxes.

Whiteboard

Electronic connectivity of two or more 'standard' whiteboards. Note that this category reflects traditional pen marking on a board rather than use of shared window(s) on computers. Systems are also now available that permit interaction with a computer 'screen' projected onto a large display area.

Shared Workstation

Two or more computers linked together, enabling each user to share one or more windows (and applications) - for viewing and (possibly) update. A common facility for such a system is simply to provide the equivalent of a shared whiteboard.

Video

The transmission and viewing of video using normal video technology (ie video cameras and monitors). It is assumed that audio is also carried (unless noted otherwise), and display via workstations is not incorporated. The video quality may range from B/W through greyscale to colour, and slow scan through to full motion video.

Audio across Workstations

The transmission and reception of reasonable quality audio between two or more connected workstations, across a computer data network.

Video across Workstations

The transmission and viewing of video using connected workstations, together with one or more video cameras - with display via windowing on the personal workstations. It is assumed that audio is also carried (unless noted otherwise). The video quality may range from B/W through colour, and slow scan through full motion video. The technology may support point to point and multicast. Note also that technology is now available for projecting screen displays for PC, Mac and Sun onto a larger area.

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2 **Categorisation of Technologies**

There are a number of different collaborative tools and technologies that are becoming available, covering a broad spectrum of content and possible usage. A simple attempt has been made to classify the available products into the following categories :

- Calendar Management
- Audio
- EMail/Text
- Fax at the Terminal/Workstation
- Whiteboard
- Shared Workstation - Display Screen
- Video
- Audio across Workstations
- Video across Workstations

It is the case that some of the technologies identified in this document span more than one of the above categories. Specifically, some of the products offering 'video across workstations' also provide a 'shared workstation capability', and an 'audio across workstation capability'.

Calendar Management

The maintenance of an electronic diary, made available for 'public' viewing with publication and access across a network. Unfortunately, these systems are typically machine specific - hence only viewable from within discrete Mac or Sun domains.

Audio

Connection between two or more people/sites using normal telephone lines. Aside from services such as Telecom type audio-conferencing, there are specialised microphone/speaker systems for enhanced group participation.

EMail/News/Text

Some form of textual document interchange over and above typical Electronic Mail and News services - offering additional richness of service in content, notification or access. The basic technology or service provides for transmission and receipt of electronic mail. Mail is now available across a number of networks, and support is now available for some multi-media work. Related to mail are systems that enable real-time textual chatter between users, more advanced forms of text based systems for the distribution of news, establishment and operation of bulletin boards, the sharing of information through specific users, and the joint development and review by multiple users of shared documents.

3 Review of Technologies/Products

3.1 Calendar Management

3.1.1 Calendar Management - 'openwindows cm'

The 'openwindows' Calendar Manager is an appointment and resource scheduling tool which :

- displays day, week month or year
- schedules events
- provides reminders as mail messages and/or pop-up window
- access, browse, edit other users (according to their permissions).
- it would be quite easy to create calendars representing resources such as rooms.

To make cm a Divisional tool requires some thought because :

- It is not completely trivial to run it from X-windows if you're not running the openwindows window manager
- It may be that access list restrictions in ciscos currently prevent it being used between sites (note that I would not recommend completely removing the relevant restriction, only opening up the other DIT sites)
- Mac users could only access the system through MacX.

Cost : Included with openwindows.

Recommendation: One system administrator from one of the 3 sites investigates and reports on the feasibility of using cm as a Divisional tool. The tool is included with each Sun procurement as part of openwindows.

3.1.2 Calendar Management - Products for the Macintosh

For the Macintosh range of hardware there a number of options for software that provided calendar facilities including Day By Day, Up To Date and DayBook. They provide similar facilities, and typically cost between \$100 and \$250 (with opportunity for volume discount).

The market is highly competitive, with rapid revision by developers. The Division is currently trialing 'Day by Day', within the Canberra and Melbourne Labs. The market leader 'Now Up To Date' has been trialed in the Melbourne Lab and seems preferable - offering many more features, including support for the remote use of PowerBooks. If further information on this subject is required, please contact the Editor.

Cost : Typically \$100 to \$200 per single user copy, usually with the opportunity to purchase discounted 5 or 10 user packs.

Recommendation : Those needing to share diaries and living in a (Mac) world procure and use a common application. Advice should be taken on which product to adopt from existing Divisional users. Where possible, procurement should be synchronised to take advantage of multiple copy discounts.

3.2 Audio

3.2.1 Audio - NEC VoicePoint

VoicePoint from NEC is intended to provide superior audioconferencing facilities to those offered by normal speaker phones. The attributes claimed include :

- Full duplex operation
- Sound balanced for full room operation

One usage of this system could be to take the audio load off current technology workstation video-conferencing technology operating over AARNet. Although video is the bulk of the load, the user is affected more by delay and breakup on the sound feed.

Cost : the price per node is about \$2000.

Recommendation : Each lab procures one VoicePoint and makes it generally available for all conference calls.

3.3 EMail / News / Text

3.3.1 EMail / News / Text - Free Applications

- Lots of free mail and news management programs: sendmail, PP, bnews, cnews, inn, ...
- Lots of free Unix mail and news readers: elm, mh, xmh, mailtool, rn, nn, vn, ...
- Lots of free remote mail and news readers for PCs and Macs: eudora, techmail, pine, trumpet, ...

Cost : None.

Recommendation : Ensure that the laboratories are aware of the various applications and attempt to control the proliferation/fragmentation of multiple systems in use.

3.3.2 EMail / News / Text - Grapevine

Software produced by the Office Express (University of NSW) for the efficient management of information for the executive. The system is available for vax/vms and unix platforms. There are user agents for macs and PCs. A report by Trevor Hales on the system is available from the Editor.

Cost : The cost for a 10 user system is approximately \$600 per user, with a one-off additional fee for X support of \$6K and a need for approximately 5-10 days consultancy (at about \$1K per day) for training. A package for 100 users is \$40K, with 3 weeks consultancy/training at about \$15-\$18K and additional users at \$300. These costs are based upon a single server - additional servers are \$5K.

Recommendation : Program Managers and Office of Chief to identify if functionality is useful, and if trial should be planned.

3.3.3 Email / News / Text - Lotus Notes

Lotus Notes is a leading corporate application, used with apparent positive results. Originally a PC only co-operative work program, it has recently been made available on Mac and Unix platforms - provided they are connected to an OS2 server. The new release also provides support over a number of LAN and WAN technologies. The application is similar to Grapevine, enabling distribution of information across identified groups and enabling collaborative work on common documents. It is possible to build bespoke applications upon Notes - now a significant development activity in the commercial world.

Cost : Not currently known - awaiting announcement for new release with Mac, Unix and WAN support.

Recommendation : One Lab/Program/Project evaluates Lotus Notes to determine if the application would be useful within the Division, and if the hardware requirements are acceptable. If the initial evaluation proves positive, a wider trial across sites should be investigated.

3.3.4 Email / News / Text - Metamail

Metamail is a simple way to add the ability to receive multi-media mail to existing mail software. This is already in use at the Carlton lab.

The costs of this are not great if we only use products that others have modified to include metamail. Can we get everyone to have access to multimedia mail without violating that restriction? If not the cost of actually modifying mail software is several days of programming effort: and there is some mail software for which we don't have source (e.g. Sun's mailtool).

Cost : Some systems (eg MIME) are available at no cost.

Recommendation: Significant issue to be analysed - is multi-media mail relevant/required within the Division? If there is a positive outcome - Hal Miller to report on the steps necessary so that all staff have the ability to receive multi-media mail [composition tools that allow sending are more difficult of course: see Andrew below].

3.3.5 Email / News / Text - Andrew

The Andrew Toolkit and the products based on it, particularly the Andrew Message System, form a large X-windows based system designed to be a major demonstration of the potential of multi-media cooperative work.

Andrew's ez multi-media editor allows output in RTF format. It thus provides a simple link into DIT's standard Word5 and Framemaker document preparation tools.

Andrew doesn't work as well on B&W X-windows terminals as it does on colour terminals. This is increasingly true of many applications, and DIT must consider whether it should aim to give all staff colour capability in the future. In the meantime it is probably impractical to even consider making Andrew a DIT standard.

Cost : None.

Recommendation : See Metamail above.

3.4 Fax at the Terminal/Workstation

3.4.1 Fax at the Terminal/Workstation - Mac Based

Single user, PowerBook and site server systems are now available from NetComm and PSI and others. PSI have announced an OCR capability (with conversion to Word format) in their next release. The latest releases also support fax direct from within an application, as simple as printing.

Cost : Including modem, the cost is approximately \$600 for a single user, and \$1500 for a site server.

Recommendation : Each Lab evaluates the utility of a site server, for possible procurement.

3.4.2 Fax at the Terminal/Workstation - Sun Based

At least one commercial fax system operable on Sun sites is available, and is in operation at CITRI - TRUFAX sourced from Saki Computers. Access for transmission is either through modified, specific commercial applications (which are not typically used within the Division), or through the sending of text or Postscript (as though to a printer) to the fax server. It is claimed that a future release will include OCR capability.

It is understood that there is at least one public domain unix based fax system. Further information is available from the Melbourne Laboratory, who have tried unsuccessfully) to make use of it.

Cost : approximately \$2K per site, including modem.

Recommendation : Each Lab evaluates the utility of a site server, for possible procurement.

3.5 Whiteboard

3.5.1 Whiteboard - Electroboard Smart 2000

Smart 2000 is a conferencing system that makes use of a PC screen projector to enable shared use of Windows applications such as Excel and Word. Groups at different (two) sites can see and 'mark-up' on each whiteboard, with electronic and hardcopy available at each site. Marking on the screen can be by pen, finger or keyboard. The display is achieved through overhead projection from a PC running windows. It is unfortunate that the systems is PC based, but assuming file portability for major applications such as Excel and Word (to/from Macs) is could be useable. Connectivity is currently via dial-up line, but LAN support is promised shortly. The system is still being enhanced, with snapshot camera and scanner support indicated for the future.

Cost : Total turnkey end system price (per site) is estimated at approximately \$35K - including Windows PC, good quality OHP (about \$2K), projection unit (range of capabilities with mid-price around \$10K) and SmartBoard/software around \$17K.

Recommendation : Subject to a review of similar products on the market, and confirmation of real need for use between the sites - investigate the establishment of such a facility at each Laboratory.

3.6 Shared Workstation

3.6.1 Shared Workstation - Mac Based Systems

For Macintosh there are two well know systems for sharing the screen between users - Carbon Copy and Timbuktu. In certain cases these are used to permit a user to control from a remote Mac.

Cost : The current indication of prices for the software systems for a machine are Carbon copy (\$239) and Timbuktu (\$259).

Recommendation : One pair of each product are trialed within an appropriate project, and evaluated for wider adoption within the Division.

3.6.2 Shared Workstation - Sun Based Systems

See the entries below for Communique and wb (Video across Workstations).

3.7 Video

3.7.1 Video - CSIRO

CSIRO is involved with and development and trialing of a complete 'telemeeting' technology developed by CSIRO-Flinders Joint Research Centre. The technology encompasses an electronic whiteboard, a

'liveboard' (interaction on a large screen with a computer application) and full video-conferencing facilities. Note that the liveboard is reliant on applications which are aware of the board technology, and are currently scarce. the technology is on trial within the Division of Radiophysics.

Cost : The cost for the full system per site is approximately \$65K. The cost per end system for the 'liveboard' is approximately \$15K.

Recommendation : More information is required on the system, and an evaluation of Divisional needs and similar commercial systems needs to be performed.

3.8 Audio across Workstations

3.8.1 Audio across Workstations - vat / nv / wb

See the section on Video across Workstations.

3.8.2 Audio across Workstations - Communique

See also Communique under Video across Workstations.

3.9 Video across Workstations

See also vat/nv/wb under Audio across Workstations. There are apparently some products now being released in the US, but no detailed information is currently available.

3.9.1 Video across Workstations - communique

Audio and video - with capability spanning grey scale, 8 bit and 24 bit colour depending upon video card used. Options on video card include support for real time JPEG compression. Functionality covers both live video and shared whiteboard. Text and documents can be displayed and physically moved between sites. The system runs on sparc machines, with support for a variety of LAN and WAN connectivity technologies.

Cost : In addition to a sparc suitable graphics support a video card is required (grey scale for about \$1K or Parallax with JPEG support at \$13.5K), software for greyscale is \$2.5K per end user (\$11K for 5 licences) and colour with Full Motion Video at \$3.5K per end user (5 pack at \$16K).

Recommendation : Attempt to get the suppliers to complete a successful demonstration of the system. Perform a cost benefit analysis of the commercial offering against the 'free IETF' facility identified below. Equip at least two sites with one form of the technology to perform the trailing identified below.

3.9.2 Video across Workstations - vat / nv / wb

This is a suite of free products designed to exploit and demonstrate emerging multicast technology at the network layer. Only sparc binaries are currently available, though source has been promised. The wb (white board) program has not been released at all yet but should be soon.

Vat and nv have been used to videocast IETF meetings from America and the recent AARNet NetworkShop from Brisbane. There is thus significant experience in the use of this technology to for interaction that is mostly one-way: i.e. lectures with questions.

Sound over TCP/IP has been around for a long time. All the previous experience is contained in vat which handles various sound formats, allows for merging/mixing multiple streams and converting. It handles unicast and multicast. It has a sophisticated user interface. However despite all that, a packet network is not ideal for sound since lost packets lead to sound break-up.

Nv uses the standard sparc videopix card, and transmits greyscale pictures at a small number of frames per second. It is possible to receive multiple video streams at once into separate windows. However bandwidth and screen size limit this so that it couldn't be used for a large number of separated participants. It could perhaps be called "few to few" interaction

Cost : Software free, video card under \$1K, requires a Sun workstation that can support greyscale.

Recommendation: Buy a camera and a videopix card for each site. Install the multicast software on some Suns at each site and set up multicast tunnels to allow us to have a DIT private videoconference which we can set up as needed, perhaps with an initial trial with a DIT-wide seminar series.

3.9.3 Video across Workstations - Mac Products

It is believed that a number of Mac products are now being launched which will support this functionality, having appeared in recent US trade shows. No further details are currently known.

4 Summary and Comparison of Technologies

4.1 Form of Information Content

Product	Audio	Text	Image	Vision			
				Colours		Speed	
				B/W	Colour	SS	FMV
VoicePoint	X						
EMail	(X)	X	(X)				
Grapevine		X					
Lotus Notes		X	X				
Workstation Fax		X	X				
Smart 2000		X	X				
CSIRO	X	X	X	X	X		X
Telemeeting							
Communique	X	X	X	X	X	X	X
Andrew	X	X	X				
wb			X				
vat	X						
nv				X		X	

Note 1 SS : Slow Scan

Note 2 FMV : Full Motion Video

4.2 Communications Media

Product	PSTN	LAN	AARNet	ISDN
VoicePoint	X			X
EMail	X	X	X	X
Grapevine	???	X	X	
Lotus Notes	X	X	X	
Workstation Fax	X	X	X	X
Smart 2000	X			
CSIRO				X
Telemeeting				
Communique	X	X	X	X
Andrew		X	X	
wb		X	X	
vat		X	X	
nv		X	X	

4.3 Technology Platform

Product	Mac	IBM PC	Sun W/S	X Term	Bespoke
VoicePoint					X
E-Mail	X	X	X	X	
Grapevine	X	X	X	X	
Lotus Notes	X	X	X	???	
Workstation Fax	X	X	X	X	
Smart 2000		X			X
CSIRO	X				X
Telemeeting					
Communique			X		
Andrew				X	
wb				X	
vat			X		
nv			send	receive	

4.4 Scope of Collaboration

Product	One to One	One to Many	Few to Few	Many to Many
VoicePoint	X	X	X	X
Email	X	X		
Grapevine	X	X		
Lotus Notes	X	X		
Workstation Fax	X	X		
Smart 2000	X			
CSIRO	X	???	???	
Telemeeting				
Communique	X	???	???	
Andrew	X	X	X	X
wb	X	X	X	
vat	X	X	X	
nv	X	X	X	

5 Contact Details**NEC**

NEC
635 Ferntree Gully Rd
Glen Waverly VIC 3150

Tel : (03) 262 1111
Fax : (03) 562 5715

Sun Microsystems

Sun Microsystems
180 Albert St
South Melbourne VIC 3205

Tel : (03) 696 0099

Apple

Apple Computers Australia
16 Rodborough Rd.,
French Forests, NSW

Tel : (02) 452 8000

MAC Calendar Tools

Any significant Mac software supplier.

Grapevine

Institute of Information Technology
Level 15, Tower 1
The Plaza
Bondi Junction
NSW 2022

Tel : 02 389 4800
Fax : 02 387 8585

Lotus Notes

Lotus Development Pty. Ltd.
Level 6, Advance Bank Centre
60 Marcus Clarke Street, Canberra 2601

Tel : (06) 243 5156
Fax : (06) 243 4848

PSI

Fosh Australia Pty Ltd
Suite 27
458 St Kilda Road
Melbourne 3009

Tel : 03 866 8599
Fax : 03 820 2052

NetComm

NetComm Australia Pty Ltd
1st Floor
26-30 Thompson Street
South Melbourne
Vic 3205

Tel : 03 696 2222
Fax : 03 696 6017

TRUFAX

Saki Computer Services Pty Ltd
93 Kallista-emerald Road
The Patch
Victoria 3792

Tel : 03 752 1512
Fax : 03 752 1098

Electroboard Smart 2000

Electroboard Pty Ltd
Suite 3, 711 High Street
East Kew
Victoria 3102

Tel : 03 859 9555
Fax : 03 859 9316

Carbon Copy/Timbuktu

Any significant Mac software supplier.

Communique

UNIXPAC Pty Ltd
339 Military road
Cremorne
Sydney
NSW 2090

Tel : 02 953 8366
Fax : 02 953 5875

