A Roadmap for the Future of Multi-Site Videoconferencing

*A Report for the UK
e-Science Programme*

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e-Science Core Programme

- UK effort to be at the forefront of Grid research

- Grid will provide 'easy access to computing power, data processing and communication of results'

- National Centre and 8 Regional Centres spread across 12 sites

- Many UK projects with inter- and intranational collaborations

- Clear need for collaboration technology

- Centres have Access Grid nodes

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Report Contents

- Where each technology fits best
- Costs
- Ease of use
- Display, visual, audio quality
- Networking issues*
- Multi-site issues
- Collaborative tools
- Security*
- Future Potential*
- Interoperability*

- Recommendations for UK e-Science Programme*

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Access Grid

- Research tool – started by Argonne National Lab

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Access Grid
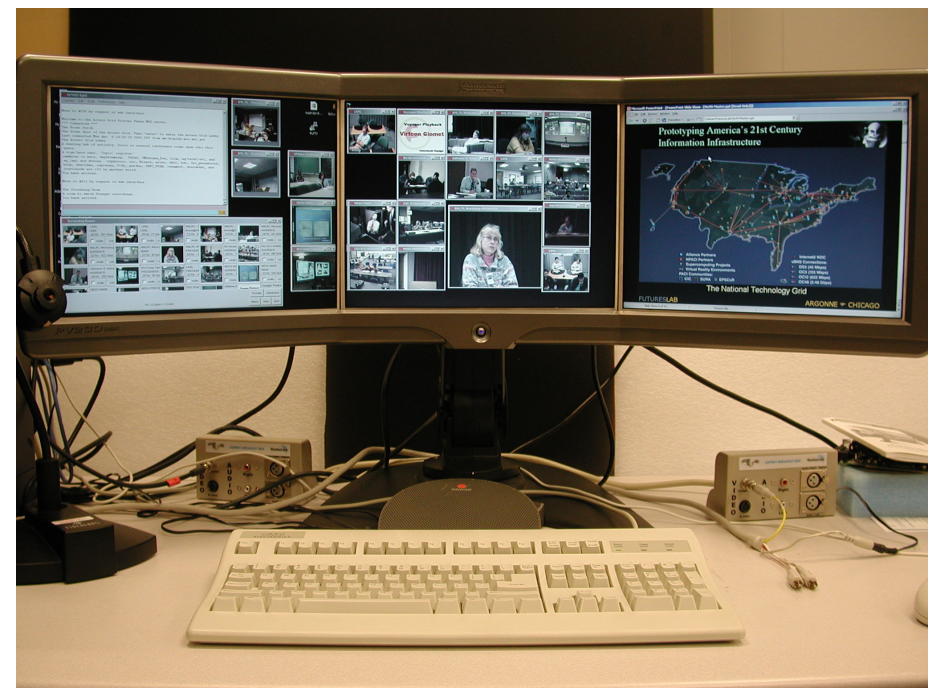
- Commodity equipment, Open Source software

- Large-scale display

- High-quality full-duplex audio

- Multicast

- "Advanced Collaboration Environment" - AG2:

  – Integration with Grid technologies (security/data management)
  – Framework for integrated services
  – Improved network features
  – Better audio-visual quality

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H.323/H.320

- "Mainstream" videoconferencing (e.g. Tandberg, Polycom)

H.323/H.320

- H.323 = IP; H.320 = ISDN

- Usually employ hardware codecs, into which are plugged microphones/cameras

- Broadcast quality video

- Single video stream – makes multi-site conferences hard

- Older systems use 'voice-selected' video

- H.323 insecure; H.320 highly secure

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VRVS

- Research project – started by Caltech

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- Central web server; worldwide reflector network

- Major strength is usability with wide variety of soft/hardware clients (H.323 or Mbone)

- Used by wide range of facilities (laptops to studios)

- Like AG, used for large multi-site conferences

- Future developments:
  - User authentication; more virtual rooms; selection of bandwidth ranges; centralised control; improved video; improved network features

Non-Studio-Based Videoconferencing

- Low cost DIY solution

Non-Studio-Based Videoconferencing

- Typically uses commodity (H.323) software, desktop computer, video cam, microphone headset, non-dedicated space

- Quality of experience limited, although can be improved using cheap echo cancellation/hardware codecs, etc.

- Security is limited or non-existent

- Best suited to one-to-one meetings where seeing co-participants is useful or to conduct limited data sharing

- Also useful to supplement studio-based facilities when they are not available (e.g. due to large timezone differences)

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Interoperability

- What if collaborators have different technologies?

- Joint Industrial-Academic projects

- People "on the road"

- Mix and match to provide greater security (e.g. using telephone with Access Grid)

- Fallback solutions

Interoperability – Technical Issues

Guest technology

Host/dominant technology	Access Grid	VRVS	H.323	H.320	Phone
Access Grid	Yes	With VRVS server	Problematic	Problematic	Yes
VRVS	With certain configuration	Yes	Yes	With H.323 / H.320 bridge	Yes
H.323	Problematic	Yes	Yes	With H.323 / H.320 bridge	With most codecs
H.320	Problematic	With H.323 / H.320 bridge	With H.323 / H.320 bridge	Yes	Yes
Phone	Yes	Yes	Yes	Yes	Yes

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Interoperability – Other Issues

- "Lowest common denominator" user experience

- Technically challenging – can lead to operational difficulties

- Booking systems

Report Recommendations (1)

1. Create an e-Science advanced collaborative environments R&D effort

2. Formalise Access Grid support

3. Deployment advice through existing agencies

4. Enable full interoperability between Access Grid and VRVS

5. Enable maximum interoperability between Access Grid and H.323/H.320

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Report Recommendations (2)

6. Deploy and support multicast bridge(s) as a stopgap measure for non-multicast-enabled sites

7. Reduce Access Grid resource implications by working closely with commercial vendor(s)

8. Improve local networking in support of IP-based videoconferencing

9. Investigate improvements for multi-site booking systems

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