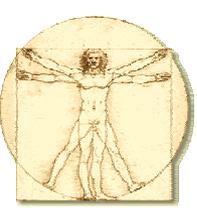


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Collaborative Technologies: The Next Generation, or We've just begun

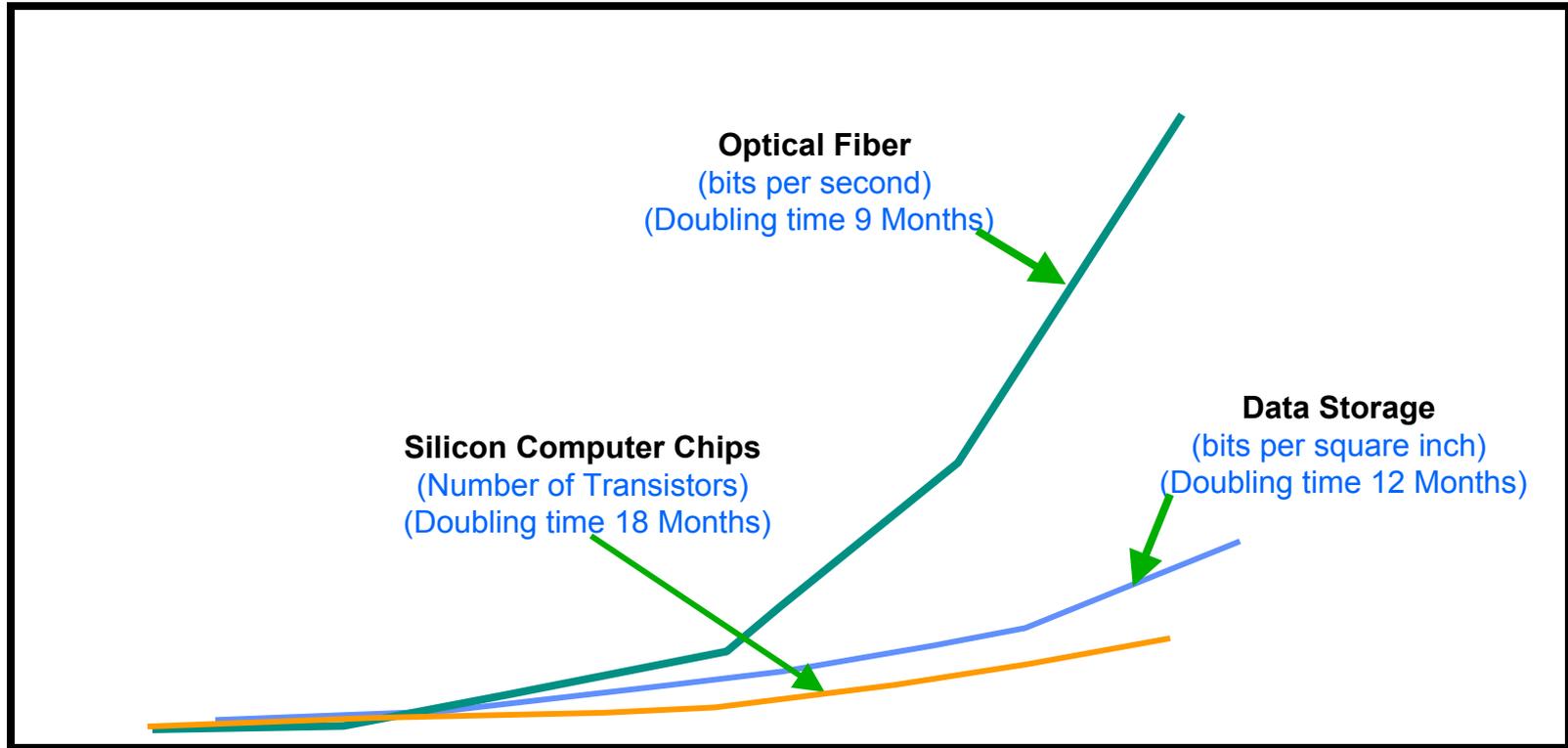
Alan Blatecky
Deputy Director
RENCI





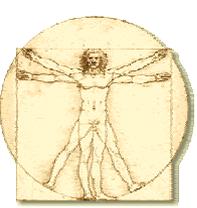
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Technology Drivers



Scientific American, January 2001



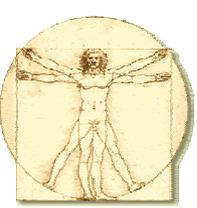


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Driving factors

- Technology Pull
 - Continuing exponential advances in technology
 - Compute, storage, networks, etc
- Science Push
 - Science as a Team Sport
 - Collaboration will be more important than HPC



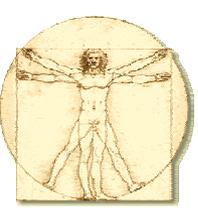


General Observations

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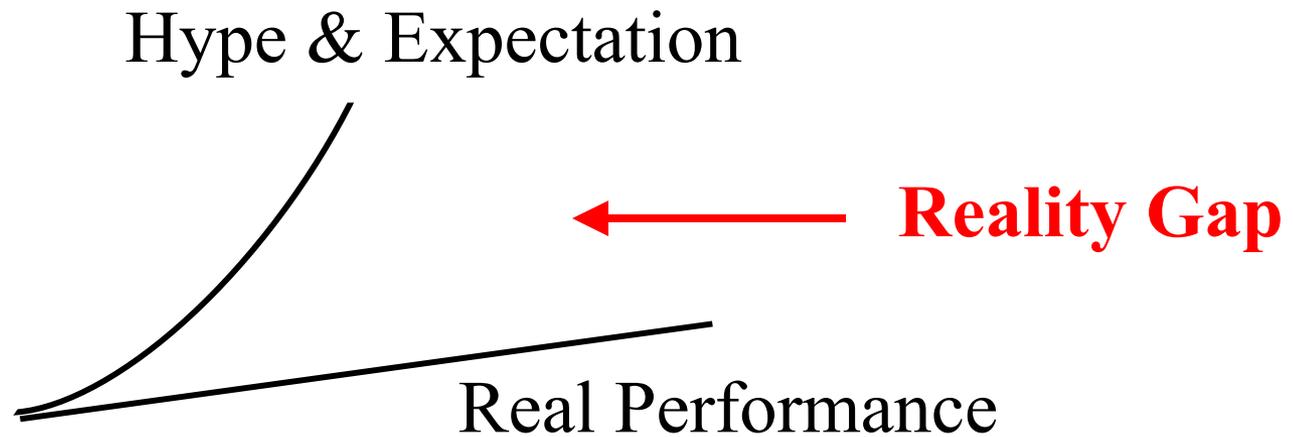
- Emerging technologies are enabling new types of collaboration capabilities
- E-science has some unique requirements that will continue to push the edge
- Collaborative Technologies aka Access Grid are beginning to address and support real collaboration
- Inordinate amount of hype, promise and confusion abounds
- Focus on development has been primarily on technical efforts and capabilities
- Now is the time to go to the next stage

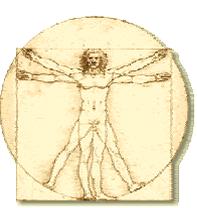




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Reality Curves



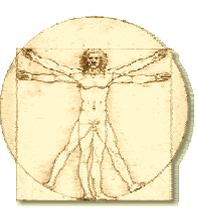


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Disclaimer

- Access Grid technologies and nodes have already had an extraordinary impact on both collaboration technologies as well as science
- Comments are not intended as criticisms, but as opportunities for further discussion & development
- It is because of the success of AG, that we can begin to address even tougher and complex issues



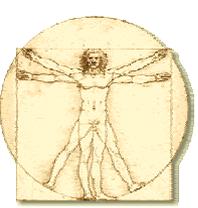


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AG observations

- AG is complex and difficult
 - Requires significant expertise and support
 - Considerable amount of “on-hands” expertise needed during operations
- Must be simpler to implement, operate and use
- Need higher technical quality
- Need to increase reliability and robustness
- Need to make the technologies transparent





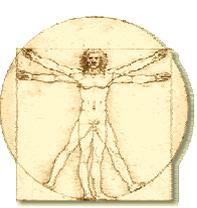
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Challenges facing Collaborative Technologies

- Technical
- Ideological
- International
- Economic
- Social

Communications model;
it is not what is said, but what is understood



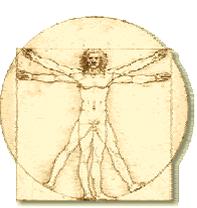


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Technical Challenges

- Reliability – need to move to ‘commercial service’
 - All things should work at least at the 99% level
 - No lost words, sites, lost video, etc
 - One 2-hr meeting each week for a year across 5 sites --
Translates into a total of 60 minutes of problems for the entire year!
- Software reliability – “production grade”
- Robustness of systems
 - Automatic work-arounds, back-ups & compensation
 - Manage variances and mis-matches
 - Ability to minimize disruptions quickly
- Establishing multiple technical standards
 - Different types/levels of service
 - Certification, enforcement



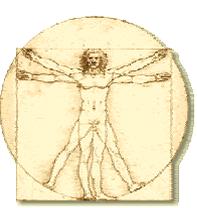


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Technical Challenges con't

- Establishing automatic “pre-check routines”
- Formal, internal chat rooms (private/public)
- Easier use & management of documents, graphics
- Schedule/control
 - More local control, especially for users
 - Queuing mechanisms
 - Advanced scheduled and “ad hoc” capabilities
 - Admission, authentication
- Real-time monitoring, performance, information and details



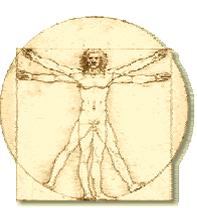


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More Observations

- Collaboration technology bar is set way too low
 - Tech folks often willing to live with minimal capabilities
 - “it works” is often considered success
 - Not much interest to do “engineering” improvements
 - Not-invented-here also plays a role
- We’re 80% there; how do we get the next 10-15%?
- Need to involve more technologies and software
 - Interactive gaming, virtual worlds, etc
- Need to involve other communication disciplines and expertise
- Many parameters have not been adequately addressed yet



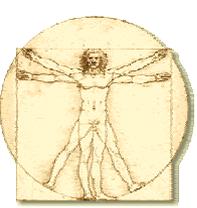


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Video Challenges

- Higher definition (resolution and frame rate)
 - See lips move (in sync) – non-verbal
 - HD?
- HD viz capabilities
 - “vision walls” for collaboration
- Convey idea of space, and spacing, size
 - Small conference table; auditorium
- 3-D, perspective, “personal” space
- Ability for local users to select/control what they want to look at remotely
 - Look at individuals, scan entire group, etc
 - Balance between order and chaos
 - Privacy/control issues abound here



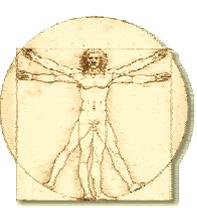


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Audio

- High fidelity – CD quality
 - Low distortion, no clipping, etc
 - “broadcast” quality and expectation
 - Setting standards and testing
- Manage feedback better with new technologies
 - Gated microphone arrays
 - Acoustic beams (Hypersonic Sound)
- Hands-free use
- Auto cues for level adjustments
- Range of inputs & capabilities



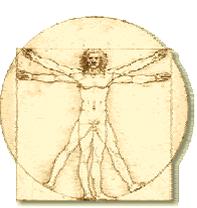


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Shared documents

- Powerpoint presentations seems pretty well in hand – especially if prepared beforehand
- Spontaneous white boards, visuals, audio, last minute ideas or brainstorming and mark-ups
- Dynamic Graphics, spreadsheets, on the fly
- Very large data sets, visualizations
 - Hi-Res movies, vision walls, etc
- Remote access to AG printers for hard copy
- Synchronous, asynchronous, version control





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Types of Services

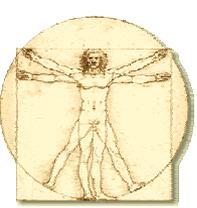
- Small collaborations
 - 2-3 people at 2-3 sites
- Small work teams
 - 6-8 people from 3-4 sites
- Committee meetings
 - 30 people from 8-10 sites
- Large meetings – broadcast
 - 75 people or more from 20 sites
- Conferences, workshops, training
 - long meeting times (in hours)

Interactivity
decreases



One size/approach can not fit all needs



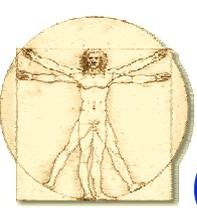


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Communication Models: needs and interactions

- Leader, manager
 - Floor control to manage meeting
- Moderator, facilitator
 - Ensuring everyone is heard/participates
- Collaborator, team member
 - Distributed control, contention
- Flexibility in meeting space and infrastructure
 - Spaces are often designed for meetings
 - Informal, formal, etc
- Clear sense of what is going on for everyone



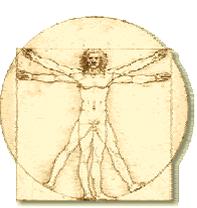


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Collaboration temporal modalities

- Regularly scheduled meetings
 - every Wednesday at 9:00 am
 - once a month or quarter
- More ad hoc in nature
 - called as required
 - may be driven by need, problem, focus
 - short-term notification
- Serendipity
 - accommodate spontaneity
 - driven by idle curiosity, or “small” questions
 - “hallway conversations” - discussions over coffee
 - “water fountain” discussions



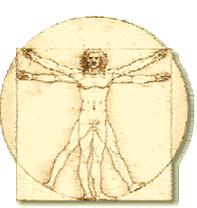


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Non-verbal

- Enormous content in non-verbal
- Verbal component ~20-25%
- Gestures, facial movements, body positions
- Tone, tenor
- Culture-biases; meeting, discussion protocols
- Space, proximity, relationship



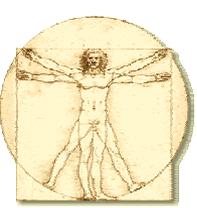


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Interoperability

- One size won't fit all
- Interoperability with other approaches (VRVS, etc)
 - Two-edged sword
 - Increases capabilities, but decreases effectiveness
 - Lowest common denominator reigns
- Open source approach
 - Development of multiple classes of services & standards
- Collaboration also follows Metcalf's Law



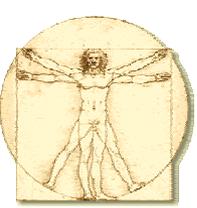


Social Challenges

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- AG facilities are infrastructural ecologies
 - Need to be part of institutional design/plan
 - Not a separate function, but an extension of physical facilities and embedded in the local social infrastructure
- Collaboration technologies are critical to the formation and management of Virtual Organizations
 - VOs are defined by interactions and communications
 - Collaborative Technologies is one of the few tools to navigate and manage VOs
- Current conceptual frameworks and metaphors are limited
 - Technical and social foundations for cooperation and collaboration are miniscule



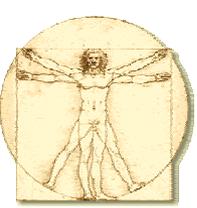


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Social Challenges con't

- Social mores and social conventions need to change and morph
 - Collaboration support needs to be institutionalized
 - Need new traditions of competing and cooperation
- Incentives (individual, team, organization) need to be developed
 - Sharing becomes fundamental for science and education
 - Technological change is more rapid than institutional change
- Systemic evaluation and planning required
 - Experience base
 - Development of pertinent literature



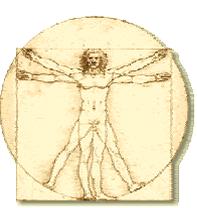


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Virtual proximity as a goal

- Recreate and instantiate an infrastructure for effective collaboration without regard to distance or location
- May want to be more aggressive about what AG can do and should do
 - It isn't a “substitute” for travel or for face-to-face
 - It is ANOTHER way to meet
 - It may be the primary way to communicate in cyberinfrastructure
- Make it a “portal” to cyberinfrastructure
 - The ‘ether’ to support collaboration
 - Avatars, holodecks, etc



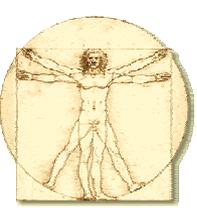


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Other actions

- Develop/explore related work
 - CSCW, the Well, etc
- Develop “pidgins” from various disciplines
 - Grammar from technology
 - Syntax from humanities
 - Content from science
- Establish a series of trading zones for disciplines to interact and intersect
- Help make the AG be the lingua franca for participation in cyberinfrastructure, e-infrastructure, e-science



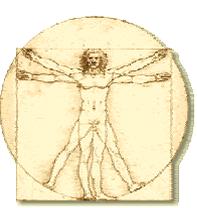


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International Challenges

- How can different cultures be accommodated by AG?
 - Basic communication differences go beyond language
 - Understanding of science, basic assumptions differ
- How can interoperability be further encouraged?
 - And what does interoperability mean beyond technical?
 - Are there some other protocols we should be addressing?
- How can international coordination of collaborative technology developments be encouraged in general?



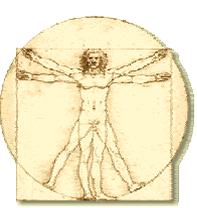


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Future AG Providers?

- Who will likely be, or should be AG providers?
 - Telcos, network providers
 - Service companies
 - Brokers (eBay collaboration)
 - Aggregators
 - Specialized applications providers
- Where should local control/ownership end and service begin?

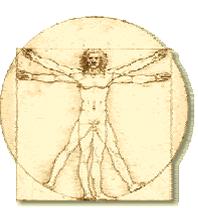




Yet more general needs

- RENCI
- Integrity and privacy solutions
 - privacy, authentication, authorization, etc
 - Transaction capabilities
 - Trusted third parties, brokers, agents, assurance
 - Productivity tools
 - Remote control, data mining, viz, ease of use
 - Models which catalyze and leverage cross-domain expertise
 - Working technical and sociological collaborative models





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So, where to next?

