

CANARIE

CANARIE Network Enabled Platforms Overview The convergence of Cyber-Infrastructure and Next Generation Internet

Bill St. Arnaud

CANARIE Inc – www.canarie.ca

Bill.st.arnaud@canarie.ca





Safe Harbour statement

- > **This slide deck is intended to only provide an overview and some of the key features of the proposed CANARIE Network Enabled Platforms program**
- > **Full details of the program, criteria and eligibility have yet to be finalized**
- > **Feedback from June 26, 27 workshop will also provide input into the development of detailed program**
- > **However, highly recommend interacting with CANARIE staff well before formal program announcement**



CANARIE Funding

- > Government of Canada has announced \$120m funding for CANARIE
- > A key aspect of new CANARIE funding will be deployment of “platforms” to support eScience and other applications
 - “**Network Enabled Platforms (NEP)**”
- > Next generation Internet architectures and cyber-infrastructure are converging on a similar architecture principles of “virtualization” of resources and services and creation of many concurrent facilities linking distributed computing, sensors, instruments, databases, etc
 - e.g. GENI is a platform to support network, computational and other types of research
- > Focus of NEP is on interconnection of “**production**” facilities of distributed computers, databases, instrument and sensor integrated with middleware technology such as grids, web services, Web 2.0, UCLP, Next Generation Internet, etc
- > **NEP is NOT a research program**



Network Enabled Platforms

- > **Ideally proposal should be led by “community of interest” or “virtual organization” (VO) of domain scientists or users**
 - Single PI, single institution proposals will be discouraged
 - VO may designate management organization to manage VO, develop SOW with CANARIE, develop middleware etc
 - Example NSF – Cyber Infrastructure Management Organizations
 - JOI for Oceanography
 - BBN for GENI
 - etc
- > **Consortium or VO establishes governance and set resource sharing policies for users and defines common architectures, etc**
- > **Many such international consortia or VO already exist**
 - **Therefore participation in international platforms strongly encouraged**



CANARIE's role

- > **CANARIE will fund middleware development to enable the seamless interconnection of resources such as databases, computational resources, instruments and sensors**
 - Of particular importance will be the middleware to support VO policies, authorization and access to these resources
 - Portal development
 - Middleware solutions can be built around SOA, Globus, AJAX, REST, UCLP, Web 2.0, NGI, etc
- > **CANARIE staff are also available to assist in design and deployment of middleware and portals**
 - Similar services and capabilities may be available from CRC/NRC
 - CRC/NRC may also be designated organization to manage VO
- > **CANARIE does NOT fund research as a final outcome**
 - But research necessary to build the platform may be an eligible expense
- > **Essential reading:**
 - <http://www.nsf.gov/pubs/2007/nsf07558/nsf07558.htm>



Suggested Platform Development Process

- 1. Identify participating institutions and researchers**
- 2. Create or join community of interest, or virtual organization (VO) to set governance and policy**
 - > VO most likely organization to make application to CANARIE on behalf of the community (if within Canada)
 - > For contractual and management purposes may designate specific institution or organization to be lead organization
- 3. Define policies and processes for access to shared resources such as databases, computational facilities, instruments, etc**
- 4. Identify specific databases, computational facilities, instruments that are to be shared by community**
- 5. Consult with CANARIE staff on appropriate middleware architecture, security, portals, wrappers, etc**
- 6. Submit Letter of Intent to CANARIE for funding**



Notes

- > **Expect development of VO with appropriate governance and resource sharing policies to be the most difficult and time consuming step**
 - E.g. Compute Canada
- > **Initially CANARIE is only expecting 3-5 proposals in the first year**
- > **Lightpaths or APNs will not NOT be a required in a proposal**
 - Expecting only 2-3 proposal that will require lightpaths or APNs
 - Most likely for participation in international platforms such as Optiputer, NEESgrid, etc
 - Only a handful of campus lightpaths will be required – which can be largely addressed with current facilities



Hypothetical Example

Atlas Grid

- > **VO:**
 - Several universities and researchers across Canada agree to process and distribute ATLAS data. “ATLAS Canada” is the VO that is governing body
- > **Policy:**
 - Each participant agree to connect identified clusters to Grid-X1 and reserve 50% of computer cycles in job queue for ATLAS VO for 3 years
 - Each participant agree to accept VO authorization using Grid Canada
 - Each VO agree to set aside 1 Terabyte common shared file space accessible to other members of VO
- > **Middleware:**
 - Each participant agrees to run GT4
 - Portal to monitor and manage job data
- > **CANARIE funding:**
 - Funding to test and deploy VO middleware and portal



Hypothetical Example

Brain Grid

- > **VO:**
 - 2 Brain imaging institutes in Canada and 5 international institutes create GBIRN VO
- > **Policy:**
 - Canadian institutes will create a set of WS for imaging processing and WS workflow for multiple stage processing that will work with Amazon EC2/S2 managed by Canadian institute
 - Actual job data will be held at participating institute and only WS parameters stored on S2
 - WS will be offered commercially to organizations outside of GBIRN VO
- > **Middleware**
 - WS running on EC2
 - Portal running on EC2 for job management
- > **CANARIE funding**
 - Development of WS brain imaging services and WS workflow to run on EC2
 - Portal development
 - Optiputer node to collaborate with BIRN



Hypothetical Example

Student Management System

- > **VO:**
 - 5 North American universities that are part of Quali project
- > **Policy:**
 - Quali VO agrees to develop and deploy several prototype student management services
 - Each participant responsible for hosting at least one service on their local computational & database facility accessible to all other participants
- > **Middleware:**
 - Open source or commercial ESB (Enterprise Service Bus)
 - Develop API to allow students to develop their own services e.g. Facebook Platform
- > **CANARIE funding:**
 - CANARIE funds development of SOA and ESB for services for which Canadian institution is responsible



Hypothetical Example

Space Science Grid

- > **VO:**
 - University of Alberta physics, CGSM and NASA VxO at UCLA
- > **Policy:**
 - Members of space science VO agree to make all real time and stored data service to all other members
 - VO designates Netera as VO coordinator, project manager, middleware developer etc
 - Netera develops detailed SOW and makes application to CANARIE for funding on behalf of VO. Netera also provides funding
- > **Middleware:**
 - Web services or GT4 at all participating sites using Grid Canada certificates
 - Establishment of VO job queue on Westgrid
 - Representation of on line applications as WS to VO members using Westgrid, Amazon or other computational infrastructure
 - Portal development
- > **CANARIE funding**
 - Development of web services and deployment of GT4 for CGSM members
 - Development of on line applications as WS uncoupled from infrastructure so that they will work on Westgrid, Amazon etc
 - Development of VO capability on Westgrid



Eucalyptus Participatory Design Studio Grid – using UCLP and SOA

- > **Carleton Immersive Media Studio (CIMS),
Carleton University, Canada**

The Participatory Design Studio will allow architects and industrial designers at multiple locations to collaborate in real time by sharing computational resources, geometry datasets, and multimedia content.

The expected result is the development and field testing of a Service Oriented Architecture utilizing User Controlled Light Paths (UCLPv2) on CA*net 4 that provides university architecture staff and students in Ottawa and Montreal with on-demand simultaneous shared access to visualization, modeling, and visual communication tools. The project is innovative because commercially available architectural tools not originally intended for long-distance use will become easy-to-use powerful enablers of long-distance design participation.



Source: Maxine Brown



Eucalyptus Network (APN)



Canada's Capital University

Source: Gabriel Wainer

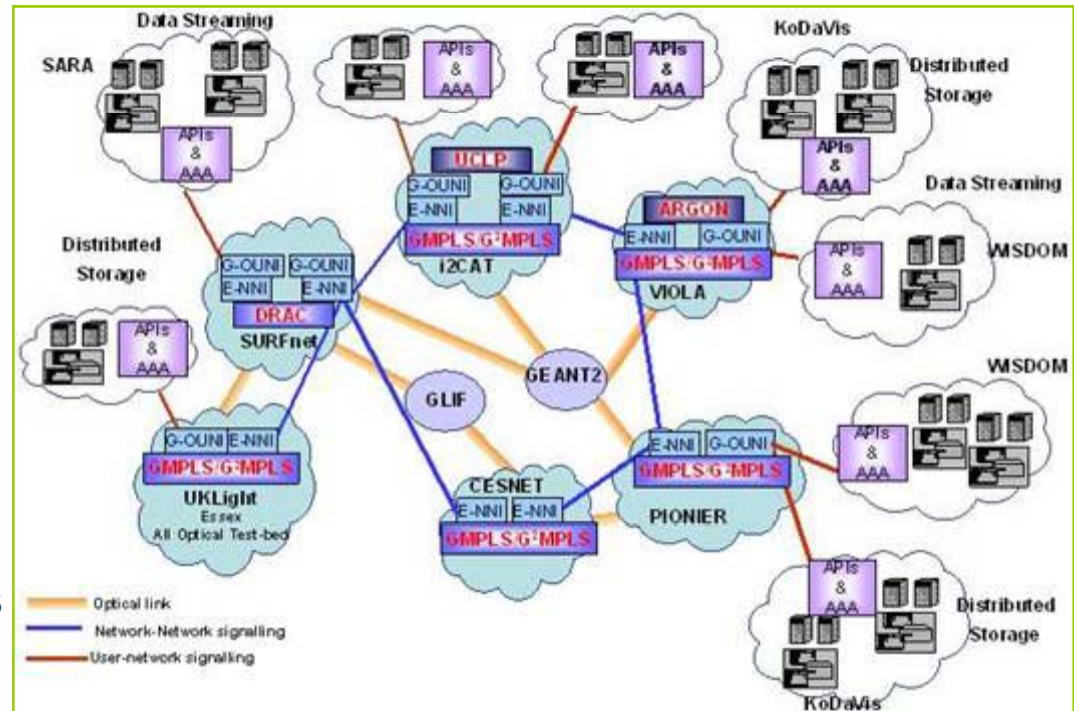


NETWORKS > COLLABORATION > RESULTS > RÉSEAUX > COLLABORATION > RÉSULTATS



Phosphorus: Lambda User Controlled Infrastructure For European Research

- > **European Union (EU) Research Networking Testbeds IST program**
 - 30-month project, to begin **October 2006**
- > **An alliance of European and Global partners to develop advanced solutions of application-level middleware and underlying management and control plane technologies**
- > **Project Vision and Mission**
 - To address key technical challenges in enabling on-demand end-to-end network services across multiple domains
 - To treat the underlying network as a first-class Grid resource
 - To demonstrate solutions and functionalities across a testbed involving European NRENs, GÉANT2, Cross Border Dark Fibre and GLIF connectivity infrastructures



Source: Maxine Brown

Interactive Imaging of High Resolution Brain Slices from McGill University



Source: Mark Ellisman, UCSD, Calit2



Global Lambda Visualization Facility (GLVF)

- **Problem:** Optical networks and LambdaGrids enable large-scale global science collaborations – but interoperable visualization and collaboration tools are missing!
- **Solution:** Launched in September 2005, a group of iGrid 2005 Workshop participants who were designing and developing complementary, distributed visualization and collaboration technologies decided to pool expertise, build on each other's successes, and integrate their work into a coherent whole, providing a unique model for international partnerships.

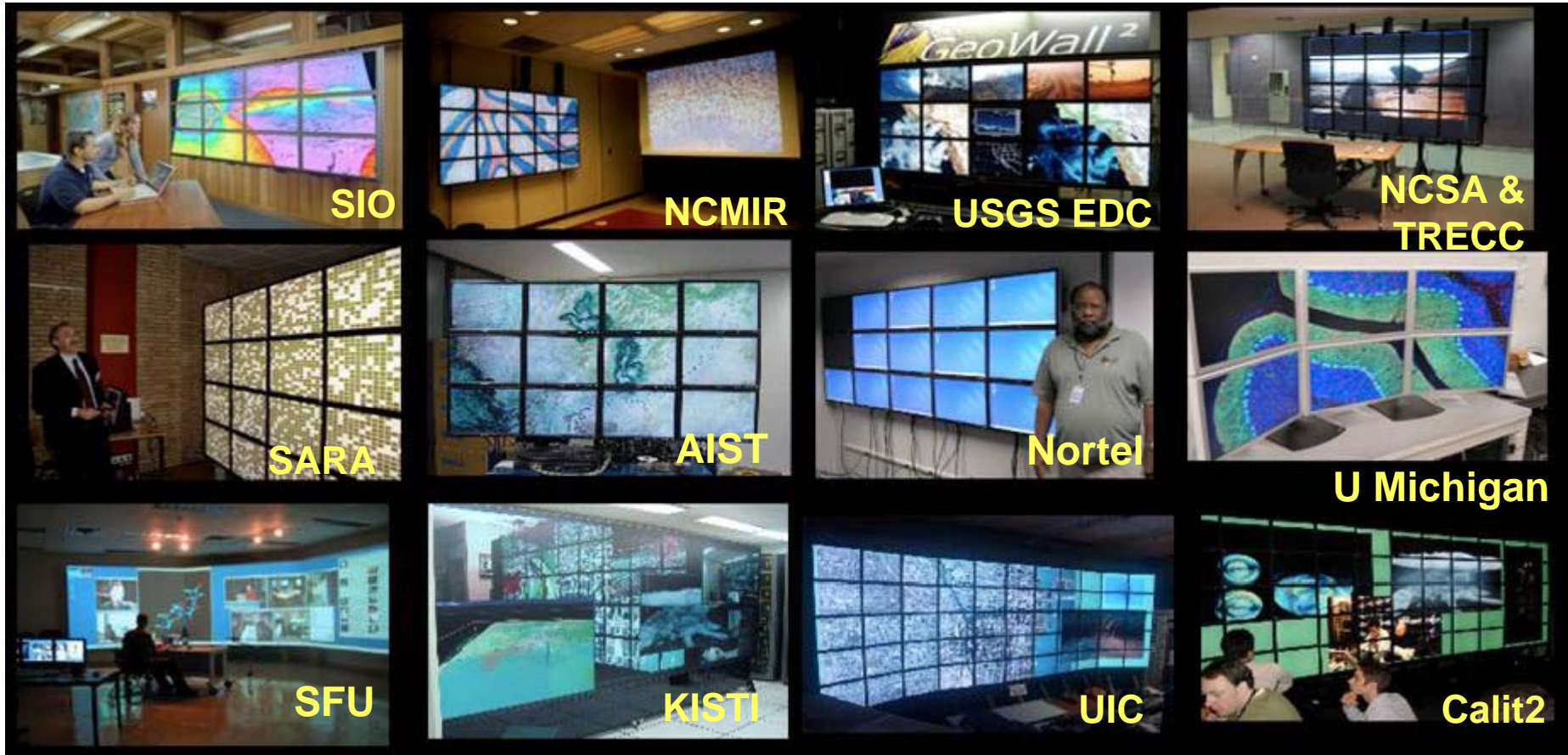


- Jason Leigh, Electronic Visualization Laboratory, University of Illinois at Chicago (organizer)

Source: Maxine Brown



GLVF Visualization Technologies



www.optiputer.net

www.evl.uic.edu/cavern/glvf

Source: Maxine Brown

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