

DMAS Advisory Committee Report February 15, 2010

Responses: April 20, 2010

This report was largely based on contributions made by the DMAS Committee at the December 8-9, 2009 meeting.

DMAS Advisory Committee Meeting Members

Present (Advisory Board)

Bill St. Arnaud - Chief Research Officer, CANARIE, (Chair)
Bruce Spencer - Research Officer, Internet Logic, NRC Institute for Information Technology
Eric Tsang - Associate Director, Business Development, Communication Research Centre
François Dubé - Director, CISTI Programs Transformation, NRC Institute for Scientific and Technical Information

Those present from UVic (UVic)

Benoît Pirenne - Associate Director, Information Technology, NEPTUNE Canada
Eric Guillemot - Manager, Software Development, NEPTUNE Canada
Martin Hofmann - Team Lead, Systems and Operations, NEPTUNE Canada
Chris Barnes - Director, NEPTUNE Canada (initial part only)
Mairi Best - Associate Director, Science, NEPTUNE Canada
Adrian Round - Project Manager, VENUS
Scott McLean - Director, Ocean Networks Canada Centre for Enterprise and Engagement (ONCCEE)

Overview

On December 8-9, 2009, the DMAS Advisory Committee was convened at the University Club of the University of Victoria to review progress of DMAS and to discuss future options and issues with respect to security, production, future directions, funding strategies and comments on Oceans 2.0

Overall the committee was impressed with the successful launch of the NEPTUNE Canada regional cabled observatory and reliability of the DMAS system with only a few minor hiccups. NEPTUNE staff was able to address satisfactorily issues and concerns raised at the previous DMAS meeting.

Most of the discussion focused on funding issues and future directions for DMAS and Oceans 2.0

Specific comments and recommendations:

1. Once again a large part of the committee's discussion was focused on the issue of ongoing funding for NEPTUNE Canada and ONCCEE. It has been recognized that capturing the economic spinoffs from NEPTUNE Canada will make a compelling story in terms of future funding renewable. As has been pointed out in several studies, but most recently in a report by Peter Nicholson and the Canadian Council of Academies, the transfer of scientific research into economic growth productivity mostly happens

once a year at graduation when students leave academic research and join the work force. The direct transfer of knowledge from academia to industry is rather small in comparison. As pointed out in the Peter Nicholson study several academic institutions are now tracking the economic activity created by their students after leaving university in addition to that created by the researchers themselves. MIT for example, found that its students created hundreds of billions of dollars of economic wealth directly as a result of the education and exposure to leading research at MIT. They did not count any economic wealth creation that could not be directly attributed to the education and training that the students received at MIT. As such, the committee recommends that NEPTUNE Canada, VENUS and ONCCEE maintain a database to keep track of all students, technical staff and alumni of NEPTUNE Canada, VENUS and ONCCEE in anticipation at some future date that they may be contacted to see what new economic activity was created that could be directly attributable to their exposure to NEPTUNE Canada/VENUS/ONCCEE. A simple initial step would be maintain a Facebook alumni site to track participating grad students and researchers from the various participating institutions, as well as any technical staff at Alcatel-Lucent and other commercial organizations involved in the project.

While this suggestion is laudable in principle, it will be difficult to secure participation of over a dozen Canadian participating universities in gathering such statistical information. It requires not only tracking what a particular student does or where s/he goes but also continuing to do so for some years to be meaningful. Since the observatories have registered users, then those names can be recorded at least. The list can certainly be used at a later stage for a follow up in the form of a directed survey.

2. Another possible long-term source of funding would be using carbon offsets from Pacific Carbon Trust (PCT). All public sector institutions in BC must be carbon neutral as of January 2010. This is a world first. Universities in particular will be particularly hard hit. UBC estimates it will have to pay at least \$2.7m in the first year of the program, but escalating rapidly after that. On the other hand, NEPTUNE Canada/VENUS/ONCCEE could be eligible recipients of funds from the fund because they will hopefully reduce researcher travel through tools like DMAS, Oceans 2.0 and reduced use of ships. Techniques to sequester gas hydrates so they don't bubble off into the atmosphere as the ocean temperature warms or during seismic activities might also be eligible. The committee suggests that NEPTUNE Canada/VENUS/ONCCEE staff investigate the possibility of using carbon offsets as possible partial funding. They should talk to James Tansey at UBC Sauder School of Business who set up the PCT for the Province of British Columbia.

A first question along these lines posed to the Director of the Pacific Centre for Climate Solutions led to a comment saying that this was a very creative idea, but that the PCT was very good at saying "no"!

We will nevertheless endeavour to address this issue and explore the possibilities with the people suggested. A first look at a presentation by the Pacific Carbon Trust listing the conditions for granting funds indicate that such endeavour will be hard to quantify and justify. The conditions include:

- An identifiable project
- Sound methods available to quantify GHG emissions
- Reduction from business as usual and regulatory req.
- Allows project to overcome economic/tech. Barriers
- Offset has an impact that is lasting (i.e. 100 yr +)
- Only applicable to offset sequestration projects
- Readily identified, monitored and audited
- Minimize measurement uncertainty
- Clear, singular, ownership of the off-set attributes
- Offset title transferred; registered publicly

3. Almost all funding from federal agencies such as CANARIE, CFI, NSERC etc require performance measurement and monitoring. These requirements were an outcome of some financial scandals a few years ago and were really intended for fee for service type of work and not well suited to academic research. It is extremely difficult to make meaningful measurements for research outcomes other than papers published, number of grad students etc, Unfortunately, we are all caught up with these new reporting requirements which are likely to become more demanding in 2010. The committee recommends keeping track of all possible measurements for performance monitoring even if it is debatable about their relevance and utility with regards to the research outcomes of NEPTUNE Canada/VENUS. Bureaucrats love to see lots of numbers and charts. Such measurements could include number of software bugs reported in the past month, number of DMAS accesses, number of hits on Oceans 2.0 web site, number of NC website registered clients etc.

This recommendation is complementary to actions being taken on the advice of the ONC Board of Directors after the review of the ONC Strategic Plan considered on 27-28 January. The Plan is currently under review and two consultants are engaged in focusing on metrics for measuring success across all aspects of the observatories.

4. Given the tight financial constraints all research projects are now under and the fact that the new funding from CFI is to operate a bare bones operation, the committee recommends that, as much as possible all "non bare bones" activities be accounted for under aegis of ONCCEE rather than NEPTUNE Canada, even if the activity was not funded by CFI. For example although Oceans 2.0 is largely funded by CANARIE it will pose less of an "optics" problem if it seen as work undertaken by ONCCEE rather than NEPTUNE Canada. It is hard to argue that Oceans 2.0 is a bare bones activity.

This recommendation is based on an inaccurate interpretation. Whereas NSERC asked NC to submit a "bare bones" budget request in its application for operating funds (the subsequent \$13.2M NSERC/CFI/BC Min Adv Ed special ad hoc MRS award), this was in conflict with the expectations of the agencies to attain excellence and innovation in building and operating the observatory. The current \$24M operating award from CFI for NC/V/ONC was given "as requested" and that request was based on former MRS applications. Oceans 2.0 was justified as a logical and necessary development for NC to assist its scientific community utilize the dataflow and archive in an effective way. As such, NEPTUNE Canada disagrees fundamentally that this activity should be moved from NC to ONCCEE.

5. The committee applauds the use of virtual machines for supporting the multitude of servers and new applications. However, a new phenomena called "VM sprawl" is starting to be recognized because instantiating VMs for new applications is so much easier than acquiring and setting up physical servers. The committee recommends that the DMAS technical team start familiarizing themselves with a number of possible VM management tools that allow for graceful growth and management of a multitude of VMs as well as providing roll over and fail over processes, global ACLs etc

We are using Xen for all our virtual machines. Xen provides a number of tools to help manage VMs. To supplement the Xen tools we have written and are writing additional scripts to help manage the VMs, e.g. tools to show all running VMs, a database to record status of VMs and scripts to start a series of VMs.

6. As DMAS moves into production mode the committee recommends that DMAS technical team start investigating long term (over 25-year) data curation and preservation solutions, particularly those that will be supported long after funding for NEPTUNE Canada has ceased.

It is certainly early in the life of NEPTUNE Canada and VENUS to look at what is going to happen to the data in 25 years! However, we all recognize that this represents a valid issue, worth some serious thoughts. Traditionally, observational and model data have been maintained for the long term in the so-called World Data Centres specific to their science discipline. Case in point, the World Data Centre in Boulder, CO, maintained by NOAA (<http://www.ngdc.noaa.gov/wdc/>) is a repository of data dealing with solar and geophysical data. More specifically NOAA also hosts the National Ocean Data Center (<http://www.nodc.noaa.gov/>). Similarly, DFO's Integrated Science Data Management (ISDM) has an generic ocean data management role in Canada. Both could be a repository for NEPTUNE/VENUS data in the future. Or data could be divided up per discipline with seismic data staying at IRIS (<http://www.iris.edu/hq/>). Other data would could go to OBIS (<http://www.iobis.org/>), an organization with the mandate to make marine biological information available. The issue with such databases is always one of curation and availability of expertise to explain and understand the data.

7. The committee recommends that periodic integrity testing of registry and archived database to ensure no systemic errors have been introduced.

The storage systems all perform continuous tests on the disks to monitor bad blocks on the media. We use md5sum when mirroring data in the archive to ensure integrity. All databases and archived files are backed up to UVic's TSM.

8. The committee thinks miniDMAS could be a valuable software project, noting that Brentwood College School, future recipient of a miniDMAS-based observatory in the framework of the CANARIE NEP-67 project, thinks there is a market. If DMAS decides to build this, the strategy commonly considered in this area is to create an open source tool kit allowing people to develop against it, but to have some enterprise-level feature available only in another version for which a fee is required. While this may or may not be a viable commercial venture, the other major currency is now the verifiable carbon offset.

One idea the DMAS team may want to investigate is that the open source tool could require all users to estimate the amount of carbon offset that arise from *their* usage and a portion of this can be claimed as part of the carbon credit for DMAS. Suppose a miniDMAS user with a need for large storage can make use of miniDMAS software to connect to existing storage devices instead of buying a SAN. Then that user can claim a carbon credit. The miniDMAS open source project could claim some of that carbon credit. The agreement signed by the user of miniDMAS software will ensure the sharing of a certain percentage of the credit.

The "business" model we are pursuing with miniDMAS is one where the system represents a technical solution for data acquisition and instrument control, with options for the users to build upon the system by using the collection of Web Services integral to the system. Besides, a properly managed and curated data hosting, archival and distribution ability can be part of the offering. Such a palette of options would allow for instance a possible do-it-yourself user to implement miniDMAS on a small sensor network and integrate it in a wider network thanks to

interoperable Web Services or, for users with no local technical ability or desire to run the technical aspects of the system, a turnkey, managed system can be offered. Regarding the carbon credit, we will have to examine what is actually going to be possible under local rules and regulations.