Research Infrastructure Circle

1.0 Purpose of this document:

The intention of this document is to provide thoughtful input relating to the future development of research infrastructure at Okanagan - UBC. It is expected that this document will generate focused discussion on a series of issues that will contribute to the development of a world-class research centered institution. This document is not intended to be a comprehensive plan or even a final perspective of the authors on this subject. It is intended to evolve in content and to instigate discussion.

2.0 Scope of discussion:

The focus of this discussion will be to highlight research infrastructure needs, specifically those relating to the science faculty. We will also provide insight into a range of potential solutions. Emphasis will be placed on the needs that will develop at Okanagan - UBC following its inception in September 2005 and beyond. However, a number of immediate needs and issues will also be highlighted.

3.0 Current state assessment:

The following assessment is not intended to be comprehensive. It is intended to provide a brief summary of key assets issues and assets.

3.1 Key Infrastructure assets at OUC

The science faculty at OUC has a modest infrastructure base. **Under the university-college model, research activities were not directly supported** by provincial funding. As a result research infrastructure had to be secured either under the pretense of undergraduate research or through external funding sources such as the Canadian Foundation for Innovation (CFI) or NSERC. It is important that each of these infrastructure types be considered independent as the externally funded infrastructure was secured with specific expectations of use and performance.

In the science faculty we have approximately 2000 ft^2 of physical research space. The science faculty also has >20 faculty members that are actively conducting research programs requiring lab bench space. Even from this crude estimate it is clear that **OUC is far below any reasonable research space allocation guideline**. For example, an acceptable base allocation of bench research space for an individual is 250 ft^2. Based on that, 20 researchers should be provided with a bare minimum of 5000 sqft of laboratory space.

Most of the researchers at OUC did not receive any funds or support for start-up. As a result, many researchers lack basic infrastructure in order to get them research programs engaged. In addition to this a number of research capable individuals have become disenfranchised. The provision of some basic start up funds could jump-start a number of research programs.

Recommendation 1: *Provide a basic start-up fund package (~$25K) to OUC faculty in order to jump start research programs. Base the provision of such funds on a merit based application process.*
Benefits: *Such a program will boost moral, increase buy-in to Okanagan-UBC, and jump start research programs.*
Cost: *$1M would provide $25K to 40 individuals. Using a merit based application and monitoring performance indicators will help maximize outcomes.*
Funding Source: *Endowment funds are the only identified source*

Although research activities at OUC have been conducted under difficult circumstances, a number of researchers have managed to secure major research grants for both research space and research equipment. Because of the limitations in resources, most of this secured infrastructure is actively shared amongst a number of the active researchers. This sharing has created a strong collaborative culture. Ironically, **strong interdisciplinary collaborations have provided OUC with research advantage**s. It is essential that as the access to resources increase, that structures are developed that foster this advantage.

In terms of basic instrumentation resources, researchers have managed to secure a few very advanced instruments. Much of this equipment is accessible by researchers in an informal manner. In terms of analytical instrumentation, a new internal structure, the **Okanagan Regional Chemical Analysis Centre (ORCAC) is under the process of being created**. This is being designed to enable research to have access to not only to the advanced instrumentation that has been secured, but also to skilled technical staff.

3.2 Current infrastructure challenges at OUC

3.2.1 Research laboratory space

It is clear that there is a significant shortage of research laboratory space. Based on a basic requirement of 250 ft^2 of research space per active researcher, the immediate generation of an additional 3000 ft^2 of research space is warranted.

Recommendation 2: *The addition of ~3000 ft^2 of research space immediately is required to provide the current research faculty with the basic space access.*
Benefits: *Enables research programs and graduate student supervision*
Cost: *see following discussion*
Funding Source: *see following discussion*

In order for this recommendation to be implemented, a number of details such as funding source and physical location need to be identified. Currently, there are two funding proposals that have been generated to secure more research space. The first was a CFI new opportunities proposal headed by Soheil Mahmoud. This will provide funding to renovate one classroom, Science 219 (~840 ft^2) and will provide research space access for 3-4 faculty. The second is part of a BCKDF proposal recently submitted by Rob O'Brien that has request $300K in funding for room renovation. At the current time the OUC administration have not committed any specific location for the research space

requested in the BCKDF proposal. In addition, to these proposals that have only been submitted, Dan Durall has been awarded a CFI grant to develop species at risk infrastructure, including $1.2M for 5000 ft^2 of research space. In order, to enable such an area of research space, a partial addition of a third floor to the science building has been suggested.

In the past OUC has been very conservative with the initiation of CFI projects. Work has typically not been initiated until after both the CFI and BCKDF portions have been fully approved. There is approximately 3-6 month initial waiting period between project submission and CFI approval; this is followed by a second 3-6 month period between CFI approval and BCKDF approval. If the project involves a lab renovation, OUC has been contracting such work out. This process adds another 3-6 month period before the project is actually completed. Soheil's renovation project will likely receive CFI approval next month. If standard practice is followed Science 219's renovation will be completed sometime between January 2005 and March 2005. At this point in time, every BC project that has received CFI support also received BCKDF support. It would seem reasonable to initiate renovation of Science 219 as soon as CFI approval is obtained. Such action will provide research space sometime between September 2004 and December 2004.

Recommendation 3: *Expedite initiation of any funded project that will provide key infrastructure such as research space.*
Benefits: *Such a program will boost moral and jump start research programs.*
Cost: *Minor cost based on interest*
Funding Source: *Not required*

In addition to the proposed renovation of Science 219, the science faculty has planned to have the classroom in Science 236 (~750 ft^2) renovated into research space. This space has been planned to be renovated for Biology or Geology research space. However, at this time no funds are available to renovate this space. After this renovation there are no other classrooms in the Science building that are even being considered for renovation.

Future lab space is projected to be available on the completion of the third floor of the science building. However, the cost to the researcher developing this project also includes the cost of adding the third floor shell, installation of elevators, hallways and other base needs that normally are not the burden of researchers securing external grants. The typical cost of classroom renovation has been $185 per ft^2 or less. With Dan Durall's Species at Risk project, the projected cost is $240 per ft^2 or $1.2M for 5000 ft^2. In fairness, it would be reasonable for the funding secured by Dan Durall's Species at Risk project to generate 6000 ft^2 - 6500 ft^2 of research space. The source of this per unit discrepancy is that Dan Durall has been required to pay for basic structural infrastructure such as hallways, elevators etc. One way that this cost differential could be reduced, is to secure an addition provincial grant or funding from endowment funds to build a generic shell around the third floor and to provide basic infrastructure.

Recommendation 4: *Apply ~$4M in institutional funds (or provincial funding) in order to construct a 3rd floor shell on the science building.*
Benefits: *Such a program will boost moral and jump start research programs.*
Cost: *$4M*
Funding Source: *Endowment funds are only identified source*

In addition to the addition of the third floor of the science building, the current computer teaching labs in Science 126, 128 and 130 are located in prime research space. It would be reasonable to relocate computer labs that are used primarily by 1st and 2nd year students outside of the science building. In fact, a strong argument could be made to have such space relocated to either the third floor of the library or the future third floor of the arts building. It would seem reasonable to have computer labs, which are accessed by the general student population, located in high through-put locations such as the library building. The traffic generated by a computer lab is not compatible with research intensive space where throughput should be reduced. However, because of the research activities requiring computer labs, it would be of benefit to retain two or three of computer labs in the science building, possibly in Science 234, 236 and 126. Furthermore, it is very likely that the provincial government could be convinced to fund additional computer teaching space, whereas, additional research space will likely only be funded by securing external grants.

Recommendation 5: *Relocate two of the computer teaching labs (Science 130, 128) to other locations. Include computer teaching labs in the third floor of the library. Make the resulting space in the science building available for research renovation.*
Benefits: *Such a program will maximize use of limited resources*
Cost: *~$40K per renovation of existing space. Much more for new construction.*
Funding Source: *Ministry of Advanced Education and Research grants*

3.2.2 Expansion of space for ORCAC

The development of the Okanagan Regional Chemical Analysis Center will provide researchers at Okanagan-UBC (and local industry) with access to advanced analytical instrumentation and technical expertise. However, there is a drastic shortage of space for this facility. Currently it is being operated out of the Watershed Resource Science (WRS) laboratory developed by Jeff Curtis. The BCKDF proposal submitted by Rob O'Brien will, if successful, provide funding to renovate space for this facility. Ideally, this space will be located close to Science 134 where the WRS laboratory is located. In fact the ideal location to develop this facility is in Science 130. If the funding request is successful, there will be sufficient funds to relocate the computer lab currently in Science 130 to another location such as Science 236 (temporally).

Recommendation 6: *Allow the ORCAC to relocate to Science 130.*
Benefits: *Provide access to advanced instrumentation for a range of researchers at OUC. Provide a regional access point.*
Cost:~ *$160K renovation Science 130. <$40K relocation cost Computer Lab.*
Funding Source: *$300K currently requested from BCKDF*

The potential renovation of the third floor Science building will lead to some significant disruption of green house activities. There has also been suggestion by facilities management that a green house will not be developed on either the third or forth floors of the science building. This is clearly unacceptable. It is essential that some green house capabilities are associated with the existing science building. In order that these facilities receive the level of light exposure that is essential, it will be reasonable to have these located on the roof of the science building.

Recommendation 7: *Include greenhouse capabilities in any new design of the science building.*
Benefits: *Greenhouse facilities are essential for teaching and specific research projects.*
Cost: *$200K in additional funds.*
Funding Source: *Partially funded by Ministry of Advanced Education and CFI/BCKDF/NSERC funding.*

3.2.4 Office space for post-docs, graduate students and technicians

The final immediate need and concern that needs to be addressed is the provision of office space for post doctoral fellows (post-docs), graduate students and technicians. At the current time the science faculty is finding it very difficult to find office space for new faculty members. Given this, it is unrealistic to expect that office space will be available for graduate students. With research space in short supply it is also unreasonable to have graduate students use the limited research space as office space. Given this and our desire to ramp up to graduate programs, it is essential that some office space be made available immediately. One way to do this is through the addition of portable offices. At the current time one such office is present adjacent to the science building. There is room to add another such trailer and given the cost of ~$15K - $20K, it would be an ideal "quick win". Given the numbers of post-docs, graduate students and technicians that will be added over the next 2 years, we would even suggest that a set of two story portable offices be installed.

Recommendation 8: *Install a set of portable offices adjacent to the science building in order to provide office space for post-docs, graduate students and technicians.*
Benefits: *Enables development of research intensive university*
Cost: *<$100K for a pair of two story units with washrooms .*
Funding Source: *Funded by indirect cost of research grants.*

In a related, issue CFI and BCKDF funding for a total of $100K has been secured by Shawn Wang for a Computational Analysis and Optimization Lab. The renovations for Science 105 should have begun now, but currently Science 105 is occupied as an office by faculty members. Therefore, current lack or office space is actively inhibiting funded research activities.

4.0 Needs and opportunities based on projected evolution:

It is difficult to project future needs given that the makeup of Okanagan-UBC has not yet been defined. However, if we assume that the current existing programs and research clusters will evolve along current trajectories then future needs can be identified. The funding for each of these items will need to come from research grant applications.

4.1 Cold storage & other storage

It will be essential to have adequate long term storage capacity for samples requiring refrigeration. This could be in concert with the development of an archiving centre. There is a high probability that funding for such a facility could be secured from a large research infrastructure grant, such as from CFI.

4.2 Expanded animal care facility

In order to meet the needs of a small research intensive university, a significantly expanded animal care facility will be required. Such a facility will require on site staffing and adequate space. This type of facility is essential for advanced research, although, the operating cost of such a facility is significant. There is some limited possibility of doing some cost recover, fee-for-service contract research, however, the regional demand for such work is limited and ethical considerations requires extensive scrutiny of such work.

4.3 Liquid Nitrogen Generator

Many modern scientific techniques require cryogenic material such as liquid nitrogen. It is essential that we secure an accessible cost effective supply of such material. One possibility that needs to be seriously considered is the purchase of a liquid nitrogen generator.

4.4 Development of a Pseudo-commercial Science store

The cleavage of Okanagan - UBC from Okanagan College will in the short term create two smaller institutions. It is essential that when this occurs that we develop mechanisms to maintain our “buying volume advantage” with suppliers such as chemical suppliers. One means of doing this is to develop an arms length scientific stores facility that would supply each institution. In this way bulk buying dynamics would be retained. Such a facility could be operated on a cost recovery system and could supply others in the region with scientific supplies, for example, regional school districts or even the general public.

4.5 Enhancement of Okanagan Regional Chemical Analysis Centre

It is expected that the ORCAC will expand significantly. It is projected that it will occupy at least 1500 ft^2 of space (Science 130 and Science 128). It will provide access to a vast range of cutting edge instrumentation that will provide analytical services for both academic and industrial researchers. It is projected that the facility will operate on a cost recovery system and that it will be self-sufficient.

One of the exciting aspects of the facility is that it will operate with completely transparent QA/QC protocols. This offers exciting opportunities to be used as a working "education example" or to provide applied masters level training for laboratory managers or other technicians. It can be envisioned that we would have positions for co-op students and offer advanced instrumentation training courses.

At the current time, the project to fund the creation of ORCAC has drawing financial support from Sun Rype and Natural Factors. In terms of value added agriculture, these are the most significant industrials players in the region. In addition to this, a number of regional wineries have expressed an interest in participating in collaborative research projects. Therefore, ORCAC will provide a means of drawing industrial collaborators to Okanagan-UBC.

4.6 Enhancement of Molecular Biology (MB) facilities.

Currently, OUC has limited capacity for molecular biology research. Our facilities need to be drastically expanded to include additional autoclaves, incubators, refrigerated centrifuges, and plant growth chambers.

4.7 Research and graduate student computer labs in Mathematics and Statistics

For faculty research and the future graduate program of the Department of Mathematics and Statistics there is a need for climate-controlled space for research computers and for associated desk and office spaces. It is anticipated that further funding will be sought to provide additional facilities for Mathematics and Statistics researchers, graduate students and other collaborators, and additional space/renovation requirements will be required to accommodate this.

5.0 Needs based on future opportunities:

5.1 Construction of a new science building

With the addition of a significant number of new faculty members, it is clear that new office space and laboratory space will need to be created. Given the provincial governments focus on teaching space rather that research space, this initiative will need to be funded through industry support and research infrastructure programs. It is likely that new faculty members may have to be brought into champion such initiatives.

5.2 Construction of a Bioproduct Processing facility & Collaborative Industry - University space.

One area that has a high probability of securing external funding is in the area of Bioproduct Processing. This area incorporates value added agriculture, forestry and other area's such as biofuel production. The concept will be to develop a large research facility that will house university researchers as well as some industrial space. Part of the facility would be committed to processing research space where pilot scale production lines could be set up and tested. Such a facility could include a wine production facility or a medicinal her extraction facility. If set up correctly such an initiative could generate significant local industry support as well as drawing significant funding from programs such as the one outlined in the Canada-British Columbia Western Economic Partnership Agreement (WEPA)[1].

5.3 Development of "managed" research space

There are a number of medical specialists at the Kelowna General Hospital that have impressive academic credentials, including adjunct faculty positions at UBC. These individuals could secure research grants and contribute significantly to the academic knowledge base. However, their involvement in academic research is limited by their lack of access to research infrastructure and their severe time limitations. It is very difficult for these individuals to commit to the time required to generate research proposals, manage research space or research personnel. If a management team was available who could assist with these essential tasks, then it is probable that significant research funds could be secured and that valuable regional talent could be engaged. It is also the type of initiative that is highly fundable.

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