January 7, 2013

ERC Chair
APEGM
870 Pembina Highway
Wpg, MB, R3M 2M7

Dear ERC Chair:

This letter is in response to the request for extra information detailing my experience with and exposure to the area of budgeting and risk assessment. The information is as follows.

Budgeting

During the period covered by the two progress reports submitted to the ERC, I was involved in the securing (in part or all of it) the following grants and scholarships. Note, the applications often contain a proposed budget for the awarded funds.

- **Canadian Centre of Excellence Funding and Canadian Arthritis Network**
  Grant SRI-BIO-05, University of Manitoba, 2009 (4 years), [redacted] for research expenses
  Professor J.F. Peters was the PI for this grant
- **Canadian Centre of Excellence Funding and Canadian Arthritis Network**
  Grant SRI-BIO-05, University of Manitoba, 2009 (4 years) [redacted] for research expenses
  Professor J.F. Peters was the PI for this grant
- **Natural Sciences and Engineering Research Council (NSERC) of Canada**
  Postgraduate Scholarship D − 3 years (PGS D3)
  "Reinforcement Learning Based Image Classification," University of Manitoba, 2007 (3 years) $63,000 CAN ($21,000/year) for living expenses.
- **Manitoba Hydro Research Grant T277**
  "Automated Image Classification System for Manitoba Hydro Power Transmission Hardware and Structures," University of Manitoba, 2006 (2 years) $42,000 ($21,000/year) for living expenses.
- **Manitoba Hydro Research Grant T247**
  "Biologically − Inspired Collective Robotics in Robotic Inspection of Manitoba Hydro Power System Equipment," University of Manitoba, 2004 (1.5 years) $26,250 ($17,500/year) for living expenses.

In order to fund my graduate studies (without working part-time), my adivsor and I had to create a budget and target grants to maintain this budget. As shown above, we were successful in securing funding for my studies, and I did not have to take on any loans. In addition to these grants, my advisor J.F. Peters held several other grants during the period in question for which I did not play a part in securing. During this time I was able to witness him running a research lab using these grants. The lab consisted of (at least) 5 full-time graduate students, part-time graduate students, several post-doctoral fellows, and summer research assistants. I was able to take part in discussions for purchasing equipment ranging from undergraduate laboratory equipment, research PCs and laptops, office equipment (cubicles, chairs, printers, *etc.*), digital microscopes, specialized sensors for his work on internet-based telerehabilitation systems, and equipment and parts for our work on the ALiCE II (see progress report). I was also party to discussions on funding students (not only myself, but, *e.g.*, summer research assistants). Finally, I also presented two papers at international conferences. One in Gdansk, Poland, June 13-16, 2005, and other in Calgary, AB, July 4-6 2005. We had to create a budget for both these trips.

In addition to the experience mentioned above, I have also gained budgeting experience since starting my faculty position at the University of Winnipeg through the following independently secured funding.

- **Natural Sciences and Engineering Research Council (NSERC) of Canada**
  Individual Discovery Grant
  "Neighbourhood Based Image Analysis", University of Winnipeg, 2012 (5 years), $110,000 ($22,000/year) for research expenses

Results are listed at the following link. 2012 Research Grants Competition - Results by Institution

- **University of Winnipeg**
  Travel Grant
  "Parallel Computation in Finding Near Neighbourhoods", University of Winnipeg, 2011 (1 year), $1,000 for attending the 6th International Conference on Rough Sets and Knowledge Technology (RSKT11)
- **University of Winnipeg**
  Major Research Grant
  "Comparative Study of Near Sets, Support Vector Machines, and the Earth Mover Distance", University of Winnipeg, 2011 (1 year), $4,534 for research expenses
- **University of Winnipeg**
  Research Start-up Grant
  University of Winnipeg, 2010 (1 year), $5,000 for research start-up costs

I have used these funds to purchase equipment, travel to conferences, and to pay for summer research assistants.

Risk Assessment

During the period covered by the submitted reports, my work environment provided two main opportunities for observing risk assessment in an engineering setting, namely my work on the ALiCEII prototype during my M.Sc. studies, and by observing the work by our lab in creating a telerehabilitation gaming system.

- **ALiCE II:** I was a member of a research team working on a prototype for an autonomous robotic hydroelectric transmission equipment inspection system called Autonomous Line Crawling Equipment (ALiCE II). The goal was to develop numerous inexpensive bots that cooperate in the inspection of transmission equipment. The bots crawl along the ground wire strung between the tops of hydroelectric towers taking pictures of equipment for fault detection. The main risk in this project was if the robot fell off the ground wire, which could damage the unit or cause an injury if it hit someone. I was able to take part in many discussions about the magnitude of the potential loss and the probability of the bot dropping off the line.
- **Telerehabilitation System:** During my Ph.D. studies, the Computational Intelligence Laboratory was involved in a creating a telerehabilitation gaming system. The goal of this system is to make stroke and arthritis rehabilitation exercises interesting by adding a gaming element. The idea being that patients are more likely to continue their treatment if it is fun. Specifically, a simple sensor that contains an accelerometer and can return position information can be attached to household objects used in rehabilitation exercises. This sensor can be connected to a gaming system, which then turns the objects into controllers for the game. While my only contribution to the project was on processing images obtained from this system, I did, on several occasions, have the opportunity to visit the centre where this system was in use. During these visits I participated in conversations about informed consent for patients that participated in the program. This system was also connected to a database for recording results of experiments, and I was also involved in many discussions about the risk involved in safekeeping confidential patient data.

Other than these two specific examples, my Ph.D. work and my current research have many practical applications, some of which definitely involve risk assessment. In particular, the goal of my work is new methods for assessing nearness, and improved applications where the desired evaluation of nearness is similar to that of a human performing the same task. This work has the potential to impact areas such as security, defense, remote sensing, image analysis,

image retrieval, image compression, audio signal processing, and audio compression.

Respectfully,

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