Annex A – Proposal to Establish an ISO/TC 266 SCC Mirror Committee

The questions from the template provided by the Standards Council of Canada are included at the end of each section.

Committee
Identification: ISO/TC 266 Biomimetics

Criterion	Justification for the Establishment of an SCC Mirror Committee
Advancement of the national economy	Biomimicry, biomimetics and bio-inspired design constitute a nascent field of research and practice that cuts across traditional disciplinary boundaries. By tapping into information from organisms, processes and systems in nature, this approach can deliver novel solutions currently not well understood or implemented in the technology domain. The source and trans-disciplinary nature of these solutions show promise of increasing the sustainability of resulting designs, reducing the impact of human activity on the ecological system services upon which we depend or even helping to regenerate those systems. Biomimetic patent filings have grown exponentially since 1985 (Bonser & Vincent, 2007). Similar trends have been seen in studies of academic publications across a wide range of disciplines (Lepora, Verschure, & Prescott, 2013). A 2010 study funded by the San Diego Zoo suggested "biomimicry-based goods and services could account for approximately $300 billion of U.S. GDP by 2025" (Fermanian Business & Economic Institute, 2010, p32). There are a growing number of significant biomimetic inventions such as the PAX Streamlining Principle (Harman, 2013). Although the practice of this field is in its early stages within Canada, targeted research is currently underway in a number of universities such as the University of British Columbia, University of Calgary, Carlton University, University of Guelph, McGill University, Simon Fraser University and St. Francis Xavier. Canadian companies actively developing or investigating opportunities in biomimetics design include GaitTronics, Hastrich Design, Mawashi Protective Clothing, Powersmiths International Corp, REGEN Energy, WhalePower and WindSimplicity. In addition, network groups such as Biomimicry Alberta, Biomimicry Quebec and the BID Community are building expertise and providing services to companies interested in exploring biomimetics solutions. Canada's involvement in the ISO/TC 266 working groups is essential to incorporate the views of Canadian stakeholders in the final ISO standards, ensuring that Canadian organisations can effectively engage in this field both nationally and internationally. This involvement can also create opportunities for growing the biomimetics community within Canada, building contacts internationally and increasing Canada's credibility through demonstrated leadership in the field.

	• *Will the standards under development facilitate innovation and technological advancement for Canadian business?* • *Is there evidence to indicate the standards would be beneficial to Canadian domestic or export markets?*
Support sustainable development	Canadians and the international community value the diverse natural assets of Canada. Biomimetics provides a new way to value natural systems based not on what we can *extract* from them, but rather how we can *interact* with them which in turn can stimulate deeper learning. Developing solutions based on biomimetic principles and processes can connect Canadians more closely with natural ecosystems, encouraging Canadians to protect and potentially regenerate these assets, open up new opportunities for economic growth and connect Canadian companies to international peers in sustainable development. • *Will this standard support the social economic and environmental goals that express the broader expectations of Canadian society as a whole?*
Benefit the health, safety and welfare of workers and the public	Biomimetic design principles encourage systems thinking, taking into account a wide spectrum of stakeholders in both the human and ecological spheres. In the process of learning to value nature in new ways, stakeholders value natural assets in their entirety, rather than merely based on their economic values. This can lead to innovative solutions that increase resilience, adaptability and vitality. Resilience helps us deal with the growing volume and intensity of the stresses affecting economic, social and environmental systems. Adaptability allows these systems to evolve over the longer term, creating new opportunities and synergies. Aspiring to increase vitality goes one step further, encouraging us to improve the health of these systems through greater diversity, complexity and dynamism. Sound and generally accepted standards can increase the likelihood that government funds supporting biomimetic innovation and research will be properly invested for the benefit of all Canadians. • *Will the standards allow the product to perform its function so as to limit the probability of risk of injury or damage?* • *Will the standards written be in a form suitable for adoption as part of Codes, regulations and work methods?*

Assist and protect consumers	A core objective of the ISO/TC 266 initiative is to clarify what it means to classify a product or service as biomimetic, a term currently lacking a consistent definition. This will help reduce after-the-fact attribution for the sole purpose of marketing, increasing consumer understanding of the biomimetic process and confidence in the outcomes. Although biomimetic design does not necessarily lead to increased sustainability, the process encourages exploration of broader societal and ecological objectives in addition to meeting the immediate needs of consumers and producers. Building on our innate interest in nature, designing and developing tangible products and services using knowledge gained from nature has been shown to increase student interest in the sciences and technology. The importance of trans-disciplinary collaboration in successful biomimetic endeavours can help engage a broader cross-section of the population in becoming more creative and innovative. • *Will this standard help consumers a) benefit from, and drive competitive markets b) benefit from access to clear, concise, and accurate information that allows them to assess the value and usefulness of the product and or service and c) overcome consumer detriment, in particular those who experience detriment due to vulnerabilities such as low income or low literacy levels?*
Facilitate domestic and international trade	Standards can encourage productive development of new domestic technologies, products and services by providing guidance on conformance, increasing clarity, improving efficiency and providing a basis on which trusted relationships can be developed. Standards can both limit and encourage international trade depending on the ability to comply. Participation in this ISO initiative will allow Canada to highlight any national concerns with the evolving standards. Within the constraints of ISO/SCC confidentiality requirements, early involvement can help generate interest in biomimetics among Canadian companies and organisations, bringing the work of innovative Canadian firms to the attention of multi-nationals. This ISO initiative could create opportunities for biomimetic professionals to help organisations obtain ISO certification, similar to the emergence of LEED accreditation within building design/construction. • *Will the standards be developed in an open and transparent process, involving balanced representation, technology-neutral and based on performance so as to provide a level playing field and promote manufacturers to compete more effectively in an open market?* • *Will the standards have a positive impact on internal or external trade?*

Availability of human and financial resources to conduct the work	The following individuals from academia, industry and organisations involved in biomimetic design have agreed to participate in the mirror committee.

Dr. Mojtaba Ahmadi	Carlton University, GaitTronics	
Melina Angel	Biomimicry professional, Biomimicry Quebec	
Dr. Edwin DeMont	St. Francis Xavier University	
Stephen Dewar	WhalePower	
Marjan Eggermont	University of Calgary, Biomimicry Alberta	
Carl Hastrich	Hastrich Design	
Norbert Hoeller	Bio-Inspired Design Community	
Dr. Shoshanah Jacobs	University of Guelph	
Mark Kerbel	REGEN Energy	
Philip Ling	Powersmiths International	
Dr. Filippo Salustri	Ryerson University	

Although Canada can be an observer country within the ISO/TC 266 initiative, acting as a participating country allows involvement in existing technical committees and opens opportunities to propose new working groups. Funding this level of involvement will require financial support through corporate sponsorship and individual contributions.

- *Is there direct evidence of the necessary human resources available from affected stakeholders to establish a participating SCC Mirror Committee?*
- *Will financial resources be made available by affected stakeholders to actively participate in the international work?*

References

Bonser, R. H. C., & Vincent, J. F. V. (2007). Technology trajectories, innovation, and the growth of biomimetics. *Proceedings of the Institution of Mechanical Engineers, Part C: Journal of Mechanical Engineering Science*, *221*(10), 1177–1180. doi:10.1243/09544062JMES522

Fermanian Business & Economic Institute. (2010). *Global Biomimicry Efforts: An Economic Game Changer* (p. 44). San Diego: Point Loma Nazarene University. Retrieved from http://bioinspiration.sandiegozoo.org/sites/default/files/BiomimicryEconomicImpactStudy.pdf

Harman, J. (2013). *The Shark's Paintbrush: Biomimicry and How Nature is Inspiring Innovation*. New York: White Cloud Press.

Lepora, N. F., Verschure, P., & Prescott, T. J. (2013). The state of the art in biomimetics. *Bioinspiration & Biomimetics*, *8*(1), 013001. doi:10.1088/1748-3182/8/1/013001