NSERC Reallocation SC Workshop

(University of Toronto, January 28-29, 2001)

Notes on Steering Committee Meeting for GSC 06

Present:

Alberta	abourizk@civil.ualberta.ca
Toronto	adams@civ.utoronto.ca
C-CORE	jclark@morgan.ucs.mun.ca
Waterloo	haas@uwaterloo.ca
Laurentian	pkaiser@nickel.laurentian.ca
Waterloo	gerhard.kennepohl@sympatico.ca
Calgary	lachapel@ensu.ucalgary.ca
British Columbia	dsm@civil.ubc.ca
Sherbrooke	kenneth.neale@courrier.usherb.ca
Alberta	dwsmith@civil.ualberta.ca
Alberta	peter.steffler@ualberta.ca
Dalhousie	hans.vaziri@dal.ca
Canam/Manac Group	richard_vincent@canammanac.com
	Alberta Toronto C-CORE Waterloo Laurentian Waterloo Calgary British Columbia Sherbrooke Alberta Alberta Dalhousie Canam/Manac Group

Regrets:

Jim Montgomery

Cohos Evamy Partners

montgomeryj@cohos-evamy.com

1. Introduction

The Civil Engineering (CE) Steering Committee for Third NSERC Reallocation Exercise (NRE) held a two-day workshop at the University of Toronto, Galbraith Building 117, January 28 and 29, 2001. Ralph Haas welcomed as the Chair of the Steering Committee the participants and introduced the agenda and a folder with relevant background material.

2. Background

Ralph has gave a brief review of the background for the Third Reallocation Exercise which included overviews of goals, principles, NSERC's 1st (1994) and 2nd (1998) Realocation Exercises and some lessons learned from 1998 submission (Attach.I, copy of slides).

3. NSERC Reallocation Criteria

Gerhard Kennepohl presented an overview of the criteria that apply to the reallocation exercise. This presentation included an overview of principles, outcome, impacts, and joint responsibilities, a discussion of excellence and importance to Canada as the guiding principles and criteria, a desription of the format and content of the submission and brief comments on interdisciplinary and joint research proposal, consulting with the community and schedule (Attach. II, copy of slides).

4. Expectation of Workshop

Ralph Haas emphasized that the expected achievements of the workshop should include summarized reports and written documentation of the discusions and also specific follow-up assignments. He expressed the need to complete the first draft (strawman) of the vision statement as soon as possible and before any more detailed discussions can proceed logically (first day noon?). A first draft of a strategy for the development of Civil Engineering was on Ralph's wish list.

5. Vision Statement

Daniel Smith who was "*volunteered*" by Ralph Haas, introduced a first draft (strawman) vision statement using inputs from the June 2000 London Workshop, a discussion paper by Hans Vaziri and his own valuable experience and background. A draft dated January 27, 2001 consisting of an 'Introduction' and 'Vision of Civil Engineering' is attached (Attach. III).

Using some additional slides Dan explained that the CE profession is facing the most challenging time of its history, a time when the need for more innovation and the need for creative solutions are greater than ever. Stating the three axioms:

- 1. Growing populatioon,
- 2. Desired quality of life, and
- 3. Retention of earth's biodiversity,

he deducted that the old paradigm,"proceed as usual', must be replaced and new approaches be used. He also visualized the strategies for future development of the CE discipline cathegorized in different schemes, including the following:

- Creating benefits for Canada
- Smart technology for better infrastructure
- > Multidisciplinary research approach
- > Sustainable biodiversity, health and environment
- ➢ Interactive infrastructure management.

This first draft by Dan Smith provided a sound basis for an intensive and productive discussion with the objective to reach consensus on the future direction for the development CE and a 'Vision Statement'.

Barry Adams outlined an approach for making a compelling case to fund research by identifying and demonstrating specific <u>strategies</u> to address and cope with todays CE <u>challenges</u>, as summarized and shown in subsequent tabulation:

Challenges

- Population growth
- Quality of life: wealth creation; risk, safety and security; efficienty, etc.
- Environment: climate change, hydrology, water levels; biodiversity; habitat; pollution; etc

Strategies

- Emerging (non-civil engineering) technologies: IT; advanced materials; plastics, etc.
- 'Hard' civil technologies: materials; processes, etc
- 'Soft' civil technologies: decision support policy implication

Barry Adams also picured the relationship of % commitment to benefit and cost. When moving along a line from *concept-management* to *operation-management* benefits and costs will asymptotically approach as shown in the following schematic:



The ensuing discussion included suggestions for a strong vision statement as well as an introduction to the submission which would clearly highlight a new direction for CE and some innovative and exciting proposals. Roundtable comments included such observations as 'CE is increasingly becoming the contact point for society's needs', 'the problem has arrived' and we will be in crisis not for lack of funding but lack of management'. Following intensive discussions, the resulting vision statement was drafted by Dan Smith:

Vision Statement:

The interaction between peoples' lives, the biodiversity between environment and the infrastructure are created by civil engineering.

The new paradigm demands that the needs of rapidly increasing population, improvement of the quality of life and the preservation of biodiversity must be met simultaneously. Civil Engineeering requires major infusion of research to meet the needs expressed in the new paradigm.

The implementation of the vision requires research in three technologies:

- 1) innovative emerging technologies
- 2) 'hard' civil engineering technology
- 3) 'soft' civil engineering technology

Consensus was reached to accept this draft of the vision statement in principle, subject to further refinements and editing.

6. Strategy for Future Development

Various strategies that are needed to achieve CE's vision of its future direction, were already part of the discussion during the formulation of the vision statement. A random collection of key strategic elements are here identified and summarized:

First Listing of Strategies:

- Develop tests for clean water, safe water, rivers wetland lakes
- Develop innovative technology for infrastructure rehabilitation/renewal
- Improve safety, efficiency of transportation systems
- Foster sustainable resource extraction
- Expansion of export, technology transfer, creation of wealth for Canada and international competitiveness
- Efficiency of energy management
- Readiness for natural disasters
- Waste management and recycling
- Clean and healthy living (indoor) environment

These strategies were subsequently consolidated and cathegorized in three major themes:

- A. **Sustainable and intellegent infrastructure** in terms of longevity, IT, monitoring/control, risk reduction, socio-economic aspects, etc.
- 1) longevity improvements in materials and design
- 2) socio-economic stability, i.e. relationship of built components to social factors
- 3) information technology applications
- 4) materials (water, waste water, residuals)
- 5) risk reduction. e.g. natural disasters, climate changes

B. Wealth creation for Canadians

- 1) automation techniques
- 2) off-shore northern affair development
- 3) energy consumption reduction
- 4) application of spatial technology
- 5) waste and residue management
- 6) intellegent transportation
- 7) intellegent infrastructure/building management

C. Environment and Biodiversity

- 1) new water and water waste treatment techniques (membranes)
- 2) habitat protection and restoration
- 3) design of biodiversity
- 4) phosphorous recovery
- 5) decease control. e.g. human-agricultural relations
- 6) improved food production

7. Practical Proposals

Peter Kaiser triggered input to an impressive list of practical proposals with the following \$ 100 million question: *Given the opportunity, where in CE would you apply and expend such venture capital?*

Each committee member was asked to outline briefly three proposals which hopefully would support the vision statement and the proposed strategy for the future development of civil engineering in Canada. The results are summarized as follows:

Project proposals:

- 1. CE research into energy reduction
- 2. Integrated monitoring technology and data processing from lab and field research
- 3. Rehabilitation of structures/new materials
- 4. Urban people movement
- 5. Potable drinking water
- 6. Waste residue management
- 7. Energy frontiers
- 8. Environmental enhancement
- 9. Intelligent infrastructure systems
- 10. Performance based engineering design (death to design load)
- 11. Global data base for structure and environment
- 12. Sensing and comunication for CE facilities
- 13. Self-cleaning membrane systems for water treatment
- 14. Improvement to transportation safety
- 15. Design technology to protect biodiversity, e.g.run of the river turbines
- 16. Lifecycle efficient technology
- 17. Young innovators fund
- 18. Bonus for teamwork
- 19. Computer integrated modeling
- 20. Social engineering
- 21. Mitigating climate change effects on infrastructure
- 22. Reduce road death by 50%
- 23. Beyond normal (perpetual) lifecycle analysis

Additional presenters referred to project proposals already listed above. Obviously, the same or similar topics were presented and discussed, as shown in the subsequent tabulation of subject areas and occurrence:

Subject area :	Occurrence:
transportation	4
structures	2
environment	7
energy	3
IT	5
infrastructure	2
performance design	5
innovation	4
northern technology	2

8. Task Assignments

The participants of the workshop agreed to contribute to the write-up and preparation of the proposed submission for the GSC 06- Civil Engineering. Listed below are the description of the tasks, assignments (* for task leader), approximate length (pages) required, and time lines:

<u>Task No.</u>	description	assigned to	pages	time line	
1.	1 st draft introduction	*Smith, Mavinic,	0.5	mid Febr	
	and vision	Vincent, Vaziri	1.5		
2.	1 st draft strategy	*Adams, Haas,	2	mid Febr	
		Kennepohl,			
3.	1 st draft proposals	*Steffler, all	4	end Febr	
4.	1 st draft impact of no funds	*Vincent, Clark, Haas,	1	mid Mar	
5.	1 st draft results of last exercise	*Clark, Steffler, Haas,	1	end Mar	
6.	references		<u>1</u> 11		
Some additional, indiviual tasks were assigned as follows:					
1.	Communication of introduction a CE Dept.Chairs (Haas)	and vision statement to		end Febr	
2.	Opinion survey on accomplishme CE Chairs (Haas)	ents and strengths from		Febr 3	

Identify key industry players and ask for endorsements
success stories (AbouRizk)

GJK/ Jan 30, 2001