

**Technology Road Map—Town Hall Meeting
Boucherville, QC—February 3, 2003**

Flipchart Notes

Discussion A: CIS Short/Medium Term Technology Development Needs

Pages A1—A10

1. Train human resources to deal with drinking water. Enforce a new Québec regulation => need for training.
2. Know the condition of the infrastructure: need for standardization.
3. Better knowledge of the harmful consequences of poor water quality. Provide information, such as measurements.
4. Multidisciplinary technologies.
5. Real-time tools for measuring the condition and performance of the infrastructure.
6. Technologies that can adapt to climate conditions during maintenance, rehabilitation and construction.
7. Tools that can determine the residual life of infrastructures.
8. Technologies adaptable to small urban areas.
9. Tools to evaluate the performance of new technologies.
10. Tools to allow more collaboration in execution (non-linear).
11. “Modern” tools adapted for practical training (professionals and practitioners); involvement of infrastructure technology manufacturers.
12. Daily evaluation network “monitoring” tools.
13. Evaluation by expert group of projects using new technologies and dissemination.
14. Knowledge sharing.
15. Cost characterization “protocol”.
16. Knowledge of networks—2 levels: 1 -preliminary; 2-in-depth.

17. Define the “measures” to be taken to develop tools better.
18. Define technological “counter-performance”.
19. Incorporate “dramatic changes” in decision planning.
20. Determine preventive and corrective interventions to be included in the decision-making process.
21. “Permanent” program of pilot projects, demonstrations and technologies (i.e., Component 3, infrastructure program).
22. Evaluation of needs/future requests—incorporate.
23. Life cycle scales—prevention, intervention
24. Develop the infrastructure protection systems.
25. Decision model adapted to the present (hierarchical) reality and upgrade to “systematic”.
26. Public education—taxpayers.
27. Technology watch.
28. “Marketing management” tools => promotion of infrastructures with regard to other needs.
29. Infrastructure “management” tools.
30. Minimum and compulsory infrastructure upkeep and maintenance standards.
31. Review of the “curriculum”—“MBA—Infrastructure”.
32. Quantification of benefits of interventions (social, economic) and making decision-makers “accountable”.
33. Emergency management tool.
34. Dissemination of R & D results.
35. Tools to define the value of current infrastructures and operating costs.
36. Market studies to help promote R & D.

37. Tools (laws) to force the municipalities to use new technologies.
38. Promote integration of clean and non-polluting technologies.
39. Strengthen quality control and competencies.
40. Better means of support for infrastructure research.
41. Define the costs of non-intervention.
42. Help coordinate interventions between utilities.
43. Define the concept of performance depending on the types of works.
44. Define the non-performance penalty criteria.
45. Pool the resources of small communities to increase purchasing power.
46. Improvement of techniques for laying new materials.
47. Data for monitoring performance of new materials.
48. Data management.
49. Auscultation tools, especially underground.
50. Tools to evaluate the impact of rehabilitation on residual life.
51. Calculations on the life cycle of the work.
52. Management tools for small municipalities.
53. Tools must respond to the broadest possible legislative and administrative framework.
54. Best practices directory with “universal” access.
55. Understand:
 - * Who are the players?
 - * Technologies adapted to the different players.
56. Define the essential points of the infrastructure diagnosis.

Discussion B: CIS Technology Challenges to Meet Needs

Knowing the Condition of Infrastructures Pages B1—B4

1. Budgets (barrier).
2. N.D. diagnostic tools.
3. Tools for networks and projects.
4. Reliability of information.
5. Involvement of Public Works => knowledge.
6. Appropriate indicators.
7. Accessibility and popularization.
8. Information update.
9. Knowledge => technology watch.
10. Identify and understand the problems “to be inspected”.
11. Compulsory declaration by the owner of the work—what form?
12. Prioritization of inspection.
13. Common standardized performance indexes.
14. Know the construction and maintenance history, etc.
15. Obstacle: diagnostic costs.
16. Recommend courses for elected officials.
17. Manpower training: specialized and technical depending on the technologies; certification and continuing education.
18. Form taken by information management?
19. Integration of analytical results into a master plan, for example.
20. Frequency of inspection (see # 8).

21. Standardization/formulation of status report.
22. Publication of results—benefits of methods.
23. Task empowerment—at all levels => coordinator (federal/provincial/municipal)
24. How much time is required to execute these measures?
25. Obtain information from experienced employees—“corporate memory”—interdepartmental cooperation.
26. Definition of new technologies—inventory.

Tools to Determine the Residual Life
Pages B5—B7

1. High-performance tools (network level).
2. Reliable—objective, repetitive, recognized or standardized.
3. Recognized practices.
4. Define “residual life”.
5. Comparative data.
6. Operations training.
7. Tools that consider the reduced data history.
8. Non-destructive.
9. Definition based on the history of the intervention and the type of structure, function and performance.
10. Integration into the master plan, for example.
11. Knowledge of materials.
12. Barriers: pressurized (aqueduct).
13. Barriers: complexity of systems (various materials, etc.).
14. Infrastructure use - forecasting tools.

15. Calibration of forecast simulations (reliability); validation at the time of the forecast.
16. Knowledge of the parameters that influence the life cycle.
17. Use of results? How in the decision-making process? => optimum intervention time.

Knowledge Sharing

Pages B8—B10

1. Ownership of information.
2. Sharing at all levels.
3. Dissemination of knowledge.
4. “Experience” with the monitored result.
5. Knowledge of errors and how to avoid them.
6. Barrier: open mind to bad experiences.
7. “Neutral validation” of case studies.
8. Knowledge sharing tools, Web site, etc.
9. Distinction:
 - * Continuing education;
 - * Education (i.e., universities);
 - * Technical.
10. General incentives for training in sharing.
11. Quality of information.
12. Cooperation between disciplines involved.
13. Send the information to whom?
14. Barrier: dissemination of industrial secrets.
15. Barrier: “blind confidence” in unproven technologies.

Quantification of the Benefits of Intervention

Pages B-11—B13

1. Case studies.
2. Define “life cycle”.
3. Identification of performance indicators.
4. Identification of interventions at different points in the life cycle.
5. Barrier: encourage to provide information.
6. Benefits: associated with money (even environmental).
7. Short-term and long-term cost/benefit studies.
8. Incentives to evaluate the social costs/benefits (analysis level, requesting party).
9. List of benefits?
10. Establish regionalized “costs” of intervention techniques.
11. Benefits:
 - * Forecast (before);
 - * Evaluate (after) and report.
12. Establish the impacts of non-intervention.
13. “Qualify” the results.
14. Studies: projects and “management methods”.
15. “Simplification”.
16. Impact on life cycle.

Calculations of the Useful Life of the Work Pages B14—B16

1. Define useful life.
2. Challenges: change the culture and accounting—all levels.
3. Establish the service levels.
4. Quantification of the effects of interventions.
5. Quantify the costs/scenarios, forecasts.
6. Decisions: short-term vs. long-term.
7. Quality vs. Cost—analytical tools.
8. Optimization of use of technologies, products, materials.
9. Define economic parameters.
10. Account for standardized services.
11. Barrier: permanence of decision-makers.
12. Incentives.
13. Establish the residual value.
14. Relate the robustness of decisions to the sensitivity of the parameters—“risk analysis”.
15. Maintenance cost trend models.
16. Expectations in terms of unrealistic times and financing for short-term projects.
17. Cyclical industry.

Tools to Evaluate the Performance of New Technologies

Page B17—B19

1. Look for “old” technologies elsewhere and compare existing technologies.
2. Comparison of performance in similar situation.
3. Accelerated tests.
4. Define utilization parameters.
5. Reliable and certified tool.
6. Beta site to evaluate—experimental sites and pilot projects.
7. Government bodies providing sites for pilot projects.
8. Emphasis on “Made in Canada” technologies.
9. Monitoring of pilot projects (programs).
10. Funding related to risk sharing.
11. Technology life cycle analysis.
12. Multidisciplinary analysis.
13. CITAC/SATI.
14. Overall cost of the technology vs. conventional technology.

Recommendations

Pages C1-C3

1. Reserve money annually to put the plan into action.
2. Promote efforts, disseminate information (educate the population, reeducation of practitioners).
3. Subsidies related to knowledge of the condition (incentives accompanied by tools).
4. "Harmonize".
5. Dedicated to underground networks.
6. Favour technologies that protect the environment.
7. Study GASB 34 and its application.
8. Investment in infrastructures.
9. Federal investments with: engine => Ottawa, distances => provinces; actions => cities.
10. Public awareness of the importance of infrastructures.
11. Involvement of journalists.
12. Future programs:
* Structured so that the work is spread over several years.
13. "Evolution" of society: insurance, litigation, etc.