



CANADIAN FOREST SERVICE

Focus on Innovation

INFORMATION NOTE 2



Historical Perspective on Forest Sector Science and Technology Alignment: The Foundation for Forest Sector Transformation

Introduction

The forest sector has historically employed a business model that successfully generated wealth for Canada for many decades. This model was built on the cornerstones of plentiful high-quality fiber, inexpensive energy, proximity to major markets supported by a comprehensive infrastructure system, and relatively little international competition compared to today's current market. The model was ideal for the development of a highly productive commodity-based industry whose main innovations were achieved through process enhancements using adopted technologies. Although this model provided financial returns, innovation was not critical for success.

But due to a combination of economic, social, and environmental pressures, particularly in the last decade, many of the sector's cornerstones became visibly stressed, no longer able to support the traditional model. Transformation through increased investment in innovation was the only option for the sector. Because science and technology (S&T¹) activities promote and support innovation, improving institutional alignment in forest S&T was seen as a key facilitator of forest sector transformation.

Although a focus on S&T in the federal government is not new, how the government views and supports forest sector S&T activities has evolved over time. In this Note, we illustrate the evolution of forest sector S&T alignment and how institutional arrangements were an integral part of S&T alignment and consequently of the overall forest sector transformation. In

¹ S&T is used to describe a wide variety of activities that have a scientific approach to technological development. S&T has two main components: research and development (R&D), and related scientific activities of which R&D comprises the greater share. R&D is further split into three main areas of work: basic research, applied research, and experimental development.

Section 1, we provide the historical S&T context at both national and forest sector levels. In Section 2, we describe the relevant organizational landscape before 2006. In these two sections, we also provide a better understanding of the challenges and the related proposed solutions to ensure S&T capacity is aligned with forest sector industry and market needs.

In Section 3, we present the concrete actions implemented in support of the forest sector S&T alignment through

1. creation of the Canadian Wood Fibre Centre (CWFC);
2. consolidation of three national forest sector research institutes into FPIInnovations;
3. creation of a memorandum of understanding with the Natural Sciences and Engineering Research Council of Canada (NSERC) to produce the Forest Sector R&D Initiative leading to the creation of eight academic networks;
4. creation of FIBRE (Forest Innovation by Research and Education) to better align the eight NSERC-funded academic networks with industry needs; and
5. delivery by the CFS of targeted programs in value-added forest products and transformative technologies.

Focus on Innovation Series

Focus on Innovation is a series of Information Notes designed to provide insights on innovation and innovation systems based on CFS experience in innovation research in the forest sector. The Notes are not intended to outline Government of Canada opinions but rather to provide a basis for discussions on innovation as it relates to Canada's forest sector. In the Notes, we will cover a wide variety of topics related to innovation to foster thinking on how best to support a sustainable, innovative, and globally competitive forest sector.

Because of these actions, the forest sector S&T capacity is now better aligned with industry and market needs. In Section 4, we discuss the benefits of these actions.

Section 1. Historical S&T Context

National S&T Context

The importance of coordinating S&T activities in Canada has long been recognized, but setting national S&T priorities has been a challenge for many decades. Before the 1980s, there was no overarching S&T strategy in Canada. Attempts were made to change this starting in the 1980s when the federal government recognized the need for more pragmatic and economically driven investments in S&T. In response to this recognition, two key events occurred in the late 1980s: the Government of Canada (1) released the first national S&T policy and (2) created the National Advisory Board on Science and Technology (NABST), a national advisory body to the prime minister on S&T goals and policies.

In 1995, the NABST issued its final report (Brassard 1996). It highlighted the need for goal-oriented S&T to create wealth, jobs, and knowledge and the need to establish an effective S&T governance system, including departmental Boards. Then, in 1996, the government released a new policy on S&T (Brassard 1996). This policy implemented many of the recommendations of the previous decade, including improving federal S&T governance and emphasizing cooperation and partnerships to develop a national innovation system.

Forest Sector S&T Context

As a result of these national changes, several changes to forest sector S&T in Canada were introduced in the 1990s. Governments at all levels were facing decreased revenues due to the economic recession, and in the forest sector, there was an institutional reorganization, a realignment of departmental activities with core federal responsibilities, and a reduction in the federal forest research budget. The federal forestry budget was reduced by 58% and provinces simultaneously cut back on research support. In contrast to these cuts, targeted research was needed to meet environmental pressures and the growing social demands for sustainable development (Boylen 1998). Examining the state of forest sector S&T was necessary to address these pressures.

Section 2. Assessment of Forest Sector S&T Institutional Arrangements

National Forest Sector S&T Organizations before 2006

Before 2006, various organizations were involved nationally in forest sector S&T (Figure 1). FERIC,² Forintek,³ and Paprican⁴ were conducting research at different stages of the forest sector

² Forest Engineering Research Institute of Canada (fiber supply to mill).

³ FOREstry, INdustry, and TECHnology (lumber, engineered wood products, and panel boards).

⁴ Pulp and Paper Research Institute of Canada (pulp and paper manufacturing).

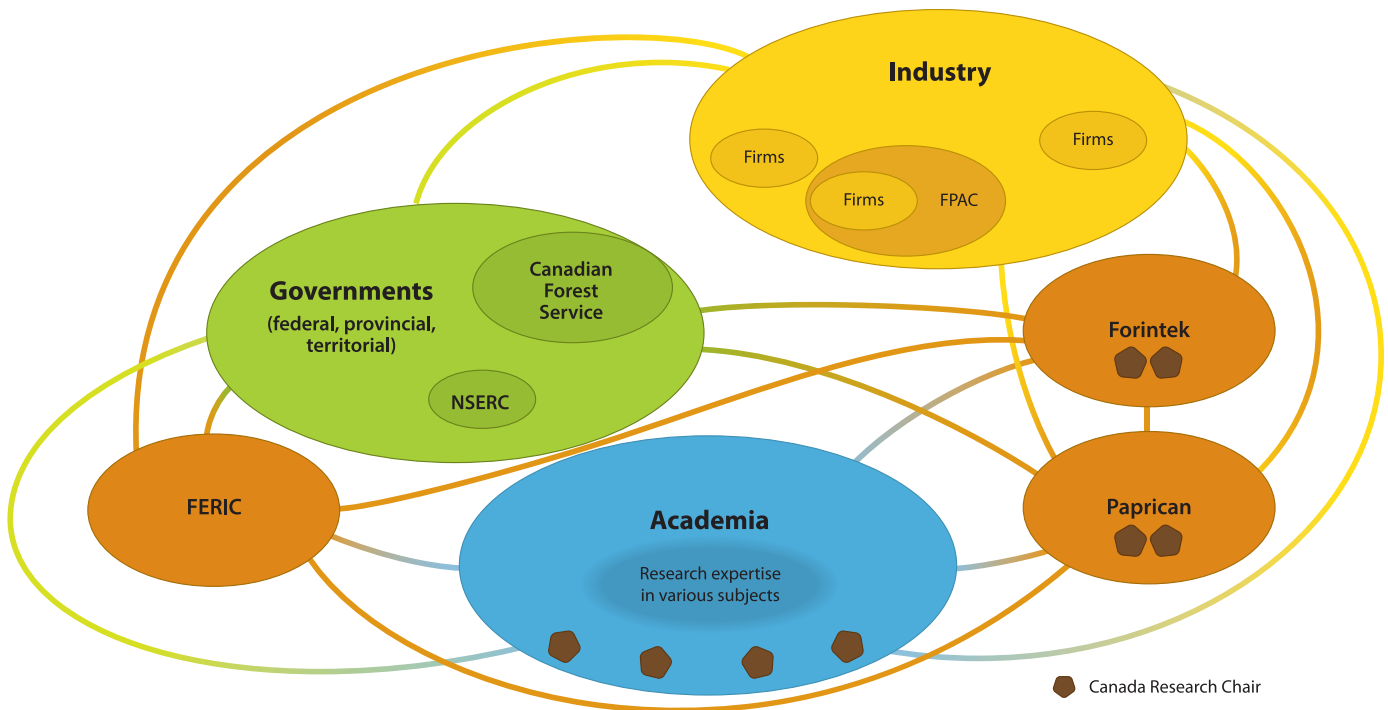


Figure 1. Fragmented forest sector S&T capacity before 2006.

value chain. Although they were setting priorities for themselves and their members, they did not influence collective priorities for the sector. In addition, several government agencies both at the federal and provincial/territorial level were funding and performing forest sector S&T as well as influencing the sector's collective S&T priorities. Academia was also conducting research activities in various laboratories in universities across Canada. Furthermore, the forest industry was influencing collective priorities as well as funding, performing, and harnessing the resulting S&T. At this time, the forest sector's inability to set collective and strategic S&T priorities was due to a lack of coordination between these organizations and their activities.

As Figure 1 demonstrates, there were many S&T organizations in place before 2006, making the coordination required to set strategic S&T priorities a challenge.

Coalition for the Advancement of S&T in the Forest Sector (FORCAST): Recognizing Forest Sector S&T Fragmentation

In 1997, forest sector stakeholders called for the creation of a body that better coordinated and promoted S&T in the forest sector. Although individual players were perceived to be effective, collectively the various stakeholders in Canada's forest S&T community were viewed as lacking a vision. To satisfy this need, in 1998, FORCAST was launched. FORCAST was pivotal because it was the first entity to focus on setting S&T priorities for the entire sector using a collaborative approach (Munro 2002). It considered the evolving needs of the entire sector by engaging all the stakeholders, including representatives from federal and provincial governments, academia, industry, and environmental and Aboriginal groups. FORCAST held several events to bring together the stakeholders to discuss how forest S&T was performed in Canada. These events started to raise decision-makers' awareness across the sector about the importance of setting joint S&T priorities. After various discussions, FORCAST concluded that

- 1. the forest sector S&T community in Canada was too fragmented to maximize its contribution to the sector and to the quality of life of Canadians; and**
- 2. no single organization was positioned to review strategic investments in forest S&T across the forest sector value chain.**

Economic Impetus for Transformation

Although FORCAST was able to identify the problems confronting forest sector S&T, it was not enough; finding solutions became increasingly important. At the start of the new millennium, the forest sector was hit by a combination of economic, social, and environmental pressures, which made it clear that the sector was no longer able to support its traditional model designed for a commodity-based industry. The stressors included a rapid rise in the value of Canada's currency versus

that of the United States; the emergence of highly efficient, low-cost producers; stronger environmental regulations; shifting market demands; and unprecedented changes in forest ecosystems such as caused by the mountain pine beetle (*Dendroctonus ponderosae*). The combined effects of these factors negatively affected the sector, turning it into a high-cost producer that was crippled by a low return on investment. This led to a loss of employment, revenue, and competitiveness (CFS 2006).

Because of these compounding issues, transformation was the only option for the Canadian forest sector to maintain and enhance its competitive advantage. The sector needed to diversify, shifting from commodity products to value-added products to increase profitability. Improving S&T alignment was seen as the main facilitator of that transformation (CFS 2006).

Canadian Forest Innovation Council (CFIC): From S&T Fragmentation toward S&T Integration

To address this need for increased alignment of forest sector S&T, the Forest Products Association of Canada (FPAC), the CFS, Industry Canada, and the provinces collaborated to create the CFIC, which replaced FORCAST in 2003. The CFIC included executive senior members from the funders of S&T in industry and the federal and provincial governments. The CFIC was the first forest sector S&T organization that proposed using an innovation system approach to strengthen forest sector S&T alignment. An innovation system focuses on the institutional arrangement of actors that collaborate through the generation and exchange of relevant knowledge so innovation takes place efficiently. S&T activities are important contributors to innovation, and effective coordination of sector-wide S&T priorities will support an efficient innovation system.

The CFIC performed a comprehensive review of all S&T players (i.e., federal and provincial governments and industry), their roles and their investments across the sector, with a focus on aligning S&T with the customer needs. The council produced a report (CFIC 2004) that incorporated FORCAST findings and made several recommendations to address the S&T fragmentation using an innovation system approach. These recommendations included

- developing an overall strategic direction for R&D and innovation to unite the various discrete organizations in a common direction and focus;**
- eliminating fragmentation in the system to develop better integration along the value chain; and**
- focusing more on the market/customer needs.**

Essentially, different organizations were playing their individual roles, competing for the same funds with no formal priority-setting mechanism. Specific recommendations from the CFIC review were instrumental in aligning forest sector S&T capacity with the forest sector innovation objectives and market needs.

Section 3. Forest Sector S&T Institutional Alignment

Aligning Government and Industry S&T Capacity

One of the CFIC’s major recommendations was to integrate forest sector S&T institutions to facilitate the implementation of an overall strategic direction that included both a comprehensive view of the value chain and market needs. The CFS played a leadership role in implementing this integration through the creation of the CWFC and FPIInnovations.

CWFC: Filling a Gap in the Innovation Value Chain —

The CFIC identified upstream fiber issues as a key gap in the innovation value chain. To address this gap, in 2006, the CWFC was created to capitalize on Canada’s fiber advantage to become the national authority on the characterization, development, and use of Canadian wood fiber in support of the economic competitiveness of the Canadian forest sector. Although the CWFC is part of the CFS and as such takes its administrative direction from Natural Resources Canada (NRCan), its research priorities are defined by FPIInnovations strategic direction (CWFC 2010).

FPIInnovations: Aligning Government and Industry—On April 1, 2007, Paprican, FERIC, and Forintek merged to create FPIInnovations, according to a governance structure proposed by the CFS. Three previously competing institutes combined to enable greater cooperation and alignment. FPIInnovations business model

is focused on identifying and responding to existing market demands instead of encouraging innovations for which there is no demonstrated market. The business model also looks to perform innovation activities across the entire forest sector value chain, all within a framework of environmental sustainability.

FPIInnovations membership includes federal and provincial governments, forest sector firms⁵ and suppliers, and firms from other industrial sectors (e.g., petrochemical). It also works closely with education and research institutions’ stakeholders. This reduces the fragmentation in S&T and begins to define an enhanced Canadian forest sector innovation system.

The creation of FPIInnovations and the CWFC aligned government and industry S&T capacity (Figure 2). FPIInnovations bridges the gap between government and industry, replacing the numerous connections between government, industry, and the previously existing research institutes with a single mechanism to exchange information and set collective priorities.

Aligning Academic S&T Capacity with Industry Needs

NSERC Forest Sector R&D Initiative: Linking Industry and Academia—In 2008, the NSERC Forest Sector R&D Initiative was created to align academic research with the forest sector’s

⁵ “Firm”, not “company”, is used to agree with OECD terminology.

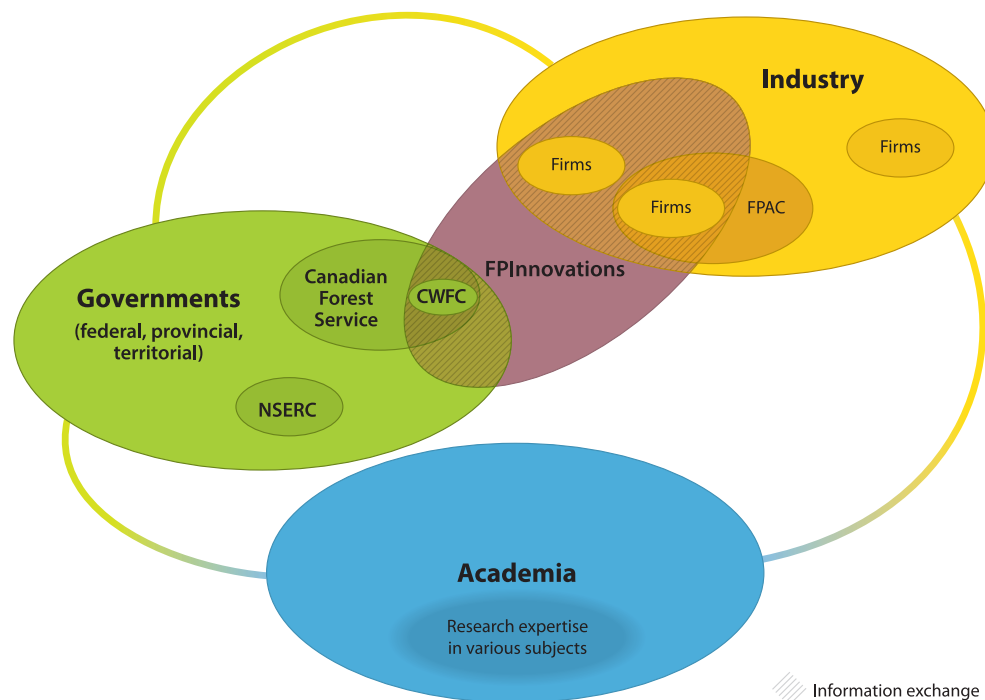


Figure 2. Aligned S&T capacity to support forest sector transformation, 2007.

innovation agenda to ensure programs have commercial relevance and to take advantage of the emerging bioeconomy.

This initiative involves several university research networks covering a wide variety of disciplines—not just those disciplines traditionally associated with the forest sector—that are participating in the development of new products and enhanced production processes to benefit the Canadian forest sector. The research conducted is strongly integrated with FPIInnovations research priorities (Figure 3). As a result, the initiative itself was only made possible because of the prior creation of FPIInnovations.

Creation of Forest Innovation by Research and Education (FIBRE): Aligning Individual Networks — The successful implementation of the NSERC Forest Sector R&D Initiative laid the groundwork for the next step in the evolution of forest sector research in Canada. In fall 2011, FIBRE was launched. FIBRE is structured to build synergies among eight individually managed forest sector R&D networks,⁶ and is supported by a partnership of FPIInnovations, NRCan, NSERC, and FPAC. The organization comprises seven NSERC strategic networks and one business-led Centre of Excellence. Working as a single organization, FIBRE combines the multidisciplinary strengths and expertise of the individual networks, enabling them to share knowledge and best practices. Integrated with FPIInnovations strategic directions, FIBRE supports the priorities of Canada’s forest sector innovation system and ensures better connectivity with other key actors.

The creation of the CWFC, FPIInnovations, the NSERC Forest Sector R&D Initiative, and FIBRE has resulted in better alignment

⁶ For more information on FIBRE and its component networks, please visit http://forest-foret.nserc-crsng.gc.ca/_docs/FIBRE_eng.pdf.

of forest sector S&T capacity, increasing synergies in the sector, and helping the sector meet its innovation needs (Figure 4). FPIInnovations linked government and public/private research capacity with industry. The NSERC Forest Sector R&D Initiative and FIBRE create stronger linkages between industry and academia.

Role of the CFS Supporting Forest Sector Transformation — The CFS has always played a leadership role in forest sector S&T coordination in support of national economic goals, regional and sustainable development, and public policies for the social, environmental, and economic well-being of all Canadians (Senate Committee on Agriculture and Forestry 2011). Because the networks funded by the NSERC Forest Sector R&D Initiative are aligned with FPIInnovations research priorities, they are also aligned with the four transformative technology research areas. CFS leadership in forest sector innovation has led to improved S&T institutional alignment through investment in transformative technologies. Although these achievements would not have been possible without the Government of Canada’s investment, other actors’ active participation (e.g., industry and academia) was also required.

Section 4. Conclusion

Canada’s forest R&D community was viewed as fragmented and lacking collective vision; now the sector has a more integrated S&T capacity. The creation of FPIInnovations as an innovation intermediary in the forest sector innovation system provides the following benefits:

- allows the sector to speak with one voice on innovation through the leadership role of the FPIInnovations Board;
- acts as an intermediary for a more effective transfer of ideas to products;

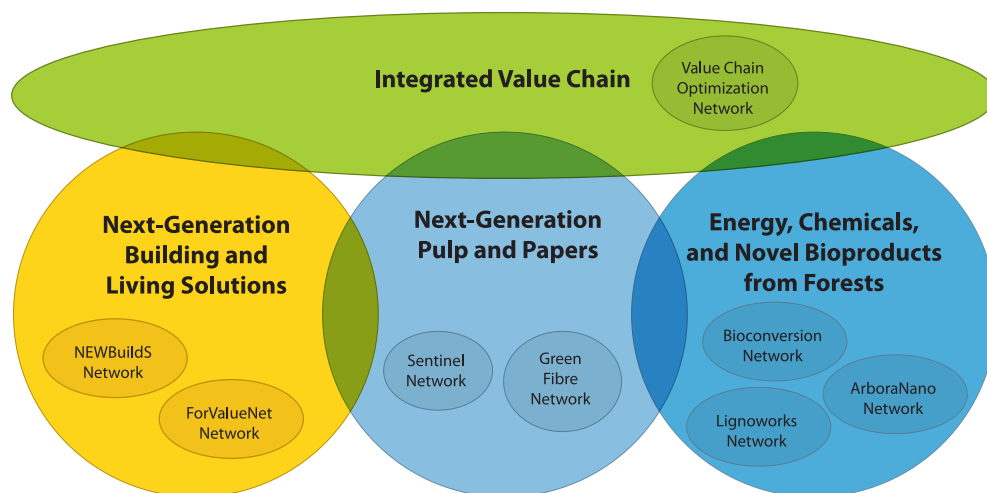


Figure 3. NSERC-funded forest sector R&D networks aligned with FPIInnovations research priorities.

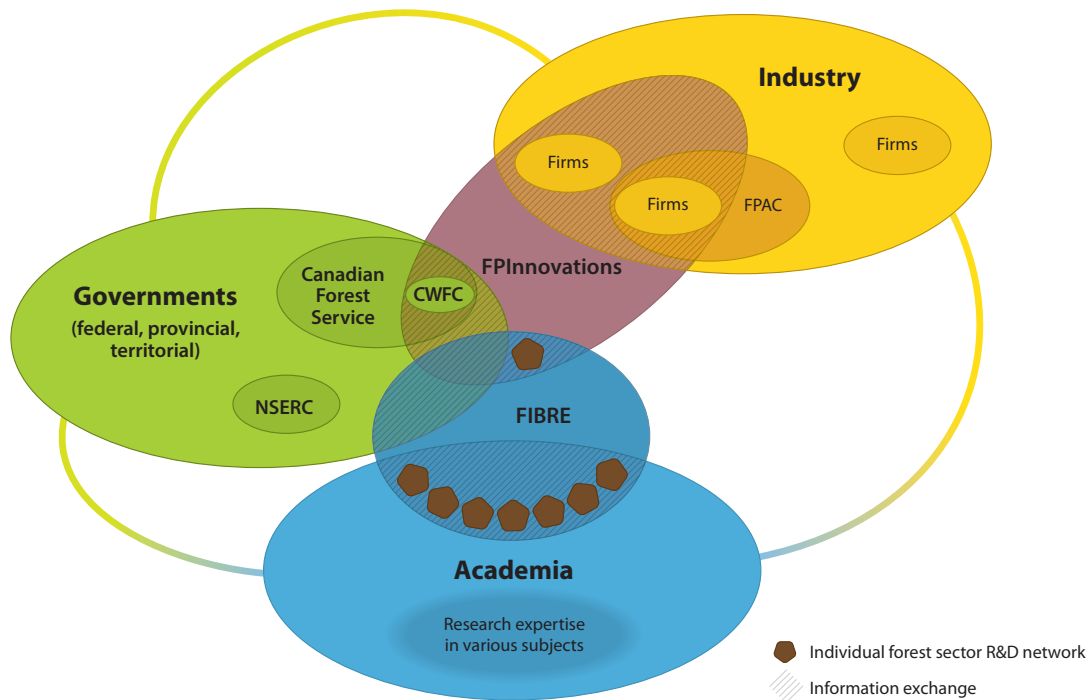


Figure 4. Aligned S&T capacity, including FIBRE, to support forest sector transformation, 2011.

- provides a mechanism to set national innovation priorities in support of forest sector transformation;
- facilitates industry engagement in the innovation process; and
- provides a hub for academic collaboration with the NSERC Forest Sector R&D Initiative and FIBRE.

The key actors in the Canadian forest sector innovation system are now in place and better positioned to address the forest sector's innovation needs. The alignment of S&T activities supports the sector's transformation not only by addressing today's challenges but by positioning the sector to be better able to respond to future challenges.

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