OPTIMIZING THE IMPACTS OF CCTTS ON COLLEGE TRAINING

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College centres for the transfer of technologies (CCTTs) are research centres established by one or more colleges that conduct applied research and provide technical assistance, information, and training for businesses and organizations.[1] Each CCTT draws upon the expertise developed in the college(s) with which it is affiliated, and specializes in a specific field (forestry, agriculture, transportation, digital imaging and interactive media, chemical processes, aerospace, immigrant labour-market integration, sustainable development, etc).[2] As they can be found in most areas of Quebec, CCTTs constitute powerful tools for social, economic, and regional development, and help enhance training for students (MDEIE), 2008)[3]. Like the colleges themselves, the provincial government—which gives these academic institutions the privilege of associating with CCTTs, provides basic funding, and regularly evaluates their performance—expects that the interaction between the colleges and their CCTT(s) will result in impacts on college training (MELS[4] and MDEIE 2010).

But how should such impacts be defined? How can more be produced? What can be done to ensure their quality improves? How can the number of impacts be increased more easily? How can impacts be measured and promoted? These were the questions I explored as part of an applied-research project conducted at the CÉGEP de Sainte-Foy with my colleagues Fanny Bourgeois and André Doré (2011a, 2011b, 2012a, and 2012b). Without going into great detail on the methods used[5] for this qualitative research, or on our findings, we will discuss here the aspects we feel imperative that all colleges and CCTTs take into account in order to more easily produce a greater number of quality impacts.

◗ HOW SHOULD WE DEFINE "IMPACTS ON COLLEGE TRAINING"?

In our research, we quickly observed that a number of actors in CCTT-college partnerships made no distinction between impacts on college training (which we will refer to henceforth as ICT) and the vehicles for such impacts. While this distinction may at first not appear obvious, there is an important difference between the two concepts. For example, having a car is not enough, in itself, to get to one's destination; other conditions (having enough gas, taking the right route, etc.) also enter into the equation. Imagine a chemistry teacher who takes part in applied research or in modifying a process in a CCTT specializing in chemistry. Does that participation alone guarantee there will be impacts on college training? No: if the teacher never discusses his work with his students, mentions that he is a researcher as well as a teacher, incorporates aspects of his research (examples, models, prototypes, processes, etc.) into his courses, or asks his students to think about the problem he is working on, his students' training will not be enhanced by his CCTT work. The same holds true if he never discusses his research activities with her CÉGEP colleagues: the latter will not have access to developments in their discipline and, at the end of the day, curricula will not benefit from innovative content that could enhance the education provided to students.

These examples highlight the fundamental distinction that must be made between ICT (for example, the benefits of CCTT work on training) and the vehicles that deliver them (for

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[1] For more information on the mission of the CCTTs, the circumstances surrounding their creation, and their organic bonds with colleges, consult the full research report that served as a basis for this article at [www.cegep-ste-foy.qc.ca/rechercheCCTT]. The site also contains a number of other documents related to our study, including a slide show complete with narration.

[2] Réseau Trans-tech, which is the umbrella network for all CCTTs, allows Website users to locate CCTTs by sector of activity, location, or name, as well as providing information on each centre and its innovations [http://reseautranstech.qc.ca/].

[3] MDEIE is ministère du développement économique, de l'Innovation et de l'Exportation [Department of Economic Development, Innovation and Export Trade].

[4] MELS is ministère de l'Éducation, du Loisir et du Sport [Department of Education, Recreation and Sport].

[5] It should be noted that this research did not involve Centres for Technology Transfer in Innovative Social Practices (CCTT-PSN), as the first CCTTs of this type were then in their infancy.

example, a teacher who participates in such work). They also show that such vehicles may or may not produce ICT. ICT can be defined as:

> …the predictable or unpredictable positive, defining, and sustainable effects that result directly or indirectly from the production of new knowledge, scientific or techno-logical innovation, or technological transfers by CCTTs on colleges and their courses and curricula (including AECs, or "attestations of college studies"), teachers, students, graduates, and CCTTs (as college components) (Kingsbury, Bourgeois, and Doré 2011a, 87).

Naturally, ICT can vary in importance and nature, but the main ICT identified in connection with our research (Kingsbury, Bourgeois and Doré 2011a, 91) are illustrated in Figure 1 (at the bottom, under "ultimate targets"). They are preceded by the routes they may take ("intermediate targets", in the centre) and the stakeholders on whom they depend ("target CCTT clients", at the top).

◗ **HOW CAN MORE QUALITY ICT BE PRODUCED?**

As illustrated by Figure 1, ICT can follow several different paths. However, our study indicates that these routes have a limited number of "on ramps", some of which can give rise to a varying number of itineraries and ICT of varying scope. For example, Figure 1 shows that teachers who take part in the work of a CCTT have more ways to contribute to ICT pro-duction than those who are simply informed of the centre's work and advances. Figure 1 also demonstrates that student participation in the work of a CCTT is the only avenue for

FIGURE 1 — ITINERARIES: FROM CCTT ACTIVITIES TO ICT
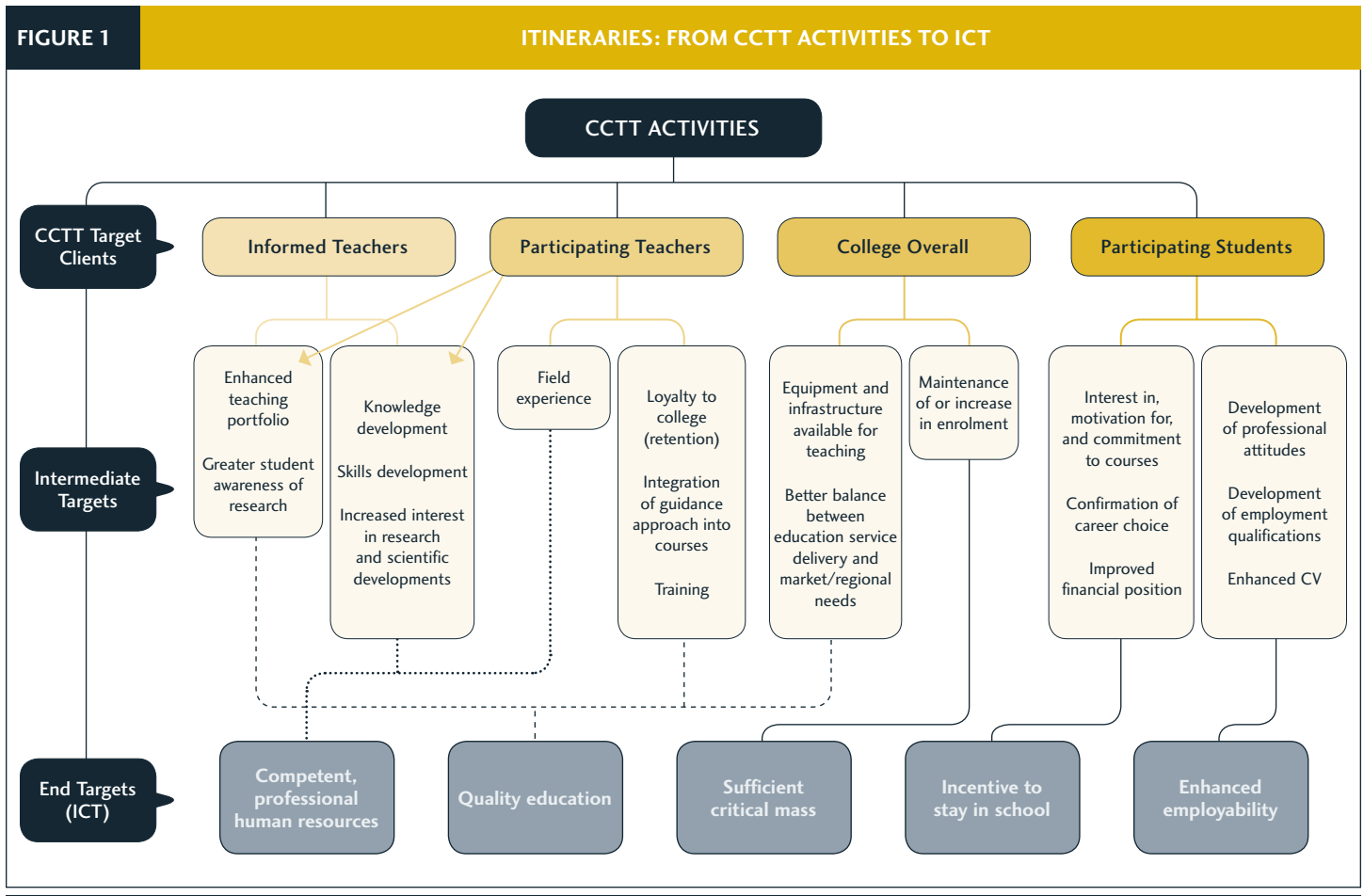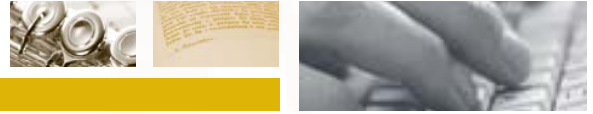
producing ICT that encourages academic perseverance and enhances employability. In other words, participating teachers and students constitute some of the more worthwhile "on ramps" for easily generating quality ICT.

KEY SUCCESS FACTORS

In the course of our work, we observed a certain number of obstacles and key success factors for ICT production. These were of two orders: those external to the CCTT-college partnership (for example, the expectations of funding organizations, which are not governed by CCTT-college partnerships) and those that are internal. In our research report, we detail these internal and external obstacles and success factors, and suggest a number of related avenues for optimization. We will focus here on internal success factors (Kingsbury, Bourgeois and Doré 2011a, 136-188), because they are the *raison d'être* of CCTT-college partnerships.

A few years ago, Réseau Trans-tech, the umbrella organization for all CCTTs, wrote: "Although coordinating CCTTs with colleges is a fundamental characteristic of the unique model governing their creation, the operationalization of that process remains an ongoing, complex challenge." (Réseau Trans-tech 2010, 7)[6] CCTT-college partnerships are subject to tensions resulting from a conflict between the wish to dedicate resources to producing ICT and the difficulty of finding those resources. For example, we know that just supervising a student trainee in a CCTT takes time, meaning the CCTT project manager cannot look for new contracts or work on those the CCTT has already been awarded. Although money is an important part of the equation, it is not the only thing that counts: some CCTT-college partnerships have managed to develop flexible management measures and tools to overcome obstacles such as those related to scheduling conflicts that complicate the integration of teachers and students into the work of the CCTTs. One of the key factors for ICT production consists in continuing—if not intensifying—the sharing and use of these solutions and practices among all CCTTs and colleges.

In analyzing the interviews conducted, we also noted that having the CCTT and the college share the same vision and mobilize their staff is extremely important. In the case of those partnerships that most successfully produce ICT, there is a shared vision that results in an almost magical list of ingredients: mobilizing leadership, shared responsibility for ICT and, especially, mutual knowledge and a good understanding between the college and the CCTT. These partnerships are a perfect illustration of the fact that it takes two to tango! When the CCTT and the college understand that ICT production does not depend solely on the CCTT, for example, it naturally follows that both bodies must implement the necessary measures. The college then provides the CCTT with tangible assistance, *inter alia* by demonstrating the value it places on ICT and mobilizing all staff (in particular the teachers), and even by discussing how to establish realistic annual targets as well as the measures best able to attain them with the CCTT administration.

> *...participating teachers and students constitute some of the more worthwhile "on ramps" for easily generating quality ICT.*

A dialogue between the college and the CCTT on ICT is certainly conducive to a better understanding of their individual and mutual challenges, which helps both parties have more realistic expectations with respect to ICT, as well as the resources required. Ongoing communication and discussions are crucial for ICT production, and must not be limited to the higher decision-making levels: they must exist at all levels. In partnerships in which ICT are produced most easily, we observed that, when decision makers from the college and the CCTT talked to one another often, the same held true of teachers and project managers, as well as project managers and students.

Based on the data collected, we believe that individuals at every level of the partnership should be in contact continuously, not merely once or twice a year. Ongoing interaction at all levels makes it possible, *inter alia*, to interest teachers and students in what the CCTT is doing, encourage them to take part, and develop a sense of loyalty to the CCTT. This interaction also helps those working at the CCTT and the college to better identify opportunities for collaboration that would be beneficial for both parties. Such ongoing discussions are also conducive to developing a common culture and changing certain perceptions held by teachers and project managers. At the end of the day, this promotes ICT production, which in turn benefits everyone. As might be expected, these formal and informal exchanges are fostered by the physical proximity between the CCTT and the college, as well as by unfettered movement between the two. However, this type of context is not always easy to establish; CCTTs must occasionally be established at some distance from their affiliated colleges, whether because of lack of office or lab space or of visitor parking on college premises. The same holds true in the CCTTs,

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6 Unofficial translation.
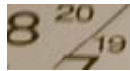
which, because of an extremely competitive industry context or risks presented by their activities, must established access-monitoring measures. Even in these cases, however, it would still be interesting to seek specific means to facilitate ongoing informal and formal communication.

Ongoing discussions at all levels also facilitate expert, reciprocal, up-to-date knowledge among CCTT and college stakeholders, which translates into the solid coordination of CCTT activities with college curricula. In CCTT-college partnerships with such expert knowledge, we noted that opportunities for producing ICT were numerous, because CCTT and college staff realize what they have in common, what they can accomplish together. Similarly, in cases where stakeholders told us they were not very familiar with what was being done at the CCTT or in curricula related to CCTT activities, it becomes problematic to make the most of the opportunities that arise, or propose projects relevant for the two entities concerned.

We feel it is paramount to emphasize the existence of certain particularly important instruments for facilitating coordination between the CCTTs and the curricula most closely tied to CCTT activities. We mentioned expert, reciprocal, up-to-date knowledge and ongoing discussions at all levels, but other instruments, including integrating teachers and students into CCTT activities (a process that is one of the most important vehicles for ICT production), are also employed by some partnerships. Of course, as previously discussed, such integration involves a number of challenges; however, our observations of certain partnerships showed that these challenges are not insurmountable. In our report, we also suggest they can be met by a number of approaches based on partnership best practices.

The other instruments involved in CCTT-curricula coordination include the identification of subjects of mutual interest.

- What industry developments should be examined by both the CCTT and teachers?
- What are the labour-force trends for which students should be trained, and for which the CCTT should provide assistance?
- What course content or competencies pose the biggest problems for students?
- What CCTT activities pertain to that content or those competencies?
- What issues inspire both the teachers and project managers?
- What are their respective areas of expertise?

By answering such questions, partnerships can more easily determine how a given project or college course could include components that are important to everyone, as well as giving a "CCTT dimension" to curricula and using the CCTT and its specialized contacts with business innovators as a means for providing students with training that is even more attuned to current and future developments.

This CCTT dimension, may, for example, constitute one of the curriculum's "local-colour" aspects, and translate, *inter alia*, into mandatory trips to the CCTT in courses that offer students a glimpse of their future career, classroom visits by project managers when specific content is to be explored, or even mandatory or optional CCTT internships. It could also take the shape of advice from project managers or teachers participating in projects with the CCTT on how to implement activities that are consistent with what some colleges call the "guidance approach" (which helps students define their occupational values, confirm or re-examine their career path, and so on). To go even further in recognizing the articulation between CCTT activities and college curricula, as well as the additional asset represented by such articulation for students, transcripts could contain a reference to "Introduction to Research" or "Training on Research".

> *[Winning practices for CCTT-college partnerships] are based, in particular, on greater recognition of CCTT activities in college curricula....*

▶ **WHERE SHOULD WE START?**

Because ongoing discussions at all levels are vital to ICT production, we suggest that the CCTT-college partnerships begin with this dimension. To help interested CCTT-college partnerships make a start in that direction, we have developed a tool (Kingsbury and Bourgeois 2011b) that can be used both to act as a basis for discussion and to diagnose or establish joint ICT-production priorities.

As shown in Figure 2, the tool takes the shape of a questionnaire on ICT-production internal success factors. We suggest that the CCTT-college partnerships have CCTT and college administrators, as well as each member of the CCTT and curriculum teams concerned, complete this questionnaire individually and then meet to compare their answers. Obviously the goal of the questionnaire is not to have the partnerships tally the number of "Yes", "No", or "In Part" answers given by each respondent; rather, it is to allow all partnership stakeholders to determine if their priorities and perceptions are the same, discuss the aspects to be improved, and identify

the joint action that will result in ICT production. Comparing the answers of each could give rise to rewarding discussions on any of the questionnaire subjects, thereby making it possible, for example, to determine if each party is reading the situation the same way, find solutions to problems specific to ICT production, or establish a consensus on the priority of certain factors that influence local ICT production.

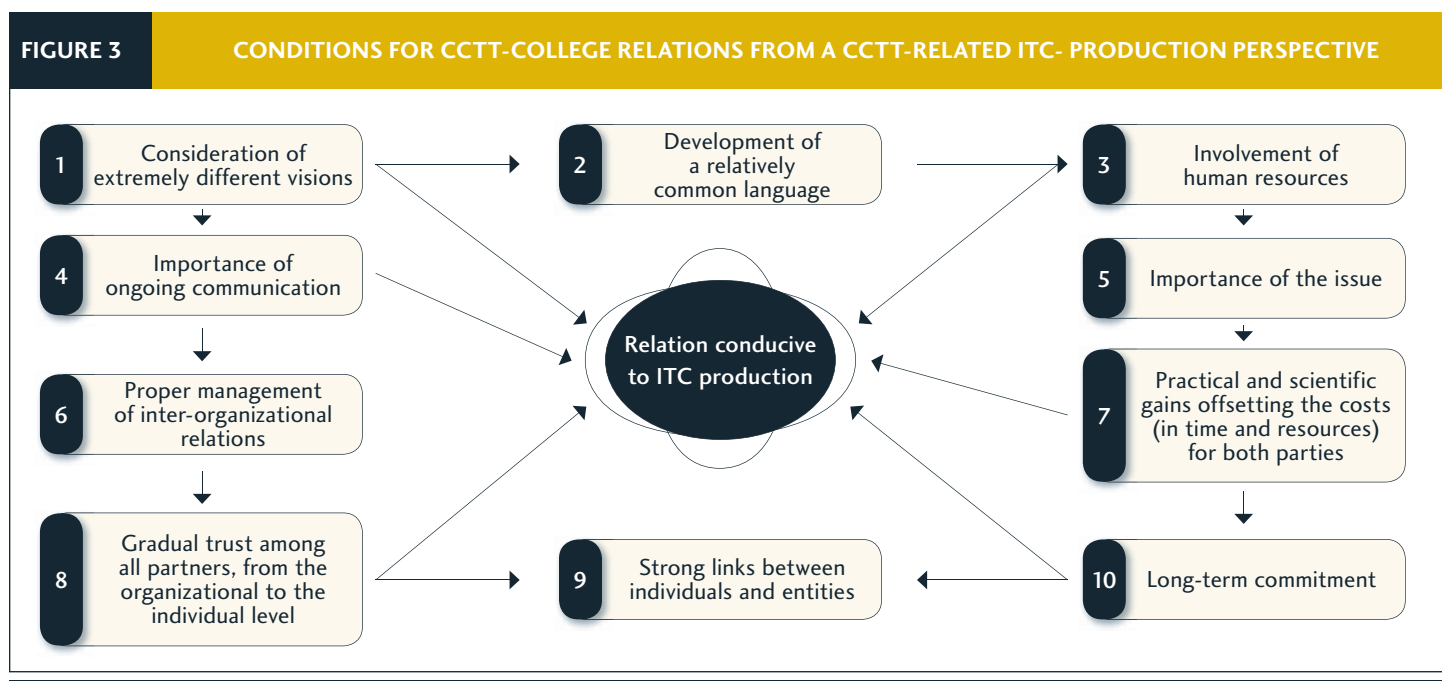| FIGURE 2	EXCERPT FROM THE DISCUSSION TOOL		
Questions	**Answers**		
Topic: Shared Vision	In part	Yes	No
1. Do we share a similar vision of the goals and mission of the CCTT?			
2. Does our leadership mobilize us around ICT production? (Specifically, is ICT production one of our priorities? For each project envisaged, do we reflect together on the ways it could contribute to college training?)			
3. Have we developed a true research culture in the college and the CCTT? (Specifically, do we inform ourselves on research findings?)			

▶ TO RECAP

The avenues for optimization we are proposing in response to the situations observed within CCTT-college partnerships are basically present, in one way or another, in Figure 3, which constitutes the transposition of a model developed in another context by Julien (2004, 25). Transposed and adapted to our circumstances, this figure illustrates the conditions under with CCTT-college partnerships can develop relationships conducive to ICT production in spite of different cultures and goals that, although fundamentally different, are not incompatible.

This model integrates the internal partnership factors that influence ICT production by establishing a relationship conducive to ICT production. It also makes it possible to incorporate the activities of the colleges and of their CCTT(s) into a system aimed at producing ICT while leaving each its own culture, goals and imperatives, which is vital.

Box 7 in Figure 3 highlights the necessity of finding, within each CCTT-college partnership, the means for adopting practices that ensure each party comes out a winner. We feel that it is clear that such practices are based, in particular, on greater recognition of CCTT activities in college curricula: those activities can represent a source of continuing education, and incorporating them more into curricula may enhance both CCTT activities and the training provided.

CCTT-college partnerships constitute a hive of projects, ideas, knowledge, and skills that will be used to build tomorrow's society. It is up to all of us—educators, researchers, and administrators—to make the most of them, starting today. ◗

FIGURE 3	CONDITIONS FOR CCTT-COLLEGE RELATIONS FROM A CCTT-RELATED ITC- PRODUCTION PERSPECTIVE

1. Consideration of extremely different visions
2. Development of a relatively common language
3. Involvement of human resources
4. Importance of ongoing communication
5. Importance of the issue
6. Proper management of inter-organizational relations
7. Practical and scientific gains offsetting the costs (in time and resources) for both parties
8. Gradual trust among all partners, from the organizational to the individual level
9. Strong links between individuals and entities
10. Long-term commitment

Relation conducive to ITC production

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