ADVANCING STUDENT MOBILITY THROUGH DATA MOBILITY – A BC FOCUS

November 2019

A study of student data exchange in Canadian post-secondary education with a focus on British Columbia.

Research led by the Association of Registrars of the Universities and Colleges of Canada (ARUCC)

Primary Investigator and Report Author: Joanne Duklas, Duklas Cornerstone Consulting

Acknowledgements

Executive Summary

Advancing Student Mobility through Data Mobility – A BC Focus represents the findings of a national research project that spanned from April 2018 to September 2019. Funded by the British Columbia Council on Admissions and Transfer (BCCAT),[1] the research report identifies the practices and potential opportunities for improving transfer and mobility by enhancing digitization and exchange of students' official academic credentials and transcripts.[2] Extensive consultation occurred for the study with registrarial leaders at post-secondary institutions and their partners such as BCCAT, EducationPlannerBC, the BC Ministry of Education, and others from across Canada and beyond. The University of Victoria represented by the interim registrar, Wendy Taylor, partnered with the Association of Registrars of the Universities and Colleges of Canada (ARUCC)[3] to help guide this project.

The impetus for this research stems in part from broader efforts to create a national student data exchange network for academic documents such as transcripts. Called the *ARUCC Groningen Project,[4]* the goal of that larger initiative includes enabling students to move seamlessly into and between Canadian post-secondary institutions and into the workforce by improving official academic document access and exchange. This BC study is supported by a similarly focused companion study conducted for the Ontario Council on Articulation and Transfer (ONCAT)[5] called, *Advancing Student Transfer through Enhanced Data Exchange*. Partners across all three projects agreed to collaborate on the research and share the findings given the close alignment between each of these initiatives.

Research Questions

The BC project explored the following primary and secondary research questions:

1. What are the current practices and state of readiness for exchanging student data in BC?
2. What recommendations do BC post-secondary registrarial leadership and supporting organizations have for creating a national data exchange model to address identified business needs that build on the related expertise and efforts existing within the province?
    - What practices either current or suggested would result in more efficient student data exchange at the provincial and national levels?
    - What areas for future research are suggested to advance discussions and activities in the area of student data exchange?

Sections 3, 4, and 5 address the first research question. BC post-secondary institutions are eager to improve practices and to support greater connectivity. This group of experts offers a long history of developing ground-breaking collaborations to support transfer and mobility such as BCCAT and EducationPlannerBC. Like other parts of Canada, the challenges are in the details in areas such as available resources, legacy systems, governance frameworks, competing priorities, and more. Section 6 provides detailed recommendations from the broader community including those in BC. Of worthy note, at no point did the higher education experts suggest a National Network wasn't a necessary and viable solution; rather, the recommendations focus mainly on the details of how to make it happen. Areas for future research and consultation include fleshing out the details of the business use cases, the data

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[1] https://www.bccat.ca/

[2] For the purposes of this project, *transfer* encompasses document and data exchange that occurs when students move into and between Canadian post-secondary institutions. *Mobility* focuses on easing students' transition into regulatory professions, trades, and the workforce by enhancing trusted sharing of official academic documents and underlying data with other third parties such as government, employers, etc.

[3] https://arucc.ca/en/

[4] http://arucc.ca/en/projects/task-force-groningen.html

[5] https://www.oncat.ca/en/welcome-oncat

elements, mapping and exchange requirements, and policy matters including governance (both for data management related to privacy and for the operating and advisory structure of the National Network).

Research Approach

A multi-layered approach shared across all previously noted projects guided the research to address the above questions. This involved an environmental scan including literature and website reviews which provided context, and primary research including a national bilingual (French, English) survey, qualitative interviews, and several inter-institutional regional meetings with institutions and organizations along with the British Columbia Registrars' Association (BCRA). The national scope of the research provided opportunities to compare BC findings to other jurisdictions.

The target audience for the primary research included registrarial and data exchange leaders at colleges, institutes, and universities and other supporting organizations across Canada including application centres and the seven councils on articulation/admissions and transfer (Appendices A, B, and C). The researcher interviewed registrarial leaders at six BC post-secondary institutions and representatives of BCCAT, the BC Ministry of Education, and EducationPlannerBC, the province's centralized application and transcript exchange services provider. The BC post-secondary institutions involved reflect the diversity that exists in the province across several dimensions such as type of institution, enrolment size, sector affiliation, and geographical location (Figure 1). In total, the researcher consulted with more than 270 people across Canada in the interviews and regional meetings including those in BC.

The national, bilingual survey collected 117 responses from 86 public and private post-secondary institutions and other organizations such as application centres and councils on admissions and transfer. It experienced an 85% completion rate. Of these, respondents from 76 publicly funded institutions responded in the affirmative regarding their ability to answer questions about their institution's data exchange practices. This group represents 30% (76/252)[6] of the total pool of Canadian public post-secondary institutions.[7] For BC, the survey respondents included representatives from BCCAT, the BC Ministry of Education, EducationPlannerBC, and 19 BC public and private post-secondary institutions of which 18 indicated an ability to answer questions regarding their institution's current data exchange practices. The latter cohort represents 51% of the potential BC post-secondary participants and forms the basis of the current state analysis for BC institutions. All 117 respondents to the survey were included in the analysis of opinion type questions.

The collaborative approach to engaging the higher education community in the consultation research process for this project represented a core strength and was necessary due to its complexity. It would not have been possible to conduct this study without this full participation; therefore, gratitude is extended to all these people for their expertise and support.

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[6] Includes 48 CEGEPs from Quebec.
[7] Including CEGEPs, publicly funded colleges, institutes, and universities, and select private institutions.

Figure 1: Diversity of Post-secondary Institutions and Organizations Interviewed in BC
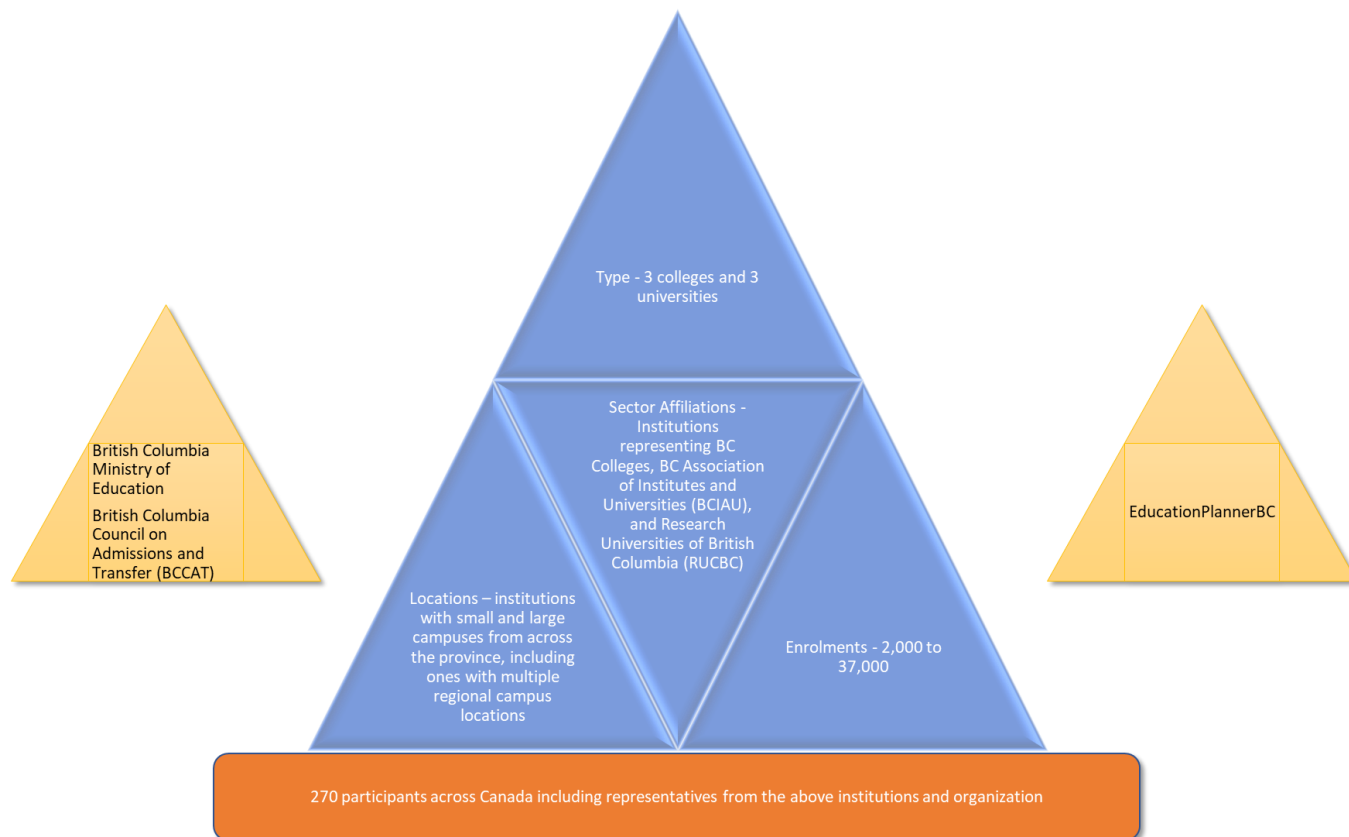
Data Limitations

The primary challenge impacting the project was the lack of data available regarding the scope of provincial and national transfer and related student data exchange for those moving into, between, and beyond Canadian post-secondary institutions. This was true across all three of the projects. Improving these gaps would be important to fully understand the trends and volumes and subsequent pressures. For example, transfer in all the provinces and territories includes intra-provincial, national, and international learners; therefore, identifying the volumes and trends across all these cohorts would better serve post-secondary institutions, future policy development, and other research projects. Most research in Canada tends to focus on specific transfer communities within a province. BC leads the way at the provincial level with its comprehensive Student Transitions Project[8] as does the Maritime Provinces Higher Education Commission with its tracking of inbound and outbound student flows across more than one province;[9] however, the lack of data available on the full scope of student transfer volumes into, between and beyond Canadian post-secondary institutions limits understanding and impacts projects such as this one.

Increasing applications, enrolments, and graduations are driving requests for a host of services across the entire student life cycle. Given the above-mentioned data gap, proxy indicators undergird the findings and subsequent recommendations. These include the growth in document and identity fraud, international students, and requests for official outgoing document validation to support students accessing funding, opportunities to study in Canada, and the workforce. The transfer volumes are

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[8] https://www2.gov.bc.ca/gov/content/education-training/post-secondary-education/data-research/student-transitions-project

[9] https://www.mphec.ca/

identified to the extent the publicly available data allows. The report provides specific examples of these and other change drivers in Section 3.0.

Findings

Current State Challenges and Gaps

To address the first research question, Section 4.0 provides an overview of the current data exchange capacities at Canadian post-secondary institutions including those in BC. Appendices D and E provide a high level overview of the current state by province. BC post-secondary institutions benefit from extensive transfer resources and tools, the high school transcript exchange services offered by the BC Ministry of Education, and the centralized application services offered by EducationPlannerBC. However, at the time of this research, not all institutions had onboarded to the post-secondary transcript exchange services offered by the latter organization. Resolving this represents an area of focus for EducationPlannerBC and the post-secondary institutions. Two post-secondary institutions in BC have established student data exchange (sending and receiving) capabilities with the centralized application services provider in Ontario called the *Ontario Universities' Application Centre (OUAC)*[10] and at least two have made arrangements with this same organization to receive Ontario high school results in large scale, batch electronic format across groups of students. Very few have established connectivity with centralized credential depositories outside of Canada to support in-bound international document exchange. These findings are not unique to BC as most post-secondary institutions in the provinces and territories across Canada are in the same situation.

The overall findings suggest the lack of digitization and electronic exchange of academic documents presents challenges for transfer and mobility including reduced student service (e.g., quality, timeliness), impediments to efficiency for both students and institutions, and untimely decisions during the admissions and transfer processes. Unfortunately, document and identity fraud represent additional concerns. These challenges indicate gaps include the following: (i) insufficient student data exchange connectivity with recognized institutions and trusted credential depositories across Canada and internationally, (ii) a lack of capacity within institutions to automatically assess transcripts, even those that arrive electronically, resulting in manual document assessment, and (iii) growing demands due to enrolment growth and concerns regarding document fraud to officially verify incoming and outgoing documents and their underlying data. Academic documents impacted include those required for admissions and transfer for applicants, particularly those from across Canada and internationally, and outgoing documents including offers of admission, and confirmations of enrolment, fees paid, pending graduation, and graduation.

For the first gap, students applying from outside of a province or territory submit documents by mail or in-person that staff subsequently hand review, evaluate, and assess manually for both admissions and transfer credit. Institutions typically verify these documents with former institutions in a manual way, a process that takes time. This gap could be significantly resolved if Canadian post-secondary institutions including those in BC established trusted electronic student data exchange with each other across provincial borders and with international credential depositories.

The second gap involves two areas: assessment of student documents at the point of admission and for transfer credit equivalency. For the former, if documents are submitted in a non-electronic format directly by students or by mail, or as PDFs (*Portable Data Format*)[11] from another institution or

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[10] https://www.ouac.on.ca/
[11] A file format that presents information that is represented on a paper document in an electronic manner, thus facilitating electronic sharing of the document with another entity. While in an electronic format, it does not always provide access to

centralized credential depository, Canadian post-secondary institutions engage in hand review. Automatic assessment is subsequently impeded unless the student's results are hand coded into existing local student systems. This situation also impacts timely transfer credit assessment. With respect to the latter, not all post-secondary institutions across Canada are able to identify transfer equivalencies at the point of making an offer which is considered a best practice. BC's transfer system is unique in Canada as many of the initial course equivalencies between BC post-secondary institutions are publicly available through BCCAT's transfer website. At the time of this research, BCCAT and the University of British Columbia were partnering to extend the existing course equivalency database to include regions beyond the province and internationally. Once fully launched, it will likely serve as a Canadian exemplar for resolving this issue in part. Furthermore, if institutions rely on the system's database and build complementary automation capacities, they may be able to further automate the assignment of transfer credit awards for individual students. Until that happens, the equivalency awards will still need to be manually assigned to each student within local student information systems; however, the project represents ground-breaking exemplar work with significant potential to enhance student supports.

The third gap results from increasing requests for official verification of documents, both incoming and outgoing, to Canadian post-secondary institutions. These likely result from growing concerns about document and identity fraud. Post-secondary institutional representatives in BC and beyond raised concerns in this area in most of the interviews and regional meetings conducted for this project. They indicated that providing trusted exchange of incoming and outgoing academic documents supports quality assured practices and helps maintain the Canadian higher education brand. Many also cited the increasing volume pressures which they indicated were adversely affecting service. As an illustrative example, Canadian post-secondary institutions have seen a 47% increase from 2015 to 2018 in international student study permits granted by the federal government. Other data indicates most of these students are coming from countries such as China, India, South Korea, France, Vietnam, and the United States. At least four of these regions maintain trusted institutionally supported and/or government mandated official credential depositories. If BC post-secondary institutions connected electronically to these entities through a national network for the purpose of official academic document exchange, the improvements to international admissions and transfer processing would be enormous, as would the reduction in the potential for document fraud. At minimum, staff would no longer need to verify the official nature of a document, its underlying data, or its source. The report shares other indicators in Section 3.0 that demonstrate the need for better methods for document exchange that leverage technology. As much of the findings are the same for the BC study as the aforementioned ONCAT study, the section is replicated in this report without adjustments.

Exemplars

The report highlights international and Canadian application centres and transcript hubs, including EducationPlannerBC and the BC Ministry of Education, that offer access to trusted electronic academic results (Section 3.0). These represent potential partners for a national data exchange network for BC post-secondary institutions that could facilitate primarily in-bound student document and data exchange (meaning, documents and data required by Canadian post-secondary institutions to support admissions and transfer decision making). Most of the Canadian ones, including those in BC, focus primarily on exchange of academic credentials within their respective regions to support application into local post-secondary institutions.[12] Some Canadian post-secondary institutions have made initial forays

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specific data elements unless it contains content beyond flat text and graphics such as metadata (https://en.wikipedia.org/wiki/PDF).

[12] Note: it is possible for students to order transcripts individually and have them sent to other third parties. For example, the BC Ministry of Education provides this support and two institutions in BC are sending and receiving transcripts as a result of

into establishing connectivity across national borders. The research indicates there are many international regions where centralized credential depositories exist for ensuring official academic document verification and exchange in support of student's transferring between post-secondary institutions and beyond. It would be ideal for BC post-secondary institutions, EducationPlannerBC, and the Ministry of Education to connect to these organizations through a national Canadian data exchange network to facilitate direct, official student document and data exchange.

While outside the scope of this project, exemplar models to consider to improve data collection for the purposes of research and policy development include the work of the Maritime Provinces Higher Education Commission (MPHEC),[13] British Columbia's Student Transition Project,[14] Burbidge and Finnie's (Burbidge & Finnie, 2000) earlier research regarding Canadian post-secondary student mobility, and the transfer and mobility research of the US-based National Student Clearinghouse (the *Clearinghouse*).[15] Through the latter organization's Research Centre,[16] institutions access extensive regional and national level transfer and mobility data. Of direct relevance to the scope of this research, the *Clearinghouse* offers its members national data exchange and verification services to thousands of institutions, secondary schools, and students. It represents an exemplar model for the future Canadian national data exchange network contemplated by the *ARUCC Groningen Project*. Other exemplars related to better understanding the volume of student movement and perspectives include the recent transcript exchange volume study conducted by ONCAT and OCAS with OUAC's support (Weins & Fritz, M., 2018) and OUSA's student-led study of 1,300 transfer students (2017).

Overall Recommendations and Areas of Future Research

The last research objective included identifying recommendations and areas of further research for moving forward with the establishment of a national data exchange network to support efficiencies as students move into, between, and beyond Canadian post-secondary institutions. The core benefits cited include improving efficiency, transfer, and learner mobility.

The Canadian post-secondary institutions including those in BC had previously and formally voted at the national 2019 ARUCC bi-ennial meeting to continue developing a national student data exchange network to support both domestic and international students.[17] As noted earlier, none during the consultation for this research disagreed with this position. Therefore, the recommendations from the higher education community in Section 6.0 provide specific suggestions on how to implement the national data exchange network. As these were the same for BC, the Section replicates that which is included in the aforementioned ONCAT study. The following represents a thematic sampling:

- Ensure the network addresses top priority needs
  - Areas identified: improving service, enhancing efficiencies for students and institutions, and mitigating document fraud by establishing trusted, official academic document exchange - The community advised that successfully establishing a national data exchange network requires a prioritized focus on developing the capacity to serve learner transfer and mobility across institutions.
- Ensure adherence to privacy regulations and other relevant statutes

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their efforts and that of EducationPlannerBC and the Ontario Universities' Application Centre. However, there is limited national and international exchange.

[13] http://www.mphec.ca/research/trendsmaritimehighereducation.aspx

[14] https://www2.gov.bc.ca/gov/content/education-training/post-secondary-education/data-research/student-transitions-project

[15] https://www.studentclearinghouse.org/

[16] https://nscresearchcenter.org/

[17] http://arucc.ca/en/projects/task-force-groningen.html

- Help institutional registrarial and technology leaders at post-secondary institutions to obtain support from provosts and presidents for the national data exchange network (i.e., through system wide advocacy and project endorsement efforts)
- Seek out project funding from governments, partners, post-secondary institutions, and others to set up the network
- Consult further with the post-secondary institutions regarding the operating structure and governance framework for the national network and ensure support for provincial and institutional diversity, autonomy, and authority
  - This represented a topic of conversation at the BCRA consultation meeting for this research. The community also signalled the importance of further research regarding data governance practices and perspectives. As a result, ARUCC began engaging in a broader consultation on the first area during the time of this research.
- Carefully consider and adopt cost recovery revenue models when creating the national data exchange network
- Ensure front-facing components and data exchange capacities support Canadian bilingualism
- Establish a phased implementation plan
  - The community provided extensive implementation suggestions which are captured in the report.
- Provide support for onboarding Canadian post-secondary institutions and application centres to the network

Final Thoughts: Enhancing Student Transfer and Mobility through Trusted Data Portability

The research validates the conclusion previously reached by the community that creating a national student data exchange network represents a viable next step to support BC higher education and student transfer and mobility. The findings suggest that tying accessible student data portability to learner mobility needs to be a strategic intention supported by the highest levels of leadership. While there are many competing priorities, Canadian post-secondary institutions including those in BC are well positioned to both benefit from and contribute to a national student data exchange network.

The research indicates that the various aspects of registrarial service delivery consider both the academic and student needs at the core of the activities; however, the registrarial community signalled more is needed as the institutions and students require greater speed, transparency, efficiency, and coherence. Providing trusted connections to facilitate seamless and direct electronic academic document exchange (e.g., transcripts, credentials, confirmations of status) from across Canada and internationally represents an important first step. Supporting further automation and scalable practices within institutions by using electronic student information and next generation technology to reduce burdens on students represents an important next step which will be well served by enhancing official student document and data exchange. While changing internal institutional practices sits outside the scope of this project, further research is encouraged to assist institutions with identifying ways to enhance internal processes as these relate to automation to support student transfer and mobility.

Additional research and consultation are recommended to help develop the connectivity to a national data exchange network. Important next steps include (i) identifying a service provider, (ii) creating a model for exchange that works for the context and diversity that exists in BC and the other provinces and territories, and (iii) identifying pilot institutions with which to partner on specific data exchange projects.

These findings will be of use to BCCAT and the other provincial councils on articulation and transfer, the post-secondary community, and ARUCC as they collaborate to create better supports for students and

institutions. Furthermore, the report will inform policy development and resource prioritization discussions related to transfer and student mobility.

The national network holds the promise of ensuring quality assured, official electronic exchange of students' academic credentials, transcripts and documents through trusted connections. With growing volumes juxtaposed against resource constraints, new and more scalable methods that embrace trusted and secure connectivity, technology, and different approaches to service delivery are not easily achieved but hold the promise of addressing core challenges. The findings from this research indicate a national student data exchange network collaboratively built and coordinated holds the promise of meeting students in their space and supporting their long-term educational journey as they move into or between institutions and into the workforce.

The findings from this research indicate a national student data exchange network to support official electronic academic documents and related data sharing holds the promise of meeting students in their space and supporting their long-term educational journey as they move into, between, and beyond Canadian post-secondary institutions.

BC institutions and the efforts underway to continue to enhance the admissions, transcript, and transfer resources and tools in the province including the exemplar work of EducationPlannerBC and BCCAT, and the expanded course equivalency system pilot by BCCAT and UBC align with and will benefit the efforts at the national level to improve admissions and transfer assessment for students.

Acronym	Full Title
AARAO	Atlantic Association of Registrars and Admissions Officers
ACAT	Alberta Council on Admissions and Transfer
ARUCC	Association of Registrars of the Universities and Colleges of Canada
BCCAT	British Columbia Council on Admissions and Transfer
CFS	Canadian Federation of Students
CanPESC	Canadian Post-secondary Electronic Standards Council User Group
CATNB	Council for Articulations and Transfer, New Brunswick
CiCan	Colleges and Institutes Canada
CICIC	Canadian Information Centre for International Credentials
CMEC	Council of Ministers of Education, Canada
CRALO	Ontario College Committee of Registrars, Admissions, and Liaison Officers
CUCCIO	Canadian University Council of Chief Information Officers
EducationPlannerBC	BC institutions' application service
GDN	Groningen
MPHEC	Maritime Provinces Higher Education Commission
NSCAT	Nova Scotia Council on Articulation and Transfer
OCAS	OCAS Inc., Ontario colleges' application service
ONCAT	Ontario Council on Articulation and Transfer
OUAC	Ontario Universities' Application Centre
OUCA	Ontario University Council on Admissions
OURA	Ontario University Registrars' Association
OUSA	Ontario Undergraduate Student Alliance
PCCAT	Pan-Canadian Consortium on Admissions and Transfer
PESC	Post-Secondary Electronic Standards Council - US Based
WARUCC	Western University Association of Registrars of the Universities and Colleges of Canada

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1.0   Introduction

This BC focused study sought to gauge the readiness of the province's post-secondary sector to implement trusted student data exchange in support of transfer and mobility. Joanne Duklas, the primary investigator and author of this final report, led the research for the Association of Registrars of the Universities and Colleges of Canada (ARUCC), a national registrarial organization. The University of Victoria served as the partner organization for this project. The BC Council on Admissions and Transfer (BCCAT) provided the funding for the project.

This report is a companion study to an Ontario study called, *Advancing Student Transfer through Enhanced Data Mobility* and to a national project called the *ARUCC Groningen and Student Mobility Project (ARUCC Groningen Project)*[18] led by ARUCC in partnership with four national associations: the Pan-Canadian Association of Admissions and Transfer (PCCAT),[19] the Canadian University Council of Chief Information Officers (CUCCIO),[20] and the Canadian Post-Secondary Electronic Standards Council User Group (CanPESC).[21] The *ARUCC Groningen Project* is a multi-year, broad-scale initiative focused on creating a national student data exchange network to facilitate transfer and mobility. All partners to these three separate projects agreed to collaborate on the research and the findings from this study; therefore, select Sections within this report are replicated from the Ontario study, with modifications made where appropriate that are of relevance to the BC context and findings.

The BC project's goals included identifying the current state and readiness for exchanging individual student data to support admissions and transfer and capturing expert recommendations on the changes and supports needed to facilitate a national data exchange network. ARUCC aspires to use the findings to achieve the following:

- identify enhancements for student data exchange at the institutional, provincial, and national levels;
- provide research that will be of use to other BCCAT and BC related initiatives and projects; and,
- inform policy development and resource prioritization for student data exchange.

All three projects serve broader international goals including supporting the strategic aspirations of institutions and organizations such as Colleges and Institutes Canada and Universities Canada, to increase the participation of in-bound international students studying in Canada and out-bound students seeking to study abroad.[22] Internationally, this proposal aligns with the Lisbon Recognition Convention (LRC)[23] and the Groningen Network Organization (GDN).[24] Both initiatives seek to improve student access to post-secondary education and subsequent mobility by enhancing quality assured recognition of prior post-secondary studies. The GDN focuses specifically on advancing digitization and trusted student data exchange as means to improve student and cultural mobility.

Sections 1.0 and 2.0 introduce the project and outline the approach which was guided by the following research questions:

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[18] http://arucc.ca/en/projects/task-force-groningen.html

[19] See https://pccatweb.org/pccat/ - members include representatives from Canadian colleges, institutes, and universities

[20] See https://www.cuccio.net/en/ - Note: a similar national association for colleges and institutes does not exist at the present time.

[21] See http://www.pesc.org/canadian-pesc-user-group.html - members include representatives from Canadian colleges, institutes, and universities

[22] See http://goglobalcanada.ca/ by the University of Ottawa Centre for International Policy Studies and the Munk School of Global Affairs at the University of Toronto

[23] See https://www.cicic.ca/1398/An-overview-of-the-Lisbon-Recognition-Convention/index.canada

[24] See http://www.groningendeclaration.org/

1. What are the current practices and state of readiness for exchanging student data in BC?
2. What recommendations do BC post-secondary registrarial leadership and supporting organizations have for creating a national data exchange model to address identified business needs that build on the related expertise and efforts existing within the province?
   - What practices either current or suggested would result in more efficient student data exchange at the provincial and national levels?
   - What areas for future research are suggested to advance discussions and activities in the area of student data exchange?

For the purposes of this project, transfer encompasses supporting learners with document and data exchange that occurs when they move into and between Canadian post-secondary institutions. Mobility focuses on easing students' transitions into regulatory professions, trades, and the workforce by enhancing trusted sharing of official academic documents and underlying data with other third parties.

Sections 3.0 to 5.0 provide the detailed findings and Sections 6.0 and 7.0 contain the recommendations from the higher education community and concluding remarks.

Examples of organizations engaging in promising practices are noted in Section 3.0. One illustrative model in Canada involves the *China Higher Education Student Information and Career Center* (CHESICC) which is government mandated as the official source for most of the Chinese students' academic results (e.g., secondary credentials, Gaokoa results, etc.).[25] McGill University established Canada's first connection to CHESICC via the National Student Clearinghouse, an American not-for-profit organization that provides national data exchange and research supports to post-secondary institutions south of the border and around the world. In this example, students from China provide permission for CHESICC to send their official academic results directly to McGill. Service enhancements, speed, processing efficiencies, reduced workload, and reduced fraud represent five direct benefits for students and McGill. Other similar models exist around the world.

The findings from this research and this final report will be of use to registrarial and pathway leaders involved in transfer and mobility practice and policy development within higher education institutions and allied organizations such as BCCAT, EducationPlannerBC, the province's application and post-secondary transcript exchange service provider, and the government. The final report is not intended for information technology professionals, system design architects, programmers, or others involved in the technical aspects of data exchange, integration, and system design. As most of those consulted for the research support the business and policy realms of transfer and mobility, the terminology and the related findings should be considered in that context.

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[25] See more details at CHESICC's website: https://www.chsi.com.cn/en/. The China Academic Degrees & Graduate Education Information service provides official verification of degrees (see http://www.cdgdc.edu.cn/).

2.0 Research Approach

As noted, the research approach for the BC study was shared across the Ontario study and the ARUCC Groningen Project. Therefore, this section replicates that of the Ontario report with appropriate modifications relevant to the BC specific research.

The project involved conducting primary and secondary research to identify the current state of post-secondary student data exchange, potential exemplars, and opportunities for enhancements (Figure 2). The former included administering a national, bilingual (French, English) survey to capture input from Canadian post-secondary institutions and supporting organizations and conducting qualitative interviews and regional consultation meetings with pathway and registrarial experts in Canadian higher education. The secondary research involved reviewing websites and scholarly and trade research in the field of student data exchange. This multi-faceted approach ensured meaningful engagement; a comprehensive and nuanced understanding of current practice; and several opportunities to identify member informed recommendations.

Figure 2: Research Approach
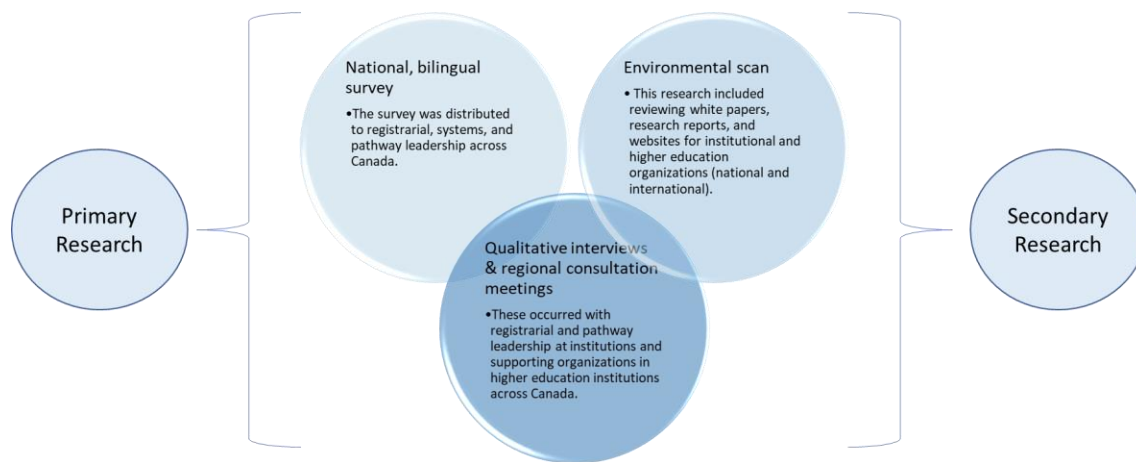
2.1 Project Collaboration

For British Columbia, the research process benefitted from the involvement of registrarial leadership at each of the post-secondary institutions in BC and from the partnering support of the University of Victoria. The collaborative approach to engaging the higher education community in the research consultation process represented a core strength of the project and was necessary due to its complexity.

The primary investigator secured agreement from the various partners of the three aforementioned projects to collaborate on the research and to share findings across five deliverables: the BCCAT research report; the ONCAT research report; and three deliverables for the *ARUCC Groningen Project* (i.e., the business case, ARUCC's funding outreach call, and the planned Request for Proposal). The approach facilitated efficient data collection and avoided interview and survey fatigue. All interview and survey participants were informed of this approach in writing and the primary investigator reiterated this verbally at the start of each interview and regional meeting. All were invited to identify any concerns with this approach; none were reported.

The primary investigator developed all communications and interview materials used to support the research in collaboration with each of the partners and ensure customized material for the BC participants.

2.2　Project Phases

The project transitioned through four phases spanning the time period from April 2018 to March 2019: project launch, environmental scan planning, environmental scan launch, and data analysis and report development (Figure 3). The project partner and ARUCC leadership supported the research through each phase.

Project launch encompassed confirming and signing the contract with BCCAT and defining and implementing the partnership framework for the project in collaboration with ARUCC and the University of Victoria. The next phase involved planning for the environmental scan which included design and testing of the national, bilingual survey and the other forms of consultation. The primary investigator incorporated suggestions for changes to the survey received from the project partner and ARUCC. The primary investigator involved the project partner when developing the format and the supporting communications for the interviews and the regional meeting with BCRA which was co-delivered with a BCCAT leader, Dr. Robert Adamoski.

The launch of the environmental scan began with the opening of the national survey, conducting a review of institutional websites, and starting the initial stages of the literature and trade research. To the extent possible, the interviews occurred after institutions and organizations responded to the survey.

The last phase began in December 2018 with the closure of the national survey. It involved a review of the survey findings and the interview notes from the institutional interviews and regional meetings. Crafting of the final report occurred in this phase and extended into September 2019. Finalization of the final report occurred in November 2019.

Figure 3: The Project Phases

Project Launch (April 2018)
- Contract awarded and signed
- Project process plan confirmed

Environmental Scan Planning (May 2018)
- National survey (bilingual) and supporting communications developed in consultation with partner, BCCAT, and ARUCC
- Initial communications and planning for interviews and regional meeting developed in consultation with partner, BCCAT, and ARUCC

Environmental Scan Launch (June 2018)
- Survey launched (July 2018); closed (December 2018)
- Literature and website/scholarly research started
- Interviews and regional meetings scheduled and launched (last one occurred in January 2019)

Data Analysis and Report Development (December 2018 to September 2019)
- Findings compiled, reviewed, analysed
- Final report developed

2.3　Target Audience for Research

The target audience for the survey, the interviews, and the regional meetings included pathway and registrarial experts at post-secondary institutions and supporting organizations. This also included

leaders with knowledge of data exchange practices from Canadian post-secondary institutions, application centres, and government data hubs.[26]

The post-secondary institutions involved in the interviews and regional meetings for this report included recognized colleges, institutes, and universities primarily located in BC and Ontario supported by research that occurred in other parts of Canada (Appendix A). All private and public post-secondary institutions in BC with membership in BCCAT were invited to participate in the interview process and to provide input during a regional bi-annual meeting of the British Columbia Registrars' Association (BCRA).

The supporting organizations invited to participate in the survey, regional meetings, and/or interviews included provincial application centres from across Canada such as EducationPlannerBC, the Ontario Universities' Application Centre (OUAC) and OCAS (the college application centre in Ontario); transfer pathway councils such as BCCAT and the Ontario Council on Articulation and Transfer (ONCAT); and known government departments that engage in student level data sharing with post-secondary institutions (Appendix B). Of note, while each of the seven councils on articulation/admissions and transfer from across Canada participated in the national survey, most of them do not directly support student data exchange; rather, they use anonymized data to support research and policy development.

The government departments invited to take the survey included the BC and Saskatchewan education ministries, each of which maintain a data repository of secondary school student credentials for their provinces. Interviews occurred with an inter-provincial research organization which collects and conducts student mobility research across three provincial jurisdictions called the Maritime Provinces Higher Education Commission (MPHEC)[27] and a national organization called the Canadian Information Centre for International Credentials (CICIC).[28] CICIC is part of the Council of Ministers of Education, Canada (CMEC). It is responsible for establishing credentialing standards in accordance with the Lisbon Recognition Convention[29] and disseminating information to the public in support of international credential assessment. Its representatives are the Canadian governments' official representative in digitization projects relevant to international conventions such as the Lisbon Recognition Convention and the Global Convention,[30] a UNESCO led instrument to bring together regional conventions across the world in support of student mobility in higher education.

2.4   National, Bilingual Survey (French, English)

A national, bilingual (French, English) survey supported the research process. It included quantitative and qualitative questions across three dimensions: institution/organizational and respondent demographics including provincial location (to facilitate follow up and cross-tabbing); the current state for student information systems and data exchange; and questioning to capture expert insights on considerations and requirements for student data exchange. Typically, a Likert scale was used when capturing expert recommendations and opinions.

Originally, the research plan involved restricting the survey to distribution within BC only; however, the existence of the *ARUCC Groningen Project* and the Ontario project presented an opportunity for inter-jurisdictional benchmarking. The primary investigator secured agreement from the partners across all three projects to distribute the survey nationally and share findings, a decision that was transparently

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[26] The research scope included post-secondary institutions and applications centres/data hubs that provide most of the student data exchange support in Canada; vendors, governments in most jurisdictions, and secondary schools/boards were out of scope.
[27] https://www.mphec.ca/
[28] https://www.cicic.ca/
[29] https://www.cicic.ca/1398/an_overview_of_the_lisbon_recognition_convention.canada
[30] https://en.unesco.org/themes/higher-education/recognition-qualifications/global-convention

messaged to potential respondents in advance. This approach minimized the number of surveys in the field requesting the same information at the same time.

Originally, the plan was to distribute the survey in fall 2018 over an eight-week period (October to November); however, consultation with the partners suggested a longer distribution would be appropriate to provide more time for institutional representatives to complete the survey. Early consultation suggested a summer launch might be more timely and easier for institutional representatives to accommodate. Therefore, the primary investigator opened the survey in mid-summer. Ultimately, this approach did not prove beneficial due to vacations and institutional workload demands impacting the September start of classes. The project partners and leadership agreed to keep the survey open until the beginning of December 2018 to accommodate a longer window of opportunity for institutions and allied organizations to respond.

The survey was distributed to BC college and university registrars directly and ARUCC registrarial members via the national ARUCC listserv. Recommended participants included those with expertise in registrarial systems, information technology, and student data exchange. Supplemental distribution occurred to institutions through registrarial association listservs from across Canada.[31] In addition, the researcher sent email invitations to representatives of supporting organizations and through the listserv of the Canadian Postsecondary Electronic Standards User Group (CanPESC),[32] which maintains membership from post-secondary institutions, allied organizations, provincial governments, and vendors involved in student data exchange. Appendix D provides a list of organizations contacted along with the post-secondary institutions. Three formal reminders were distributed through the same listservs. Potential post-secondary respondents were encouraged to participate in the survey at various pan-provincial and national meetings.

Material distributed with the survey included a bilingual word version to reduce the number of people accessing the survey to print out an advance copy, links to a website with more information on the project,[33] a supplementary document which provided further details about the project and how the results would be used,[34] and a contact person for any questions. Although more findings are shared in a subsequent section, a total of 117 respondents participated in the survey.

2.5   Qualitative Interviews and Regional Feedback Sessions

In total, the primary investigator interviewed 40 representatives of higher education organizations and students in fall 2018 for this research. These included 31 qualitative interviews with representatives from ten colleges and nine universities in British Columbia, Alberta, and Ontario[35] (Appendix A), ten supporting organizations from across Canada (Appendix B),[36] and nine students, one of whom

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[31] Specifically, the invitation for registrars was distributed to colleges, institutes, and universities with membership in ARUCC and/or the Western Association of the Universities and Colleges of Canada (WARUCC), the British Columbia Registrars' Association (BCRA), the Alberta Registrars' Association, the Ontario University Registrars' Association (OURA), the Ontario College Committee of Registrars, Admissions, and Liaison Officers (CRALO), the Quebec Bureau de coopération interuniversitaire (BCI), and the Atlantic Association of Registrars and Admissions Officers (AARAO).

[32] http://www.pesc.org/canadian-pesc-user-group.html

[33] http://arucc.ca/en/oncat-bccat-projects.html

[34] For Ontario:
http://arucc.ca/uploads/ONCAT_and_BCCAT_Projects/ONCAT_Funded_Data_Project_Overview_for_website_July_13_2018.pdf
For BC:
http://arucc.ca/uploads/ONCAT_and_BCCAT_Projects/Proposal_BCCAT_Research_Study_for_sharing_with_others_July_16_2018_REVISED.pdf

[35] An Alberta college, Medicine Hat College, also requested to participate in the interview process.

[36] Three separate individual interviews occurred for NBCAT as the leadership at that organization is exploring creation of an application centre and a transcript exchange.

represented a national student association and two of whom represented Ontario student associations. Nine of these interviews included six colleges and universities from BC, EducationPlannerBC, BCCAT, and the BC Ministry of Education. The balance of the remaining interviews occurred with institutions and organizations outside of BC.

Initial consultation occurred with BCCAT and the University of Victoria (the project partner) to determine which institutions to interview in BC. Adjustments occurred to the original list given institutional schedules and capacity to participate. The final six BC institutions interviewed represent the diversity that exists in the province across several dimensions: location, institution type, sector affiliations, program and credential mix, enrolment size, and linguistic focus (Figure 4, Appendix A).

The consultation research also included conducting 11 inter-organizational regional meetings with 231 representatives from recognized post-secondary institutions and allied organizations in Ontario and BC (Appendix C). Individual participants in the regional meetings typically included registrarial, pathway, and systems/data exchange experts from institutional Registrars' Offices and information technology departments, and from provincial application centres. The regional meeting in BC was with the British Columbia Registrars' Association (BCRA). All institutions were in attendance except one.

The report highlights the thematic findings from the interviews with inter-jurisdictional contrasts identified where appropriate.

2.5.1   Qualitative Interviews with Institutions and Supporting Organizations

The interviews each took approximately 1 to 1.5 hours and were conducted using a virtual teleconferencing platform called *Zoom.*[37] The communication process for the interviews included advance email distribution of the invitation and the interview guide, which went to the registrar or lead for each institution or organization. The guide provided an overview of the project and the interview questions. If a survey response existed for the institution or organization, the primary investigator provided the responses in advance of the interview. The communications messaging also identified the intention to share the findings across the three projects. In addition, the primary investigator created and shared websites with additional information about the *ARUCC Groningen Project*[38] and the two ONCAT and BCCAT projects.[39]

After sending the original invitation, the primary investigator contacted each institutional registrar or organizational lead to schedule an interview opportunity. They were encouraged to include faculty and staff from across their organization with expertise in student data exchange and transfer. Most participants included registrarial and information technology staff. Requests for interview opportunities were also made at provincial and national meetings such as at the BCRA meeting and CanPESC.

The interviews followed a structured format in terms of moving through the questions in the interview guide. However, the primary investigator provided unstructured opportunities through open ended questioning to allow participants to explain their local context more fully.

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[37] https://zoom.us/
[38] http://arucc.ca/en/projects/task-force-groningen.html
[39] http://arucc.ca/en/oncat-bccat-projects.html
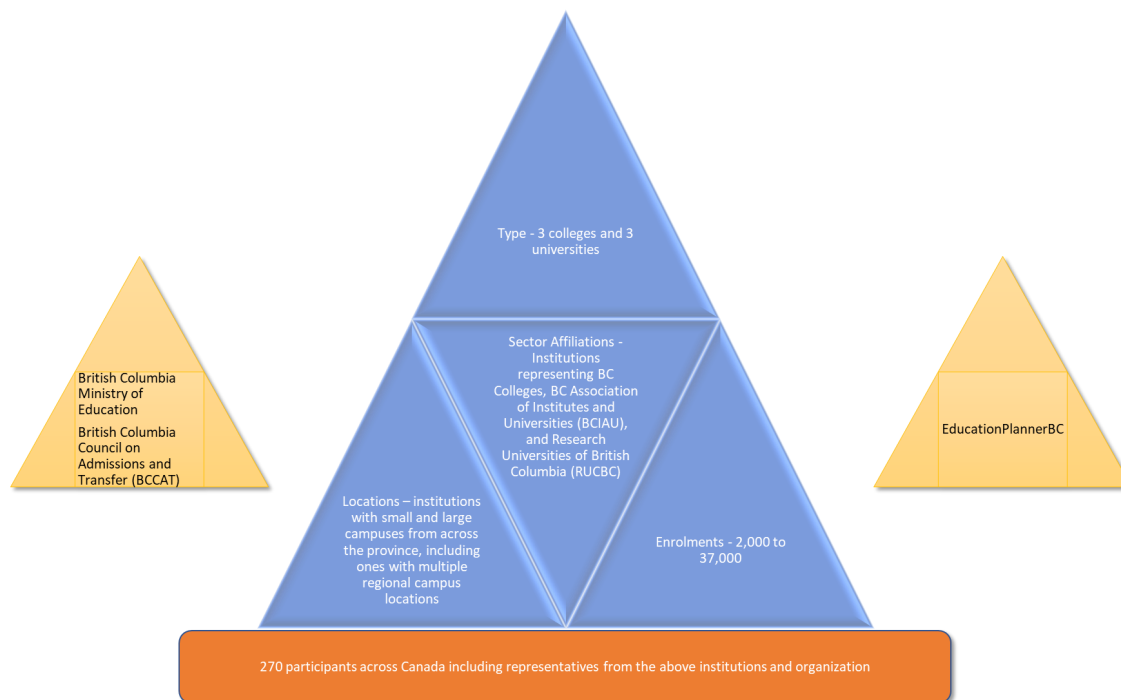
2.5.2 Qualitative Interviews with Students

Originally, the research plan and scope did not include conducting interviews with students. With the support of ONCAT and two institutions out west (University of Victoria and the University of Regina), the primary investigator spoke with nine students, three of whom participated as a formal representative of their student association; namely, the Ontario Undergraduate Student Alliance (OUSA), the Ontario College Student Alliance, and the Canadian Federation of Students (CFS). The institutions and ONCAT handled the outreach and scheduling of these discussions. At no point was the researcher provided their personal information. All participation was voluntary. The invitation to students included an overview of the project with a link to further information.

At the start of each discussion, the primary investigator explained how the information that they provided would be used which included a commitment to only provide thematic feedback in the final published report. They were discouraged from sharing confidential personal information and instead asked to provide thoughts on what they or their constituents felt worked or did not work with the sharing of student data between institutions when transferring and what they would recommend be a focus for future changes.

The students participated in a group setting either in person or virtually using *Zoom*. The format was structured and included an explanation of the project and how the information provided would be used followed by questions regarding their perspective on the operational aspects of the transfer experience. They were asked to share their thoughts on accessing official academic documents when applying into or transferring schools, what were the typical challenges, and what they would suggest required change. In the case of the group session with the three student groups, the researcher asked what they have heard or researched regarding the document exchange barriers affecting successful transfer and what they would recommend be changed as the issues related to document submission hurdles. Each session took approximately 45 minutes.

2.5.3   Regional Meetings

The BCRA meeting in fall 2018 represented one of 11 inter-organizational regional meetings; as such, ten of these occurred outside of BC. All occurred between September 2018 and January 2019 and involved a total of 231 people (Appendix C). Registrarial, pathway, and systems experts from BC and other Canadian institutions, organizations, and government bodies attended these discussions. Most of these sessions occurred in person with the location arranged by a local institutional registrarial lead. The registrars at the University of Victoria and Vancouver Island University and Dr. Robert Adamoski from BCCAT, supported the opportunity for the primary investigator to capture input at the BCRA.

Seven of these meetings were scheduled solely for the project and four opportunities resulted from accessing time on existing agendas of pan-provincial meetings or conferences, such as at the BCRA meeting.[40] For the former, advance communication included a formal agenda, an overview abstract of the project, a presentation, and links to the project website.[41] The invitation for each of these meetings went to the local area registrars with a request to invite faculty and staff with expertise in student data exchange and transfer. The presentation was used in the BCRA meeting.

Those sessions exclusively focused on the project were typically 2 to 2.5 hours in length. The format included an overview of the project, a facilitated opportunity to provide expert advice on current challenges and requirements, and a needs identification and prioritization discussion. The latter provided individual participants with the opportunity to identify their top recommended business needs, which were then reviewed, privately prioritized, and discussed by the group. This approach facilitated a private opportunity for reflection followed by an opportunity as a collective to discuss and validate or discount any thematic business needs and to articulate other potential gaps.

In the remaining meetings where the primary investigator secured space on existing agendas, the format included providing an overview of the project and having an open discussion about thematic challenges, opportunities, and business needs.

The primary investigator led most of these feedback opportunities. In three instances, Charmaine Hack, chair of the ARUCC Groningen Project Steering Committee, or Romesh Vadivel, current ARUCC president (2018-2020) helped lead the sessions. Dr. Robert Adamoski co-presented and co-facilitated the BCRA meeting.

2.6   Data Limitations

The registrarial leaders invited to respond to the survey and to participate in the interviews and regional meetings were encouraged to include faculty and staff from across their institution with expertise in student data exchange. In most of the interviews and regional meetings, the participants included registrarial and systems staff. Only one regional meeting included faculty. This likely resulted from relying primarily on registrarial and CanPESC listservs for participation. Also, some registrarial leadership anecdotally indicated that they worked with their technical IT staff to complete the survey results and made a collaborative submission. While these approaches satisfied the objectives of this research, next steps for examining data exchange would benefit from more engagement from system design architects and data security specialists and possibly faculty.

The survey allowed for more than one response per institution. This worked well for capturing opinions and recommendations; however, not always for identifying current practices as a small subset of institutional respondents at the same institution provided contradictory responses for this information.

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[40] Specifically, these included the fall meetings of the Ontario University Council on Admissions, the Ontario University Registrars' Forum, and the BC Registrars' Association, and the Ontario colleges' fall conference.
[41] http://arucc.ca/en/oncat-bccat-projects.html

The primary investigator excluded these responses during the data analysis process to ensure a clear understanding of current practice. Limiting the number of organizational respondents or encouraging advance collaboration on responses for information on current practices would be a recommended tactic for future surveys.

Some of the regional consultation opportunities that occurred as a result of accessing space on existing province wide meetings or conferences provided somewhat limited insights for the project. Meeting privately in focused regional meetings or directly with registrars was more helpful to this research. Future consultation on projects focused on data exchange would benefit from using a similarly focused consultation tactic.

With respect to the interviews and regional meetings, most of the discussion and feedback focused on strategic and operational level considerations and needs, not technical requirements. This outcome worked well for this research as the scope did not include capturing a detailed understanding of data exchange architectures and integration practices. As noted above, a more technical analysis would be an appropriate next step for future research to support implementation. The national consultation for the *ARUCC Groningen Project* illustrates the value of this approach.

Subsequent to completion of the primary research phase and aided by the primary investigator for this project, the *ARUCC Groningen Project* established a national technical advisory committee with information technology, data security, and system design experts from Canadian post-secondary institutions.[42] The mandate of this group included creating the technical requirements for the national network.[43] Their knowledge of detailed use case mapping, information flows, data exchange, and data security suggests that further detailed research and consultation of a technical nature remains an ongoing necessity to support implementation of a national network for the post-secondary community and application centres.

Those consulted for this study provided insights and information that supported achieving the objectives of this research. Further detailed research and consultation of a technical nature would be necessary to support implementation of a national network for the post-secondary community and application centres.

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[42] http://arucc.ca/en/project-governance.html

[43]

http://arucc.ca/uploads/Groningen/Groningen_2019/Governance_Page/TAC__Terms_of_Reference_TAC_as_of_Jan_25_2019.pdf

2.7   Definitions

Apostille: a 'legal certification that makes a document from one country valid in another (provided that both are signatories to the 1961 Hague Convention Abolishing the Requirement for Legalization for Foreign Public Documents' (Oxford Dictionnaries, 2019). Currently, Canada is not a signatory to the Hague; however, the government provides protocols for establishing the authenticity of documents, including for post-secondary documents (Government of Canada, 2017). Applying the signature of the registrar to a transcript is one example.

Application Centre or Data Hub: a global reference used in the report to encompass the 11 provincial organizations that centralize some aspect of data collection and exchange as a support to post-secondary studies or transition beyond secondary school for admissions. See Appendix B for a list of organizations.

Application Programming Intervals (APIs): routines, protocols, and tools to allow sharing of data between software that allow standardized information flow (without modifying original content) and communication between different components (MIT Libraries, n.d.).

Digital Signature: 'a mathematical scheme for demonstrating the authenticity of digital messages or documents. A valid digital signature gives a recipient reason to believe that the message was created by a known sender (authentication), that the sender cannot deny having sent the message (non-repudiation), and that the message was not altered in transit (integrity)' (Chakroun & Keevy, 2018).

Electronic Data Interchange (EDI): 'provides a technical basis for automated commercial 'conversations' between two entities, either internal or external. The term EDI encompasses the entire electronic data interchange process, including the transmission, message flow, document format, and software used to interpret the documents' (Chakroun & Keevy, 2018).

Endpoints: 'any piece of computer hardware with an internet connection….[e.g.,] desktop computers, laptop computers, tablets, smartphones, and other devices' (National Student Clearinghouse, Educause, REN-ISAC, 2018).

Extensible Markup Language (XML) Standard: 'a flexible way to create information formats and electronically share structured data via the public network, as well as via corporate network…the PESC XML-based data standard for *Common Credential for Certificates, Degrees and Diplomas* is an example of a standard that is designed for both electronic certification production and recording credential learning records' (Chakroun & Keevy, 2018)**.**

Flat File Format: data stored in a single table following a uniform format; it does not provide relational capacity. Example: Comma Separated Values (CSV) File

Metadata: provides information (in the form of data) about other data being sent to support sharing of digitized credentials. Providing information about the type of file and content being sent represents an example.

Multifactor Authentication: a system that relies on more than one layer of security to authenticate a user (National Student Clearinghouse, Educause, REN-ISAC, 2018).

Official: in the context of this research, it represents a document that is confirmed as authentic by the institutional registrar. Typically, a document is considered official when it is provided by the registrar directly to the requestor without being passed to a student (with a student's permission provided).

Portable Data Format (PDF): 'a document independently of the hardware, operating system and application software used to create the original file. It was designed to create transferable documents that can be shared across multiple computer platforms' [sic] (Chakroun & Keevy, 2018). Adobe documents represent a form of PDF.

Recognized Institution: an institution that has met the quality assurance standards in its respective jurisdiction. For Canada, it refers to Canadian institutions that are recognized in accordance with the quality assurance protocols within their province or territory as there is no national quality assurance agency.

Student: institutions define *students* differently and in accordance with local context. For the *ARUCC Groningen Project*, this research, and the national network, a *student* includes an individual who meets at least one of the following criteria:

1. has applied to a Canadian post-secondary institution either directly or through a provincial application centre;
2. has been admitted to a Canadian post-secondary institution;
3. has completed a credential at a Canadian post-secondary institution;
4. is currently enrolled in a Canadian post-secondary institution;
5. was once enrolled in a Canadian post-secondary institution.

Supporting Organizations: a global reference used in this report to encompass the provincial application centres, data hubs, and councils of articulation/admissions and transfer.

Trusted International Organizations: in the context of this research, refers to recognized institutions, government mandated organizations, or organizations designated by recognized institutions or government in their home country as the official source for students' credentials. These organizations are formally designated by the institutions and/or governments in their regions as being the official source when validating the bone fides of official academic documents for the purposes of post-secondary admission. In the context of this research and the national project, recruitment agents are not categorized within the definition of *trusted organizations*.

Use Case: a list of actions or event steps typically defining the interactions between a role and a system to achieve a goal.[44]

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[44] https://en.wikipedia.org/wiki/Use_case

3.0 Environmental Scan

This section replicates that of the Ontario report with appropriate modifications relevant to the BC specific research.

The environmental scan contextually situates the current state of student data exchange and facilitates identification of exemplars in and beyond Canada. The primary approach taken for this research included a review of relevant literature, websites, white papers, and other research published by vendors, higher education organizations and leaders, and scholars. The qualitative interviews helped to augment these findings. Each of the following topics is briefly explored in this Section.

- Stakeholders
- Increasing needs
- National connectivity
- Privacy regulations
- Document fraud
- Data security
- Data exchange models

3.1 Stakeholders

Various organizations and vendors provide extensive expertise in partnership with post-secondary institutions to advance student transfer, mobility, and data portability. Although listing all the organizations involved in student data exchange sits outside the scope of this research, Figure 5 highlights the main Canadian and select international ones relevant for BC post-secondary institutions, the *ARUCC Groningen Project*, and the national student data exchange network.[45]

Figure 5: Overview of Main Organizations involved in Student Data Exchange for Canada

Provincially
- Post-secondary institutions
  - Registrars
  - Chief Information Officers
- Application Centres – e.g., OUAC, OCAS Inc., EducationPlannerBC, etc.
- Transfer organizations – e.g., ONCAT, BCCAT, etc.
- Secondary Schools/School Boards
- Government
- Other third-party entities (e.g., vendors, other associations, etc.)

Nationally
- Association of Registrars of the Universities and Colleges of Canada (ARUCC)
- Pan-Canadian Consortium on Admissions and Transfer (PCCAT)
- Canadian University Council of Chief Information Officers (no national body exists for college CIOs)
- Canadian Post-secondary Electronic Standards Council User Group (CanPESC)
- Canadian Information Centre for International Credentials, Council of Ministers of Education, Canada (CICIC, CMEC)
- Government
- Other third-party entities (e.g., vendors, other associations, etc.)

Internationally
- Groningen Declaration Network (GDN)
- Post-secondary Electronic Standards Council (PESC)
- Other third-party entities (e.g., vendors, other associations, etc.)

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[45] See Appendix D for further details on the Canadian organizations involved in data exchange.

3.1.1   BC Stakeholders

In BC and at the time of this research, 35 privately and publicly funded post-secondary institutions were members of the BCCAT transfer system. This total includes Athabasca University and Yukon College which are also members of the BC transfer system. Subsequent to completion of the research, another privately funded institution joined the BCCAT transfer system. One application service provider, EducationPlannerBC, and the BC Ministry of Education directly support student data exchange. EducationPlannerBC supports intra-provincial application and transcript data exchange for BC's post-secondary institutions as these tasks relate to admissions processing. The Ministry holds the high school credential depository and handles the distribution of high school transcripts. These and BCCAT represent the main organizations consulted for this BC focused research.[46]

The provincial government receives admissions, registration, and graduation information from the post-secondary institutions to support a host of purposes including planning for and allocating public funds; supporting post-secondary education and related programs; ensuring legislative compliance; risk management; monitoring and evaluating quality; and conducting research. It further delivers the government financial aid program in partnership with the post-secondary institutions. Extensive student data exchange exists between the post-secondary institutions and the provincial government to support administration of this program. As the research focused on the exchange of academic documents, examining these areas remained out of scope for this research.

The findings suggest a subset of post-secondary institutions rely on vendors to support certain functions such as credential verification and outbound transcript/diploma distribution. Most BC institutions rely on vendors for their student information systems; these systems typically provide capacity for data exchange. Assessing the various vendor systems remained out of scope for this research; however, they represent important contributing members to the student data exchange discussions both as experts and enablers. They are a source of support, information, and guidance, and provide manuals, service announcements, white papers, and instructional and promotional pieces to support system integration, system design, software and hardware implementation, data exchange, and more.

3.1.2   National and International Stakeholders

Prior research conducted by ARUCC suggests the involvement of four main organizations in post-secondary student data exchange in Canada (ARUCC, 2018):[47] post-secondary institutions (approximately 237 of which 204 are publicly funded, plus the 48 CEGEPs in Quebec), centralized application centres (7), provincial government student data exchange hubs (two in British Columbia and Saskatchewan), and other supporting organizations (i.e., the Nova Scotia Council on Articulation and Council - NSCAT[48] and the Québec Bureau de coopération interuniversitaire - BCI) (Appendix B). Secondary schools/boards, regulatory bodies, provincial and federal governments, and other third-party organizations (e.g., vendors) support post-secondary student data exchange as well.

Six of the seven Canadian councils on articulation/admissions and transfer typically only share anonymized student data to advance research (including BCCAT); however, they serve an important role to improve transfer supports and ensure provincial and national focus and research on student transfer and mobility within and beyond regional boundaries. As with this study, any future research and data exchange initiatives would benefit from the involvement and engagement of these partners.

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[46] Other organizations engage in student data exchange in BC including the trades and regulatory bodies, government, and others. These organizations were outside of scope for this project and represent areas of further research.

[47] http://arucc.ca/en/project-overview.html

[48] https://www.mynsfuture.ca/

Most of the application centres and hubs collect data and documents and exchange transcripts to support admissions into post-secondary institutions within their region. The two government bodies in BC and Saskatchewan provide official secondary school transcripts, amongst other supports. The Nova Scotia Council on Articulation and Transfer (NSCAT) oversees a transcript exchange network in addition to providing other supports.[49] The Québec Bureau de coopération interuniversitaire (BCI) provides an exchange service to support university students wishing to take a course at another post-secondary institution in that province.[50] It also facilitates sending CEGEP results to OUAC.[51] Including the application centres in future data exchange implementation would be advisable given the supports they provide post-secondary institutions.

At the national and international levels, two organizations directly support data exchange - the Post-Secondary Electronic Standards Council and its Canadian working group, the Canadian Post-Secondary Electronic Standards Council User Group (CanPESC). CanPESC is represented on the *ARUCC Groningen Project* steering committee and the project's technical advisory committee. A PESC member also sits on the latter group. These two organizations collaborate with post-secondary institutions, vendors, and other organizations to create open source standards as a support to student data portability to ensure rigour within and between data exchange formats. As one example, PESC provides a change protocol for streamlining any needed advancements or changes to data exchange formats.[52] PESC also provides protocols to facilitate exchange between standards such as for supporting PDF (Portable Document Format) exchange that includes XML transmission of the underlying data.[53] This support is important as the findings in the next section demonstrate that several institutions across Canada use more than one method (i.e., XML, EDI, Flat Files, and PDF) to exchange academic documents when they are able to exchange electronically. The application centres and post-secondary institutions within Canada are active participants in PESC. Ensuring engagement with and adoption of PESC data exchange standards would make sense for the national network.

Any future research and data exchange initiatives would benefit from the involvement and engagement of the councils on admissions/articulation and transfer and the provincial application centres including EducationPlannerBC given the supports they provide post-secondary institutions. Ensuring engagement with and adoption of PESC data exchange standards by BC post-secondary institutions would be helpful for implementation of the National Network.

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[49] In subsequent sections, NSCAT and BCI are included in the count for application centres and hubs although they aren't considered *hubs*.

[50] https://mobilite-cours.crepuq.qc.ca/4DSTATIC/ENAccueil.html

[51] https://www.ouac.on.ca/guide/105-transcripts/#quebec

[52] https://www.pesc.org/standards-development-1.html

[53] https://www.pesc.org/pesc-approved-standards.html

The international context is informed by the work of the Groningen Declaration Network (GDN), a Netherlands trust that is focused on data portability and digitization to enhance student mobility.[54] It brings together representatives from around the world who seek to support this effort and serves as the initial inspiration for the *ARUCC Groningen Project*. ARUCC and the Pan-Canadian Consortium on Admissions and Transfer (PCCAT) of which BCCAT is a member, are formal signatories to the GDN.

The Canadian Information Centre for International Credentials (CICIC) of the Councils of Ministers of Education, Canada (CMEC) [55] is supporting similar efforts internationally as the GDN but with a focus on policy and quality assured practices such as are embodied in the new *Global Convention*, which seeks to bring together the many regional conventions supporting student mobility such as the *Lisbon Recognition Convention* (LRC).[56] The *Global Convention* aspires to stretch across all country boundaries as it focuses on implementing the *UNESCO Sustainable Development Goals* (Canadian Information Centre for International Credentials, 1990-2019).[57] Of relevance to this project is Goal #4 which focuses on the quality of higher education. The *Global Convention* seeks to cooperatively recognize and support student mobility and the right of academic credential recognition and recognition consistency. While it remains to be seen what will emerge of specific relevance to the post-secondary institutions or the national network, digitization represents an aspect of the discussions. As an example, UNESCO is working collaboratively with other organizations to create a vision for an international standard for electronically documenting, authenticating, and sharing a person's learning in a way that is understandable, supported by broad access (i.e., '*at anytime and anywhere'),* and shared in a manner that still allows amendments by the individual document owner and/or the authorized party (Chakroun & Keevy, 2018, p. 34). Transcripts represents one document type impacted by this vision. Other potential documents could include ones like credentials which articulate learning outcomes achieved or the new *European Qualifications Passport for Refugees*, a document which recognizes prior academic and vocational learning in the absence of official documents.[58] While a full discussion of these topics falls outside of the scope of this paper, the context remains important for Canadian post-secondary institutions contemplating participation in a national data exchange network.

Improving transcript exchange represents one area of focus. Other potential documents to exchange could include credentials that articulate learning outcomes achieved or the new European Qualifications Passport for Refugees, a document which recognizes prior academic and vocational learning in the absence of official documents.

Of relevance to this research and the *ARUCC Groningen Project* is the US-based National Student Clearinghouse (the *Clearinghouse*). According to its website, the *Clearinghouse* provides data exchange, official verification, research services, and other supports for 3,600 post-secondary institutions and 12,200 participating high schools in the United States.[59] Participants in the research process for this project noted the *Clearinghouse* and referenced it as an exemplar model for the *ARUCC Groningen*

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[54] https://www.groningendeclaration.org/
[55] https://www.cicic.ca/
[56] The LRC is ratified by the Canadian government – See
https://www.cicic.ca/1409/unesco_global_convention_on_the_recognition_of_higher_education_qualifications.canada
[57] https://en.unesco.org/sdgs
[58] "*a document providing an assessment of the higher education qualifications based on available documentation and a structured interview. It also presents information on the applicant's work experience and language proficiency. The document provides reliable information for integration and progression towards employment and admission to further studies.
It is a specially developed assessment scheme for refugees, even for those who cannot fully document their qualifications.*" [sic]
https://www.coe.int/en/web/education/recognition-of-refugees-qualifications
[59] https://studentclearinghouse.org/about/

Project given its supports for official student data exchange and its broad mandate which includes research.

3.2 Increasing Needs

Further developing the data exchange infrastructure in Canada to better support increasing volumes of students remains an important consideration. The research consultation process found indications of growing volumes on two fronts:

- Incoming students who bring with them academic documents requiring official validation from the originating institution or organization before Canadian post-secondary institutions would approve admissions and/or transfer credit (e.g., for transcripts and language test results);
- Outgoing document validation requests for other third parties that require official verification.[60]

As the findings in the subsequent sections of the report demonstrate, most although not all institutions handle many of these activities manually.

Much of the incoming document volumes likely result from institutional admission standards and the need to ensure a strong fit between students and the academic programs in which they are interested to ensure success. Both areas may also result from growing concerns regarding document fraud. Regardless of reason, the demands are placing increasing pressures on Canadian post-secondary institutions as many are receiving paper transcripts, particularly for out-of-province and international students, and formally and officially validating outgoing admission offers and confirmations of status originally shared directly with students. Trust represents a significant issue.

Post-secondary institutional representatives indicated systematic tracking of these document exchange transactions does not exist, which impedes trend analysis. This data gap matches previous BC focused research, which examined international document processing practices for transfer and exchange (Duklas, January 2019). Therefore, three areas are used in this research to provide proxy indicators of the growth and volume: international post-secondary study permits, Registered Education Savings Plans (RESPs), and graduation rates. The findings demonstrate the significant volumes that are impacting institutions and the implications for student service.

Although briefly addressed below, inter-provincial student transfer volume does not appear to be a significant driver although comprehensive data for examining this area are limited. This represents a focus for future research.

3.2.1 Incoming and Outgoing Document Validation Example: International Students

3.2.1.1 *Incoming:*

Canadian institutions including those in BC require international applicants to submit various academic and supporting documents to support the admissions and transfer assessment processes, including transcripts and course outlines for those with prior post-secondary studies. Official language proficiency test results or other test results (e.g., LSAT, GMAT, etc.) may also be required. Institutions need official validation of these documents from the originating institutions and testing organizations. If admitted,

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[60] *Official confirmations of student status* in this context refers to requests by third parties for confirmation directly from the Registrar rather than via a student. Third parties include other post-secondary institutions, regulatory bodies, trades associations, government, employers, banks, health care providers, and others. Outgoing document validation requests are resulting in high volumes of requests to formally and officially confirm offers of admission, enrolment, fees paid, pending graduation, and graduation.

institutions send students offers of admission. As these are sent directly to the students, third-party organizations, including government, contact institutions to officially verify these documents.

The Canadian government issued 491,070 post-secondary study permits in 2018 versus 333,645 in 2015, which represents a 47% increase.[61] Most of these students came from China and India.

According to the consultation both in BC and across Canada, the academic credentials for these students typically arrive as paper documents; some arrive as PDFs which lack machine-readable data.[62] Most require manual handling during the admissions and transfer credit assessment processes. Previous research for ARUCC conducted by this project's research group indicates several international organizations across the world exist and are well positioned to become trusted providers of official electronic academic credentials to Canadian post-secondary institutions to ease this manual processing and speed up service for students.[63]

3.2.1.2   Outgoing:
Due to fraud and other concerns, the above volumes are also driving requests from the federal government to post-secondary institutions to officially validate offers of admission and enrolment for international students. Institutions reported time consuming requests to manually vet lists of students with study permits to validate their subsequent enrolment. Most indicated a desire to find a more sustainable, trusted, and efficient method to address these types of requests.

3.2.2   Outgoing Document Validation Example: Confirmation of Student Status for Registered Education Savings Plans (RESPs)
While not a transfer issue, confirmations of student status to satisfy requests from other third parties such as to access funding from Registered Education Savings Plans (RESPs) represent a form of outgoing documentation validation. The findings indicate these growing requests are eroding registrarial ability to support other areas of the operation. Creating a national data exchange network holds the promise to further streamline the student support framework, thereby freeing up staff resources to provide more value-added services to transfer students.

As an illustrative example, RESP beneficiaries have grown from a population of 53 students when the program first began to over 430,000 in the past twenty years.[64] The program is projected to continue growing. RESP providers usually require post-secondary students prove they are accepted and enrolled at an institution before allowing funds to be withdrawn. Other scholarship organizations typically maintain similar requirements. Some Canadian institutions provide online capacity for students to download the enrolment confirmation letters which are auto populated with information; however, the research indicates these are in the minority and, at times, not accepted without other customizations. Most Canadian post-secondary institutions manually write unique letters for these kinds of outgoing document validation requests - a resource-intensive, cumbersome process that causes delays for students.

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[61] Source for study permit data: Immigration, Refugees and Citizenship Canada, https://open.canada.ca/data/en/dataset/90115b00-f9b8-49e8-afa3-b4cff8facaee - Retrieved spring 2019 – Note: data changes as these are updated monthly.
[62] LSAT, GMAT, International Baccalaureate, and TOEFL represent examples where it is possible to access these results electronically. As an example, the Ontario Universities' Application Centre (OUAC) accesses LSAT scores and others from American testing organizations.
[63] See *A Sample of National Level Student Data Exchange and Validation Services* at http://arucc.ca/en/project-overview.html
[64] Source for RESP data: https://www.canada.ca/en/employment-social-development/corporate/reports/evaluations/2015-canada-education-savings-program.html

3.2.3 Outgoing Document Validation Example: Confirmation of Graduation Status

Another form of outgoing document validation occurs upon pending or actual graduation. Most students will be required at some point (and often more than once) to provide official proof they have graduated from their former institution. For example, if a university graduate wishes to study in a graduate diploma program in a college, official proof of graduation is usually required at some point in the process. Students and post-secondary institutions also need to provide similar types of proof to funding bodies, trades associations, regulatory bodies, prospective employers, and other third parties. The research supporting the national project indicates other options exist for more streamlined, official credential verification services which the national network aims to access.[65]

As graduation rates increase, more streamlined services will enhance efficiencies for students, post-secondary institutions, and potential employers. Furthermore, efficiently supporting graduates with official credential verification and electronic transcript transmission remains essential to ease their transition into other institutions and the workplace.

3.2.4 Inter-Provincial Student Transfer Trends

Gaps in national inter-provincial student transfer data present challenges when attempting to analyze post-secondary mobility trends. A few indicators from other research provide proxy indicators of the volume and need.

- BC conducted an analysis of BC grade 12 secondary school students from 2002/03 to 2007/08 as part of the *Student Transitions Project* to determine where they completed their post-secondary studies (Heslop, 2010). The findings demonstrate that most of those who moved outside of BC for further academic studies went to post-secondary institutions in Alberta (32%) and Ontario (31%) with the balance heading to post-secondary institutions outside of Canada (20%) or to other provinces (7%).
- Universities Canada reports that 1 in 10 students study at a Canadian university outside their home province (Universities Canada, n.d.).
- The Maritime Provinces Higher Education Commission (MPHEC) conducted an inter-provincial analysis of new students transferring into the Maritimes from other provinces (2013).[66] It found students transferred into the Maritimes from almost every college and university in Canada (i.e., over 200) and from post-secondary institutions in 76 other countries. The diversity is extraordinary and likely replicated in other jurisdictions. Thirty-nine percent of the transfers came from other Canadian institutions with most coming from Ontario (15%). For the cohort years studied, Canadian university and college transfers represented 56% and 23% respectively of this overall pool.
- In another separate trend analysis, MPHEC reported that 10,564 Canadians moved to New Brunswick, Nova Scotia, and Prince Edward Island for post-secondary study, representing a 4.9% increase over the last ten years (2019). This is a somewhat significant volume for that region given the small number of institutions, although there have been declines in recent years (i.e., -3.3% from the prior year).
- A national study led by PCCAT compared inter-provincial mobility from 2007/08 to 2009/10 and found small numbers of students moving across provincial boundaries (Heath, 2012).
- Burbidge and Finnie examined inter-provincial mobility for baccalaureate-level university students and found overall mobility rates for Canada were initially 6.3%, 7.0%, and 6.5% for

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[65] http://arucc.ca/en/project-overview.html

[66] This study focused on a student cohort enrolled in ten Maritime universities from 2006 to 2009. See http://www.mphec.ca/resources/TrendsV10N1_2013.pdf

three separate student cohorts, 1982, 1986, and 1990 (2000). They further found that those who moved tended to choose nearby provinces with Nova Scotia and Ontario being destination regions for those that moved farther away from home.

- While not a Canadian example, a recent report published by the non-profit National Student Clearinghouse (the *Clearinghouse*) in the United States found a 38% transfer and mobility rate for first-time students who started in post-secondary in fall 2011 (i.e., two out of five who began that fall had enrolled in more than one institution within six years of starting in post-secondary prior to earning their first degree) (Shapiro, et al., 2018, July).

It would be helpful for this research, the *ARUCC Groningen Project*, and other research and policy needs related to inter-provincial transfer if a systematic analysis was conducted of national post-secondary student transfer and mobility. In the absence of recent data in this area, the above findings provide indicators of the volume. Many of these mobile students are supported by manual assessment practices in Canadian post-secondary institutions. A national data exchange network would present opportunities to streamline this work and subsequently enhance service to students.

> *A systematic and comprehensive analysis of national and international post-secondary student transfer and mobility rates would be helpful research to inform future implementation of the National Network and policy development more generally. Such analysis would provide a more comprehensive understanding of student service gaps and the volumes impacting post-secondary institutions in BC and across Canada. A National Network, once in place, may help to close this data gap.*

3.3   National Connectivity

Previous ARUCC research,[67] interviews, and website research highlight the student data exchange strengths and gaps in the different jurisdictions across Canada (Appendix F). Thematically, the research indicates that the following areas require resolution, most of which apply to BC except for *intra*-provincial application and transcript exchange for admissions.

- No electronic exchange of official transcripts offering machine readable data exists with trusted international organizations and institutions in other countries beyond a select few institutions.
- No inter-provincial electronic exchange of official transcripts with machine-readable data exists in any province or territory except on a limited basis in Ontario (OUAC is exchanging with 11 institutions in various provinces and with two BC institutions through EducationPlannerBC), and between Québec and OUAC and La Cité for CEGEP results.
- No member-led capacity at the provincial or national levels exists to officially and electronically confirm a student's current or former status.[68] Examples of documents affected by this and dealt with manually in most instances include confirmations of offer, enrolment (full/part-time students), fees paid, pending graduation, and graduation.

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[67] http://arucc.ca/en/project-overview.html
[68] Select institutions use third-party vendors to support out-bound document and graduation validation; however, this functionality is not universally accessed by all institutions.

- Limited national resources exist to support admissions and transfer in various parts of Canada although seven provinces including BC through BCCAT, provide transfer supports including online course equivalency and pathway guides.[69]
- No system-wide intra- or inter-provincial electronic high school or post-secondary transcript exchange offering machine-readable data exists in Manitoba, Newfoundland and Labrador, Northwest Territories, Nunavut, or Prince Edward Island. No post-secondary transcript exchange with machine-readable data exists in Saskatchewan as well.

Section 5.0 provides further findings of gaps which validates much of the above research conducted by ARUCC.

3.4   Overview of Privacy Regulations

The federal and provincial privacy regulations[70] and the *European Union General Data Protection Regulation* (GDPR)[71] establish the regulatory framework for Canadian post-secondary institutions, application centres/data hubs, ARUCC, and the national data exchange network. According to the consultation for this project, organizationally specific data sharing agreements and privacy and consent of use protocols and statements add an additional layer to support transparent and permission-based student data exchange. While a broad analysis of privacy regulations remains outside the scope of this research, identifying the privacy statutes to which BC post-secondary institutions and application centres are subject remains relevant as a newly established national network will need to align to these expectations.

As with the application centres and data hubs operating in other provinces, EducationPlannerBC serves as an exemplar for the national network with respect to how its leadership manages personal information in accordance with the various acts.[72] If EducationPlannerBC becomes a separately incorporated entity, it will be required to follow the federal Personal Information Protection and Electronic Documents Act (PIPEDA).[73] (Its governance status was being reviewed at the time of this research.) Its approach includes publishing an overall privacy statement that, like other application centres, includes the following:

- the information collected (both personal and technical);
- how data is used and where it is disclosed and transferred;
- how personal information is protected and access to personal data supported;
- third-party disclaimers;
- change protocols (including the process for the applicant to follow to change personal information); and,
- who to contact for questions, comments, changes, or complaints.

Typically, the declaration and notice of use presented to applicants by these application centres also requires their formal consent, verification, and agreement which tends to be captured as part of the online application process. A privacy officer contact is provided for those with additional questions.

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[69] ARUCC and PCCAT partnered to create and launch the national transcript and transfer guide, which provides an exemplar model for national tools to support transfer (guide.pccat.arucc.ca).

[70] The federal government links to all the Canadian and provincial privacy regulations at the following URL: https://www.priv.gc.ca/en/privacy-topics/privacy-laws-in-canada/02_05_d_15/

[71] https://ec.europa.eu/info/law/law-topic/data-protection/data-protection-eu_en

[72] EducationplannerBC = https://www.educationplannerbc.ca/content/privacy; ApplyAlberta = https://www.applyalberta.ca/privacy-policy/; MyNSfuture.ca = https://www.mynsfuture.ca/privacy-policy

[73] http://laws-lois.justice.gc.ca/eng/acts/P-8.6/index.html

The European GDPR contains clauses which extend its reach beyond Europe to companies located in other parts of the world who are directly marketing to and capturing personal information from European citizens.[74] The GDPR regulation and its meaning are fully explained on the European Commission's website including what is required in a Notice of Use.[75] It is inappropriate in the context of this paper to provide interpretations of the statute; however, further legal advice would be needed for the national network to better understand its obligations, if any, related to the GDPR as this may impact BC post-secondary institutions and supporting organizations.

Educause, a non-profit organization for higher education information technology staff, provides best practice advice across a range of areas including privacy and data protection. It advises creating data sharing agreements between all partners involved in a student data exchange network to articulate roles, responsibilities and obligations (Educause, n.d.). For BC, that would at minimum mean between EducationPlannerBC and the national network. If any direct connections were established with individual institutions, data sharing agreements would likely be necessary.

> *The national network and its service providers must adhere to the federal and provincial privacy regulations including but not limited to the Freedom of Information and Protection of Privacy Act (FIPPA), The Privacy Act, and the Personal Information Protection and Electronic Documents Act (PIPEDA). Adherence to the European Union General Data Protection Regulation (GDPR) is also likely necessary, where relevant.*

3.5   Fraud and Security

3.5.1   Document and Identity Fraud

It remains difficult to quantify the scope of the post-secondary document fraud challenge in Canada as systematic sector level identification and monitoring does not exist, a situation which is not unusual in other jurisdictions (Tobenkin, 2011). The World Education Services, an international credential evaluation organization, provides further information on the scope of the problem, which demonstrates academic document fraud is not unique to Canadian post-secondary institutions (Trines, 2017). Western Kentucky University, one of the examples cited, de-enrolled 25 of close to 60 students in a recent case due to admissions fraud (Saul, 2016). Potentially increasing examples of document fraud are emerging in Canada (Zavarise, 2018), (Rankin, 2016), (Giles & Craig, 2018). For example, a recent article published by the CBC reports an increase from 10 students submitting fraudulent documents in 2015-16 to close to 50 in 2017-18 at one institution alone (Zavarise, 2018). To put this into perspective, if a university or college uncovered 50 enrolled students who had committed admissions fraud and subsequently de-enrolled them after the drop date, the total annual revenue loss would be close to $1 million.[76]

The nature of the fraud varies from academic transcripts and related documents that are altered or created, fake diplomas, and interpretive translations of existing documents (which sometimes unintentionally misrepresent results) (Adan, n.d.). Furthermore, fraud impacting post-secondary

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[74] https://ec.europa.eu/info/law/law-topic/data-protection/reform/rules-business-and-organisations/application-regulation/who-does-data-protection-law-apply_en

[75] https://ec.europa.eu/info/law/law-topic/data-protection/reform/rules-business-and-organisations/principles-gdpr/what-information-must-be-given-individuals-whose-data-collected_en

[76] Tuition fees vary by institution. This calculation is based on $15,000 undergraduate tuition per year for an international student on study permit. It assumes de-enrolment happened after the start of classes and the tuition deadline. According to the consultation for this research, institutional representatives reported that it is extremely difficult to allocate an enrolment seat to another person after the start of classes and subsequently recoup losses in tuition revenue.

institutions is not limited to education documents but also extends to work permits, bus passes, and more (Schmidt, 2018).

To combat fraud, Immigration, Refugees and Citizenship Canada (IRCC) maintains strict criteria for controlling who may support those wishing to study, work, or live in Canada.[77] According to this research, Canadian post-secondary institutions work closely with IRCC, Canadian Border Services, and others to ensure compliance and reduce academic document fraud.

Document fraud relates to identity fraud in that institutions need to ensure that the person applying, enrolling, and subsequently claiming an academic document as theirs is legitimate. This issue is shared with other industries. A Telus study reported billions of dollars in costs to Canadians due to online fraud and related crimes with a 25% increase in exposed identities in 2015 alone (Canadian Bankers Association, 2018).[78] To address identity fraud, the Canadian Bankers Association (CBA) and its leadership have been advocating for government support to create a *Digital Identity System* (2018). As part of this effort, the CBA is seeking government support for accepting digital identities by using innovative technologies and approaches, including blockchain (Parmenter, 2019).

In the postsecondary sector, fraud represents a growing issue requiring institutional registrarial and information technology departments to carefully manage student identification and authentication processes to ensure safe and secure access to student records and data housed within institutions (Canadian University Council of Chief Information Officers (CUCCIO), n.d.). Many Canadian post-secondary institutions participate in the *Eduroam* network, which allows students, staff, and faculty to access information through a federated framework using institutionally controlled and managed identities and permission capture.[79] As a result, the higher education community maintains access to important information regardless of location. This is one illustrative example of the options available for identity management.

Creating direct, trusted connections for document exchange supported by a robust identity management framework means greater efficiencies and stronger data security for a national student data exchange network. Document and identity fraud mitigation strategies remain critically tied to whatever final solution is chosen for the national network.

3.5.2   Data Security

The participants in the regional meetings and interviews for this project continually raised the issue of data security. This is to be expected as protecting student data represents a critical concern and focus in higher education (Shipley, 2015) (Educause, 2019a). In response to a growing focus on student success, Educause, an American based non-profit organization focused on higher education information technology, is leading the *Student Genome Project* which is concerned with advising institutions across several fronts including data security, ethical data stewardship, interoperability, standards, and data management and governance (2019b). For data security and integration, Educause suggests addressing several areas when expanding connectivity with outside organizations including vendor management, contracts, service level agreements, and data flows and architecture (Gower & Hartman, 2019c). The *ARUCC Groningen Project's* national technical advisory committee of data exchange experts from across Canada represents an example of ensuring this focus. This group is guiding the technical aspects of the

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[77] https://www.canada.ca/en/immigration-refugees-citizenship/services/immigration-citizenship-representative/learn-about-representatives.html
[78] https://www.itworldcanada.com/sponsored/demystifying-digital-identity-a-matter-of-trust
[79] https://www.eduroam.org/about/institutions/

purchase and implementation of the national network. Members of this committee include representatives from BC organizations.[80]

Best practice advice provided by the National Student Clearinghouse, Educause, and REN-ISAC in their report, *Why Cybersecurity Matters* outlines specific suggestions for service contracts for data exchange projects to address these areas (2018). These include developing

- breach notification schedules and incident response plans, defined data access roles, independent security assessments, data sharing notifications, security training expectations, and protocols for addressing security patches;
- a risk identification plan that addresses connection points with accountabilities noted for issue resolution and risk mitigation;
- automated update schedules to address connections at 'Endpoints'; [81] and,
- *multifactor authentication*.[82]

Educause provides a comprehensive tool for assessing vendors' capacities for security and data protection (2019c). While written for the US context, it holds potential for use with the Canadian national network to ensure the data concerns raised by representatives of BC institutions are appropriately addressed.

3.6   Overview of Data Exchange Models

A detailed technical review and summary of data exchange models sits outside the scope of this research; however, a brief overview is provided to illustrate the typology and highlight exemplar models in place around the world. Those of potential relevance to the national network are described below and include five types: *repositories*, *exchange networks*, *badging frameworks*, *blockchain*, and *hub and spoke* (Dowling, 2018a).[83]

The *repository* model involves student data being centrally stored with access overseen, managed, and curated by a central agency. The China Higher Education Student Information and Career Center (CHESICC) represents an example of this model. CHESICC, a trusted international organization, stores Chinese qualification certificates, enrolment status, Gaokao results, and student photos in a central database.[84] As one example of its use in Canada, McGill University has established a connection to the CHESICC database facilitated by the National Student Clearinghouse (the *Clearinghouse*) to ensure access to official documents for Chinese applicants (Duklas, January 2019). Students apply to McGill and provide permission for the documents to be exchanged. CHESICC is notified and sends these to McGill via the *Clearinghouse* for a fee. The documents are official as they go directly from the Chinese repository to McGill.

An *exchange network* represents another model which involves a system-to-system (institution to institution) transfer of information directly between two organizations using APIs and other methods (Dowling, 2018a). In the post-secondary context, this model involves sending documents or student information directly between institutions without the involvement of students. It is typically a closed

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[80] http://arucc.ca/en/project-governance.html

[81] Endpoint: "any piece of computer hardware with an internet connection….[e.g.,] desktop computers, laptop computers, tablets, smartphones, and other devices." (National Student Clearinghouse, Educause, REN-ISAC, 2018)

[82] Multifactor authentication: "a system that relies on more than one layer of security to authenticate a user." (National Student Clearinghouse, Educause, REN-ISAC, 2018)

[83] Sources for information on models: (Dowling, 2018a), (Dowling, 2018b)

[84] https://www.chsi.com.cn/en/aboutus/database.jsp

and trusted method, although it is possible for students to push documentation through the network by accessing other systems that are connected to the network (Chakroun & Keevy, 2018).

Badging Frameworks are considered another type of model for exchanging student information and credentials (Hickey & Otto, 2017). With this approach, students receive electronic symbols called badges that signify successful completion of a learning outcome, topic, or subject area. Typically, these are web enabled and contain metadata that facilitate access to more information about what the badge was awarded for, by which organization, the assessment criteria, the evidence of achievement, issuance date, and other data (Open Badges, 2016).

Blockchain represents another method institutions and governments are using to enhance portability of credentials (Patel, 2018) (The Nassau Guardian, 2018) (Purushotham, 2018).[85] Two Canadian examples include the work of the federal government, which is piloting and exploring applications for blockchain, (National Research Council Canada, 2018) and the credentialing efforts at the Southern Alberta Institute of Technology (SAIT). It became the first institution in the country to launch credentials through a blockchain (Southern Alberta Institute of Technology, December 17, 2018). Internationally, the European Commission has created a consortium called the *EU Blockchain Conservatory and Forum*, which is focused on monitoring, mapping, and inspiring collaborations and conversations for blockchain (European Commission, 2019). To date, the EU has provided 83 million Euros to related projects and intends to do more in this area. More broadly, the EU is supporting extensive research and innovations through the *European Research Cluster on the Internet of Things (IOT),* which goes beyond blockchain and focuses on "coordinating and building a broad based consensus on the ways to realise the Internet of Things vision for Europe" (Internet of Things, 2016). The focus is multi-layered and complex. Of relevance to credential exchange is enhancing control of personal data, eliminating intermediaries, designing user-led systems that support data protection and privacy, facilitating digitization, addressing ways to better manage the resulting plethora of data, and ensuring interoperability (Vermesan & Bacquet (eds), 2017). Blockchain presents interesting options for augmenting services in that it provides more immediate access for students to their credentials for the purposes of employer verification of official documents.

Another model for exchange is referred to as the *hub and spoke* (Dowling, 2018a). This model is very common in Canada between application centres and institutions. The My eQuals in Australia and New Zealand uses this approach for post-secondary student data exchange.[86] In that example, institutions maintain control over the data housed in their student information systems and in an institutionally specific partitioned cloud. Students access their portal in My eQuals which allows them to see their official records and share them with others (Dowling, 2018a).

Some of the credential and student data exchange networks currently used do not appear to neatly fall into one model. For example, EMREX, a European project that facilitates learner driven exchange, might be characterized as a network in that it is supported by a trusted network of institutions that are interconnected. It might also be considered a hub and spoke because the students drive the exchange, which is supported by a national or regional server called a *National Contact Point*.[87] In essence, it is a trusted business-to-business model supported by a regionally located hub where the learner drives the exchange and determines what happens with their data. For example, assuming the institutions have

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[85] Exploring blockchain falls outside of the scope of this research. Those interested learning more about this model are encouraged to review Dowling's helpful overview in *Blockchain Position Paper* (2018b). His work focuses on analyzing the public blockchain model.

[86] https://www.myequals.edu.au/

[87] http://www.emrex.eu/

coded all the relevant business rules, the network holds the capability for students to access their former institution's student information system, identify courses previously taken, move their data through the network, deposit it into the student information system of their new destination institution, and have transfer credit automatically reflected in their new student record and transcript (Duklas, January 2019).

Many of these models facilitate the exchange of various data formats and documents including in PDF, which Canadian post-secondary institutional representatives including those in BC suggested would make sense for early implementation of a national network. The American registrars' association, AACRAO, provides best practice advice for PDF transcript exchange which addresses security, rights management, and accepting secure PDFs as official if they are digitally certified/encrypted (2018). The Postsecondary Electronic Standards Council (PESC) provides a data standard format for supporting PDF to support secure exchange.[88]

For those interested in exploring the various models, Chakroun and Keevy (2018) provide a very thorough overview in *Digital Credentialing: Implications for recognition of learning across borders* which is adapted from Dowling's work (2018a). They outline the typology of possibilities for consideration by the Canadian higher education community.

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[88] https://www.pesc.org/pesc-approved-standards.html

4.0 Section 4.0 – Findings: Current State

4.1 Overall

The findings from the national survey are outlined in this section. In the final analysis, the data suggest that most of the student data exchange (sending and receiving) occurs *intra-provincially* in Canada. A limited amount of *inter-provincial* exchange is occurring, primarily involving the Ontario Universities' Application Centre (OUAC) in Ontario, EducationPlannerBC in British Columbia, ApplyAlberta in Alberta, and the Bureau de coopération interuniversitaire in Québec. Additionally, Nova Scotia, New Brunswick, and Saskatchewan are pursuing plans to expand inter-provincial exchange with select Canadian jurisdictions.

The qualitative recommendations suggested by the higher education community for moving forward include results from all survey respondents and thematic findings from the consultation and interviews conducted for this project, the ONCAT project, and the *ARUCC Groningen Project*.

4.2 Dataset

The national, bilingual survey collected 117 responses from 86 public and private post-secondary institutions, application centres, and other organizations such as councils on admissions and transfer such as BCCAT. It experienced an 85% completion rate. Of these, 76 respondents from publicly funded institutions responded in the affirmative regarding their capacity to answer questions about their organization's current data exchange capacities. This represents 30% (76/252) of the total pool of Canadian _public_ post-secondary institutions.[89] However, given the nature of the BC Transfer System which includes 11 private institutions as at the time of this research, the current state analysis includes both groups in this report (Table 1). [90] Of the total BC dataset, representatives from 18 public and private institutions that are members of the BC Transfer System responded in the affirmative regarding their capacity to answer questions about their institution's current data exchange capacities. This cohort represents 51% of the potential BC post-secondary participants. This group forms the basis of the current state analysis for BC institutions. All respondents to the survey form the basis of the analysis of opinion type questions.

Table 1: Dataset

Respondent Pool	BC PSIs		Other Provinces/ Territories[91]		Total
	Subtotals	% Overall	Other Provinces/ Territories	% Overall	
Total unique PSIs used for current state analysis [92]	18	20%	72	80%	90
Total potential PSI respondents	35[93]	11%	250[94]	89%	285[95]

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[89] Includes 48 CEGEPs from Quebec.

[90] In the interest of ensuring maximum inclusion of BC PSIs participants, the dataset used for this report is slightly different from that which was used for the ONCAT report. Those nuances are identified in the various tables in this section when applicable. One response per institution ('PSI') was included in the current state analysis for those with participants who responded in the affirmative regarding being able to answer questions about their PSIs data exchange capacities.

[91] No responses were received from organizations in the territories.

[92] One response per institution ('PSI') is included in the current state findings; the data set includes only those with participants who responded in the affirmative regarding being able to answer questions about their PSIs data exchange capacities; no responses were received for PSIs in the territories.

[93] Includes the public and private members of the BC Transfer System.

[94] Includes 48 CEGEPs

[95] Includes 48 CEGEPs

Respondent Pool	BC PSIs		Other Provinces/ Territories[91]		Total
	Subtotals	% Overall	Other Provinces/ Territories	% Overall	
Total survey respondents[96]	23	20%	94	80%	117
% of potential PSI pool in region	51%	NA	29%	NA	NA

4.3   Organizations Involved in Exchanging Data with BC Institutions

Most BC PSIs reported sending and receiving data with EducationPlannerBC (5 and 8 respectively), the BC government (13; 11), other PSIs (5; 7), and trades organizations (6;2) (Table 2). Half of the respondents (9/18) indicated they receive secondary school data from the BC government. Very few reported receiving student data from organizations outside of BC or beyond Canada. The data suggest that other provinces and territories are exchanging similar data although there appears to be more activity exchanging data with regulatory bodies, credential evaluation organizations, employers, and the federal government. It is important to note that other than the 2 PSIs in BC that reported exchanging data with OUAC and OUAC sending transcripts to other parts of the country outside of Ontario, the amount of inter-provincial exchange is non-existent in all provinces and territories. This shouldn't be interpreted as no documents are flowing across provincial and national borders. The consultation indicated this occurs quite regularly but not supported by digitized document exchange (i.e., it is by mail, in person, or in flat file PDF formats).

Table 2: Exchange Parties and Flow of Student Data (Survey Data)

Categories of Organizations exchanging data with Canadian PSIs	Organization	BC (n=18)		Other Provinces (n=72)	
		PSIs sending to…	PSIs receiving from…	PSIs sending to…	PSIs receiving from…
Application Centres and other organizations in Canada	EducationPlannerBC	5	8		
	ApplyAlberta		1	12	13
	NSCAT			1	1
	OUAC	2	2	19	18
	OCAS			13	13
	SRAM			7	7
	SRAQ			7	7
	SRASL			2	2
	Bureau de coopération			10	13
Government entities involved in student data exchange with PSIs	Federal Govt	3		26	14
	Provincial Govt	13	11	62	52
Institutions or boards that are involved in data exchange	Secondary School Boards	1	9	5	20
	PSIs	5	7	23	27
Trades/regulatory bodies that engage in student data exchange with PSIs	Trades Association	6	2	15	8
	Regulatory Bodies	1		21	4
Other third parties involved in data exchange	Employers	1	1	8	2
	External Credential Evaluators	2	1	11	10

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[96] More than one response was allowed per organization/PSI; the overall dataset includes PSIs, application centres/hubs, and councils on articulation/admissions and transfer.

Categories of Organizations exchanging data with Canadian PSIs	Organization	BC (n=18)		Other Provinces (n=72)	
		PSIs sending to…	PSIs receiving from…	PSIs sending to…	PSIs receiving from…
International Organizations/ Credential Depositories	CHISECC (China Credential Depository)				2
	My eQuals (Australian/New Zealand Credential provider)				1
	National Student Clearinghouse (US)		2		11
	Scripsafe (US)		2		6
	College Board (US; AP Scores)		3		11
	Parchment (US)		4		12
	International Baccalaureate Organization		3		10
Councils on Articulation/Admissions and Transfer that exchange anonymized data for research purposes (student, agreement, and/or course related data)	BCCAT*	6	5		3
	Campus Manitoba*			3	1
	NBCAT			2	1
Other Organizations	Other		2	5	4
	Explanation	BC data: PSIs reported sending data to third party vendors (e.g., graduation confirmation data)	Receive data from US Department of Education (financial Aid information); the College Board, ACT, TOEFL, and Naviance (Parchment)	Other province data: examples of exchange cited: TOEFL; ACT; Ordre de infirmiers et infirmières du Québec; OHQ; insurance providers; vendors who verify graduation; National Clearing House, Siège social de l'UQ, Socrate; Credential evaluators	

4.4 Type of Data Exchanged

As with other PSIs across the country, a significant proportion of BC institutional respondents reported sending and receiving financial aid related data (56%, 56%) which represents a lower percentage but still significant when compared to PSIs from across the country (Figures 6 and 7).[97] However, the extent of data sent and received appears to demonstrate that other PSIs outside BC are engaging more actively in data exchange particularly for transcripts, proof of enrolment confirmation, graduate confirmation (sending), and admissions data. For example, 65% of the PSIs outside BC reported sending graduate confirmation data electronically versus 28% in BC. Similarly, 69% and 71% PSIs in other provinces reported sending and receiving electronic post-secondary transcript data versus 28% and 44% in BC. Proof of enrolment confirmation data illustrates the same dissimilarity: 28% BC institutions send this data electronically versus 56% of the PSIs from other provinces. The findings suggest that a significant amount of BC PSIs do not currently engage in electronic data exchange in contrast to those in other provinces. As a lack of electronic exchange is a proxy indicator of the degree of manual effort currently

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[97] In the other category for BC institutions: sending: graduation confirmation data; receiving: US Department of Education (Financial aid data); the College Board, ACT, TOEFL, and Naviance (Parchment) (Admissions info); for PSIs outside BC: they noted in the Other category the comment they sent 'enrolment data beyond the transcript' without providing further details.

Detailed data for findings in the Current State Analysis are contained in Appendix F.

involved in supporting students across these dimensions, the opportunity clearly exists to support BC PSIs with expanding the capacities for exchange.

Figure 6: Categories of Data Sent

Figure 6: Categories of Data Sent

Bar chart values:
- Other categories of student data electronically exchanged: 3% (Other Provinces), 6% (BC)
- Secondary Transcript data: 14% (Other Provinces), 0% (BC)
- Proof of Enrolment Confirmation data: 56% (Other Provinces), 28% (BC)
- PSI Transcript data: 69% (Other Provinces), 28% (BC)
- Language Proficiency data: 14% (Other Provinces), 6% (BC)
- Graduation Confirmation data: 65% (Other Provinces), 28% (BC)
- Financial Aid data: 71% (Other Provinces), 56% (BC)
- Diploma data: 49% (Other Provinces), 33% (BC)
- Co-curricular data: 11% (Other Provinces), 6% (BC)
- Admissions data: 67% (Other Provinces), 33% (BC)

■ % of Respondents from Other Provinces (n=72) ■ % of BC Respondents (n=18)

Figure 7: Category of Data Received

Figure 7: Category of Data Received

Bar chart values:
- Other categories of student data electronically exchanged: 3% (Other Provinces), 0% (BC)
- Secondary Transcript data: 75% (Other Provinces), 50% (BC)
- Proof of Enrolment Confirmation data: 18% (Other Provinces), 17% (BC)
- PSI Transcript data: 71% (Other Provinces), 44% (BC)
- Language Proficiency data: 49% (Other Provinces), 33% (BC)
- Graduation Confirmation data: 15% (Other Provinces), 6% (BC)
- Financial Aid data: 63% (Other Provinces), 56% (BC)
- Diploma data: 28% (Other Provinces), 22% (BC)
- Co-curricular data: 11% (Other Provinces), 11% (BC)
- Admissions data: 61% (Other Provinces), 61% (BC)

■ % of Respondents from Other Provinces (n=72) ■ % of BC Respondents (n=18)

4.5   Data Formats, Data Storage Practices, Data Transformation Capabilities

BC institutions reported they primarily send documents in formats such as PDF (39%) and PESC XML and XML (39%, 22%) (Figure 8) and receive documents in PDF (50%), Flat File (44%), and PESC XML and XML (44%, 22%; Figure 9).[98] The diversity of practice and reliance on these formats are evident in other provinces although a proportion beyond the province's borders rely on EDI (26% for sending; 36% for receiving). As respondents could choose more than one response, these data illustrate the complicated methods by which institutions consume and distribute data. One standard approach does not exist.

The survey questions sought to understand in-house capacities to transform data formats, a key strength when considering participating in broader data exchange networks (Table 3).[99] Thirty-three percent (33%) of the BC respondents indicated this capacity existed locally versus 47% of the respondents from the other provinces. Half or more for the BC PSIs (50%) and PSIs from other provinces (61%) do not rely on an external third party to support transforming data exchange. For BC PSIs, this may suggest a capacity gap which could negatively impact their ability to participate in the National Network for student data exchange.

The findings suggest BC PSIs and those outside the province use more than one data exchange format with PDF, Flat File, and XML being more popular. This suggests diversity and potential complexity exist which will impact the National Network and institutional onboarding needs.

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[98] Respondents were allowed to identify more than one format and data storage practice; therefore, percentages will not not total 100% for this portion of the analysis. Detailed data findings are in Appendix F.
[99] Respondents could make one choice only to this question.

Figure 8: Exchange Formats Commonly used when Sending Data

Chart data (% of Respondents from Other Provinces (n=72) / % of BC Respondents (n=18)):
- Other (e.g., excel, publish into online databases, CSV, Access, Oracle, etc.): 8% / 11%
- Other XML: 63% / 22%
- PESC XML: 29% / 39%
- PDF/A: 11% / 0%
- PDF: 49% / 39%
- JSON: 7% / 0%
- Flat File: 42% / 22%
- EDI (ANSI X12): 26% / 11%

■ % of Respondents from Other Provinces (n=72)　■ % of BC Respondents (n=18)
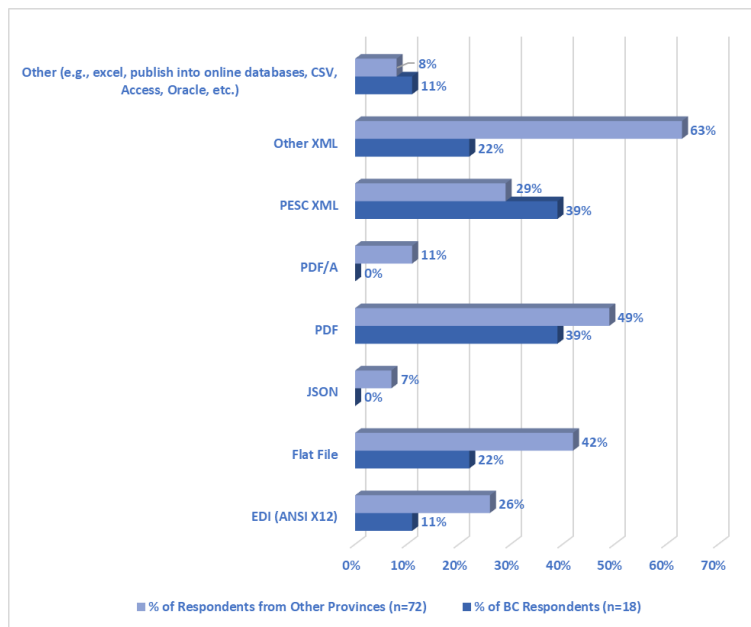
Figure 9: Exchange Formats Commonly used with Receiving Data

Chart data (% of Respondents from Other Provinces / % of BC Respondents):
- Other (e.g., excel, publish into online databases, CSV, Access, Oracle, etc.): 6% / 11%
- Other XML: 54% / 22%
- PESC XML: 31% / 44%
- PDF/A: 4% / 17%
- PDF: 54% / 50%
- JSON: 6% / 0%
- Flat File: 40% / 44%
- EDI (ANSI X12): 36% / 11%

■ % of Respondents from Other Provinces　■ % of BC Respondents
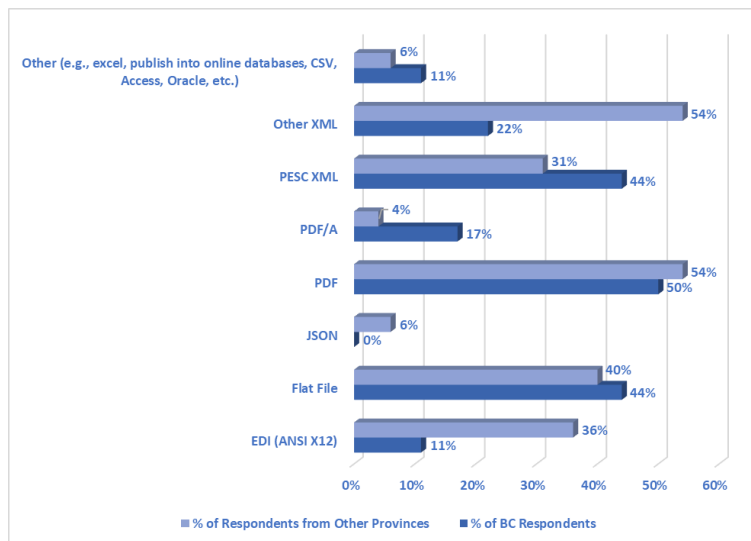
Table 3: In-house Capacity to Transform Data Formats (e.g., XML to PDF, etc.)

Region	Where is Data Transformed?	Yes	No	Don't know	No response
BC PSIs (n= 18)	Within your institution?	6	4	6	2
	% of BC Respondents	33%	22%	33%	11%
	By a third party?	4	9	3	2
	% of BC Respondents	22%	50%	17%	11%
Other Provincial PSIs (n=72)	Within your institution?	34	21	13	4
	% of Respondents from Other Provinces	47%	29%	18%	6%
	By a third party	17	44	7	4
	% of Respondents from Other Provinces	24%	61%	10%	6%

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4.6   Data Storage Practices and Student Information Systems

Local storage practices are similarly diverse with PDF and XML being common for both BC PSIs and those from other provinces (Figure 10). Capacity to store student data offsite could represent a strength when considering the potential data systems architecture options that might emerge with a National Network. For example, select solutions store student data in partitioned cloud storage environments which enhances flexibility when considering data exchange options and service layers for students. Figure 11 indicates that BC PSIs reportedly store data in the cloud more so than PSIs from other provinces.[100] A significant proportion of both groups store data onsite. Diverse practices even within individual institutions are evident as respondents could choose more than one option.

BC PSIs use various student information systems with Banner, Colleague, and custom developed solutions evident (Figure 12).[101] Similar diversity exists outside of BC although Colleague is less apparent and PeopleSoft is more evident (Figure 13).[102] This context underscores the importance of considering how this complexity will impact implementation of the National Network. Clearly, interoperability and flexibility will be critical to success for these institutions.

BC PSIs more so than PSIs from other provinces may lack the capacity to comfortably transform data formats. This could introduce implementation challenges when joining the National Network. However, BC PSIs appear to more commonly lever cloud storage solutions, an important strength when considering alternate data systems architectures and student service layers for the National Network. Interoperability and flexibility appear to be critical requirements for a National Network

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Figure 10: Data Format Storage Practices

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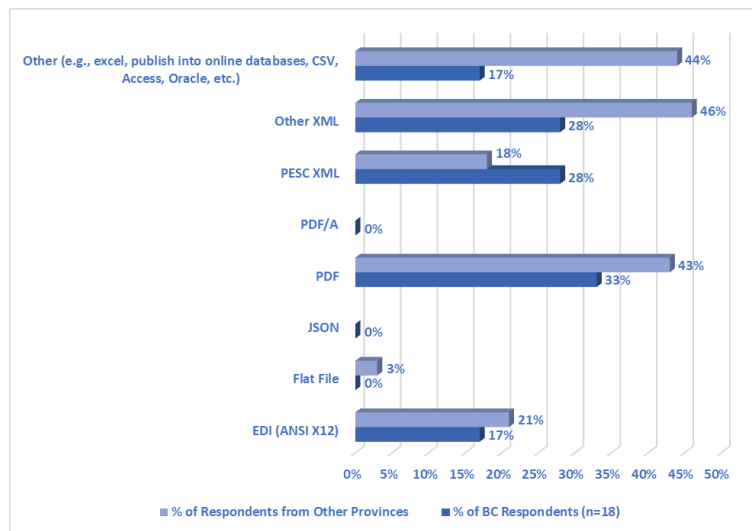
[100] Respondents could choose more than one option.
[101] Other student information systems for BC: Jenzabar, Orbis, Rasors Edge, Clock, Unit4 student management system (PSIs were allowed to identify more than one SIS.)
[102] Other student information systems for outside BC: Blackbaud, Agresso, Skytech, OnBase, Campus Management, Elevate, Crossroad (PSIs were allowed to identify more than one SIS.)

Figure 11: Data Storage Location Practices
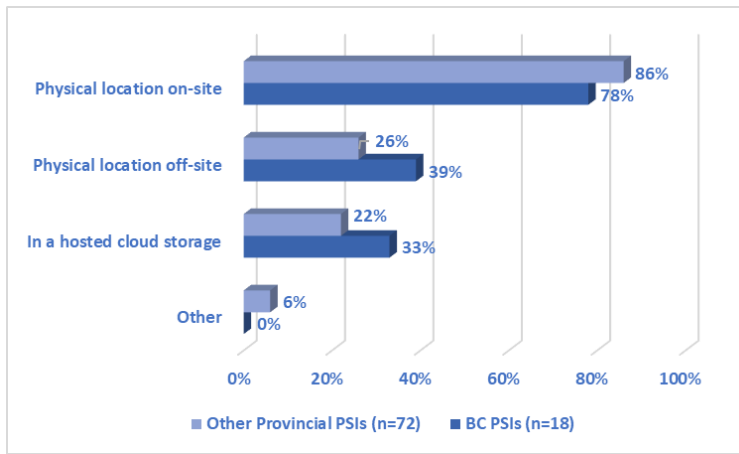
Figure 12: BC PSI Student Information Systems (n=18)
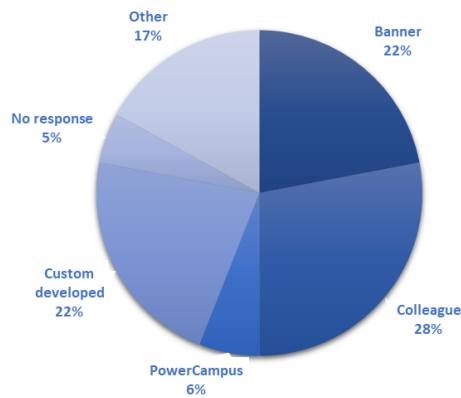
Figure 13: Other Province PSI Student Information Systems
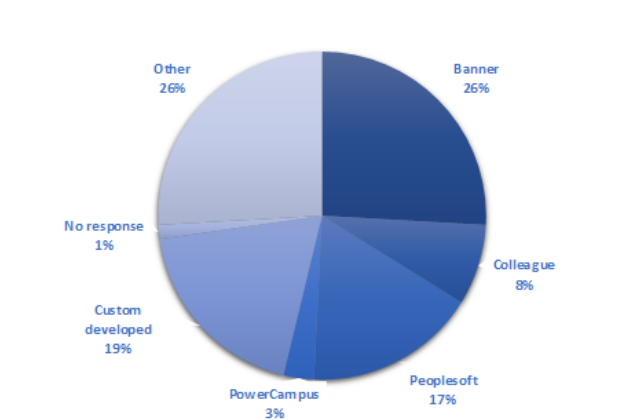
4.7 Outgoing Document Validation: Official Verification of Status for Current Students and Alumni

Capacity to verify a student's status represents an important digitization opportunity and a value-added service for students. Its lack is also a source of significant manual effort for post-secondary institutions. Two areas of enquiry in the survey related to this included confirmation of enrolment and confirmation of graduation.

Most Canadian institutional respondents in other provinces and in BC indicated that they ***do not offer*** online enrolment verification services (44% for BC PSIs; 63% for outside of BC) or online credential

verification services at graduation (78% for BC PSIs, 72% for outside of BC) to students and other third parties (Figures 14 and 15). Further, BC respondents reported only 12% of the BC institutions offer a confirmation of graduation verification service online versus 22% of those outside of BC (Figure 15). It is important to note that a higher proportion of BC PSIs reported offering online enrolment verification services (45% versus 32% for PSIs from other provinces) (Figure 14).

These findings represent significant gaps as they illustrate the lack of electronic capacity to validate official documents or student status after the point of admission. The situation provides a proxy indicator of the manual effort occurring in post-secondary institutions. As noted in Section 3.0, post-secondary institutions across Canada are seeing increasing volumes of these requests across a host of areas. Examples identified include when validating official offers of admission granted to international students with Canadian Immigration, Refugee and Citizenship (IRCC) and Canadian Border Services, confirming official status of enrolment to third parties such as providers of Registered Education Savings Plans (RESPs) and health care providers, and officially confirming pending or successful completion of graduation to employers, regulatory bodies, and others. The lack of online services and perhaps even electronic data exchange capacity in these areas is concerning considering these increases.

Given the growing interest and potential need to create the capacity to officially verify micro-credentials, the survey contained a question which asked institutions to identify the extent to which they were exploring micro-credentials. The intention was to capture an indicator of the potential growth in this area. Figure 16 notes that 56% of the BC PSIs and 72% of PSIs from other provinces are not exploring this area, suggesting that at the time of the research, this was not a potential growth area for Canadian PSIs. It should be noted that the interest in this field is shifting rapidly; therefore, this represents an area to continue to study as quality assured practices will be critically important. A growth in micro-credentials may put increasing demand on registrarial services, requiring scalable secure options to ensure appropriate support for students.

Figure 14: Online Enrolment Verification Services Available – PSIs only
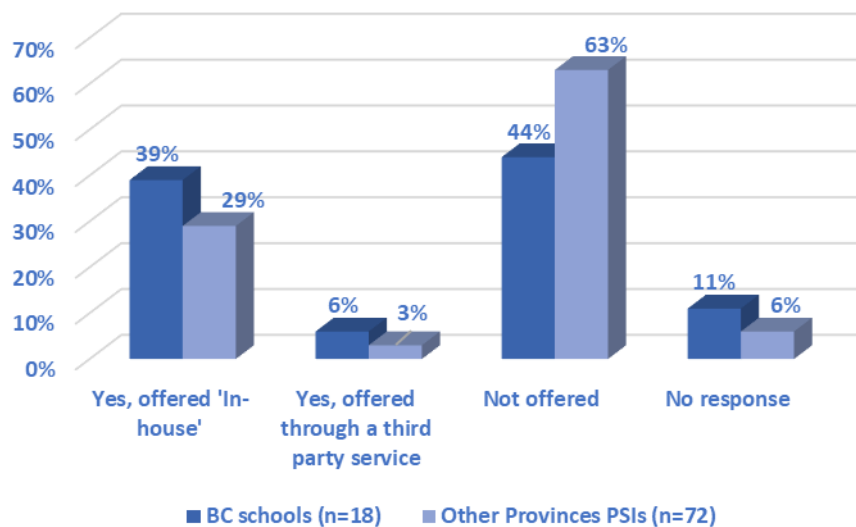
Figure 15: Online Credential Verification at Graduation – PSIs only
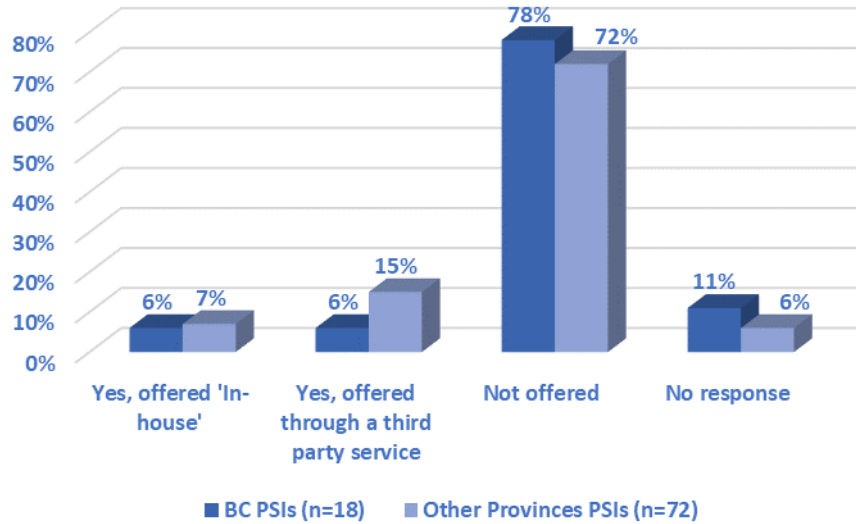
Figure 16: Engaging in Micro-Credentials and Badges
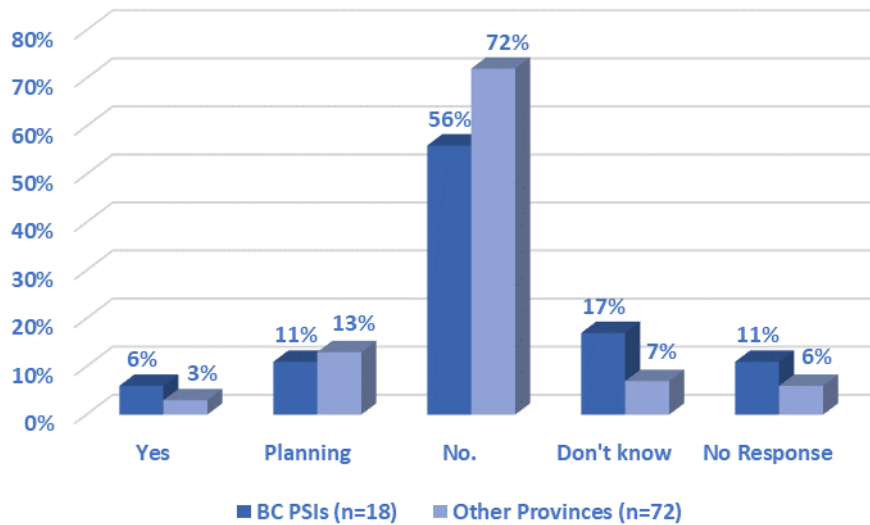
4.7.1 International Connectivity

In the past five years, there has been a significant increase in official credential depositories or the capacity to verify and exchange official documents and student data in more accessible ways in other parts of the world than what exists in Canada (Figure 17).[103] This has presented an opportunity for Canadian post-secondary institutions and application centres to establish direct connections to trusted international credential depositories as a support to student document and data exchange.

At the time of this research, 31% (31/99) of the Canadian post-secondary institutions, application centres, and data hubs reported engaging with third-party international organizations to exchange student data, in all cases to support the admissions process (Table 4).[104] At the time of this research,

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[103] Reprinted with permission from ARUCC.
[104] These data include post-secondary institutions and application centres/data hubs. Organizations could choose more than one category of response and identify more than one organization; therefore, the numbers will not add up to 31 unique organizations.

most reported using these external providers to access academic results for studies completed in other countries as a support to the admissions process. Some rely on these organizations for outward bound academic documents (i.e., transcripts, diplomas). Unfortunately, no systematic, national connectivity or capacity exists currently to support in-bound international documents directly for international trusted organizations that are officially recognized by their governments or PSIs in other countries.

Figure 17: Trusted International Providers for Exchanging and/or Validating Official Post-secondary Documents/Data
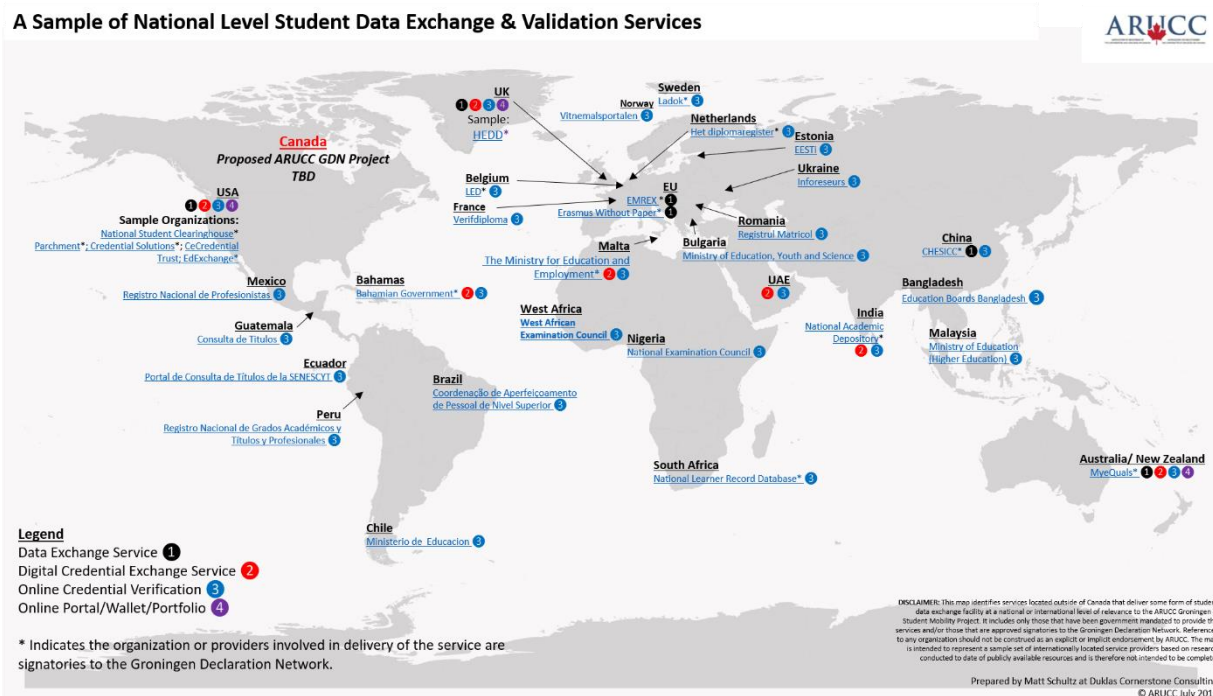
Table 4: International Exchange Organizations and Activities with Canadian Post-secondary Institutions and Application Centres (n=31)

Trusted International Organizations	Receive	Send	Plan to Send or Receive	Don't Know/Not Applicable	Row Total
CHESICC (China)	2 institutions		1 institution; 1 application centre	95	99
My eQuals (Australia/New Zealand)	1 institution		1 application centre	97	99
GradIntelligence (UK)	1 institution		1 application centre	97	99
National Student Clearinghouse (US)	13 institutions; 1 application centre	2 institutions	3 institutions	83	99
Credentials ScripSafe	7 institutions; 1 application centre			91	99
College Board (US)	12 institutions; 1 application centre		2 institutions	84	99
Credential Solutions (US)	2 institutions		1 application centre	96	99
International Baccalaureate Organization (International)	12 institutions		1 institution	86	99
Parchment	15 institutions		4 institutions	81	99
Other[105]	5 institutions	1 institution	1 institution	92	99

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[105] The following were referenced under 'Other': Salesforce (https://www.salesforce.com/ca/); test score results for ACT, SAT, LSAT, and MCAT; PDFs and other data from individual international institutions (e.g., Stanford).

5.0   Gaps and Challenges

The findings in this section replicate those noted in the ONCAT study with appropriate nuances noted of relevance to the BC context.

The consultation for this research identified significant gaps and challenges which this section thematically highlights (Table 5). Many of these could be resolved by establishing trusted national and international exchange of official academic documents and underlying data. These are shared by BC institutions and include growing concerns regarding document and identify fraud; insufficient connectivity with recognized institutions and trusted credential depositories across Canada and internationally; and capacity gaps within institutions to automatically assess and assign transfer credit, even for those documents that arrive in an electronic format. Institutional participants in the regional meetings including the BCRA session and interviews, routinely noted the increasing pressures facing post-secondary institutions due to a lack of resources. Some also suggested difficulties exist when trying to access internal support and priority status to introduce enhancements to student document and data exchange that support transfer and mobility.

These gaps impact on student's incoming and outgoing documents that require official validation. Potential risks include the erosion of the Canadian higher education brand (due to fraud), student service (e.g., quality, timeliness), and the capacity for students to have access to their official documents when they want and where they want. The situation is resulting in growing impediments to efficiency for both students and institutions, a situation that significantly impacts many supports including those related to transfer credit. Each is described further below.

Table 5: Thematic Summary of Data Exchange Gaps

Gap	Details	Documents Impacted
Increasing document fraud	No or limited system level exchange capacity exists to support official validation of outgoing documents (other than post-secondary transcripts)	Outgoing official documents needed to confirm official validation of a student's status for other third parties – Examples: offers of admission and confirmations of enrolment, fees paid, pending graduation, and graduation
	No or limited capacity exists to support official validation of incoming documents for studies completed outside of individual provinces and territories	Examples: Incoming academic documents (and other supporting documents such as language test results) required for admissions and transfer consideration
Lack of national and international connectivity for exchanging official documents	No or limited system level mechanisms exist to support exchange of *official* academic transcripts and supporting documents to aid efficient and quality assured admissions, transfer, and exchange processes:[106] • for Canadian educated students from other provinces and territories • for internationally educated students No system-level mechanism exists to electronically share and/or verify official student status at students' current or former Canadian post-secondary institutions.	Examples: Incoming academic documents (and other supporting documents such as language test results) required for admissions and transfer consideration

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[106] In the context of this study, submission of *official* documents is intended to encompass documents that come directly to Canadian institutions from other post-secondary institutions or government mandated credential depositories.

Gap	Details	Documents Impacted
Challenges with intra-provincial document exchange	A concern raised more outside of BC: no system-level connectivity exists between agreed upon course equivalencies and the application process to support the transfer assessment process. A concern raised in every province including BC, particularly for smaller institutions: limited automation exists within institutions to support transfer credit decision processes (e.g., automatic assignment of equivalencies or identification of pathways). Larger institutions sometimes have created capacity to enhance some aspects of the process through automation.	Examples: Offers of admission – as these relate to providing a student information about transfer credit equivalencies

5.1 Increasing Document Fraud (Inbound and Outbound Document Validation)

In the interviews and regional meetings, institutions across Canada including those in BC indicated the importance of establishing trusted connections between post-secondary institutions and officially mandated data exchange hubs for academic document exchange to mitigate document fraud. The perception exists that document fraud is growing and resulting in lost enrolments and the erosion of trust.

As previously mentioned, it is difficult to identify the scope of fraud occurring as the cases are not tracked at the national level. Institutional representatives anecdotally shared proxy indicators such as '*3 to 5 fraud cases per week*,' '*35 in total*' last year, having to '*review 1400 student files and create customized letters to support expedited visa processes for international students*', and '*having to de-enrol students after the refund drop date due to discovering academic document fraud, which resulted in lost revenue to the institution of $2.5 million*' (due to not being able to recruit additional students to replace those de-enrolled after the start of classes). They reported increasing expectations from external third parties, such as the Canadian federal government, to provide official verification of students' statuses at their institutions given the concerns about fraud.

> *Preventing document fraud represents a top priority concern for Canadian post-secondary institutions including those in BC and validates the need to establish trusted connects and subsequently create a national data exchange network.*

5.1.1 Limited Supports for Confirmation of Status or Confirmation of Graduation (Outbound Document Validation)

The consultation supported the survey findings – creating capacity to officially verify student status at Canadian post-secondary institutions using electronic, peer to peer connections or tamper proof technology options represents a priority need to reduce document fraud and enhance trust in the Canadian higher education system. Currently, there are no, or limited, system wide capacities to support this core requirement. Examples cited in the regional meetings and interviews that would be better served by having this capacity impact documents that provide official verification of offers of admission, enrolment, fees paid, pending graduation, and graduation.[107] The core student data required for these examples include student demographic data, institutional and program identifiers, term/session dates,

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[107] Select institutions reported that they rely on third party vendors to support confirmations of final graduation for their alumni.

and registration status (offer made when, fees paid including amount, full- or part-time course enrolment, pending graduation, evidence of graduation).

The institutions cited the growing volume and manual effort required to officially validate the status of students to fulfill requests from banks or related organizations (e.g., for Registered Education Savings Plans), health care or insurance providers, Immigration, Refugees and Citizenship Canada (IRCC) or the Canada Border Services Agency (CBSA), employers, regulatory and apprenticeship bodies, and other third parties. Institutions reported that these requests often require customized response and yearly follow up as a minimum.

It seems that third-party organizations including the government do not trust status confirmation documentation including offers of admission provided directly by students; hence, the growing pressure to find an electronic means to support students in this area. A national data exchange network would help to improve service to students and others in that it would provide immediate and direct official verification capacity.

5.2 Limited National and International Connectivity (In-bound and Out-bound Document Exchange)

In keeping with the above points, Canadian post-secondary institutional representatives stressed that the lack of national and international connectivity to support student academic document exchange is causing a reduction in supports for students, workload pressures, and document fraud challenges. They emphasized the need for scalable and trusted document exchange capacity to support the portability of official academic documents between trusted entities. According to the research, this need remains for both in-bound international documents and out-bound Canadian documents (i.e., for those students who wish to study and work across Canada or in other countries). They suggested the lack of connectivity limits capacities to address document fraud. Furthermore, the research indicates the current situation is impeding efficiency and automation opportunities, increasing manual document fraud monitoring, and undermining student service (e.g., through increased service turnaround times given the extra time involved in assessing documents and determining their bone fides).

5.2.1 International Document Validation

International document assessment remains predominantly manual as institutions reported hand review of each document is required by individual staff to ascertain the following:

- official document status (i.e. not fraudulent);
- official recognition of the institution/program;
- admissibility;
- prerequisite completion; and,
- transfer credit.

This validates the findings from a recent international study on assessment practices (Duklas, January 2019). According to the consultation for this research, the current manual approach is not sustainable given the growth of incoming international students.

5.2.2 Mobility of Canadian Post-secondary Students

A missed opportunity exists to support Canadian educated students that wish to work or study abroad. Due to the federated provincial/territorial system for education, those interviewed indicated that Canada's post-secondary system looks confusing to those in other countries who are assessing the credentials of our graduates for study or work. The diversity of Canadian quality assurance and institutional recognition protocols, post-secondary institutions, and credentials cause interpretation challenges. As a result, it is not easy to assess a Canadian transcript, establish its bone fides, interpret

the contents, and confirm the recognition of the institution from which a student graduated. Although helpful when available online or electronically, it is not enough to confirm that someone graduated.

Given the focus on digitized documents exchanged electronically through a national network, the opportunity exists to identify methods to demystify and streamline the processes for those outside the country assessing the credentials of our graduating students.

5.2.3   Limited Inter-Provincial Exchange of Electronic Data (In-bound Document Exchange)

As previously mentioned, the survey data and research indicated that very few institutions and only a small number of application centres are exchanging electronic student information across provincial and territorial boundaries. As mentioned in an earlier section, the Ontario Universities' Application Centre (OUAC) is sending electronic transcript data to 11 post-secondary institutions in other provinces and exchanging data with EducationPlannerBC in British Columbia for two BC institutions.[108] OUAC is also receiving CEGEP data facilitated by the Bureau de coopération interuniversitaire in Québec. Other than these three examples, no electronic post-secondary data is being exchanged inter-provincially in a systematic way, which means that most of the admissions and transfer processing for out-of-province transfer students involves manual effort.

During the interviews and regional meetings, institutional representatives expressed a desire to access electronic high school transcripts from other provinces. National findings suggest that student data is desired from institutions and application centre/data hubs in near vicinity to particular provinces and between provinces with larger populations (e.g., between Ontario, BC, Alberta, and Québec). This latter finding appears to align with the inter-provincial mobility patterns identified in other research (Burbidge & Finnie, 2000). Electronic data exists such that a national network could help to resolve this challenge.

Handling post-secondary documents received directly from students results in manual review, slower processing times, a heightened need for additional review, and service reductions. Learner mobility is negatively impacted. Electronic data exists; however, an information highway – what this report references as a national network – that connects these depositories and transcends regional borders does not.

5.3   Potential to Enhance Intra-Provincial Student Data Exchange

Institutional representatives in the interviews and regional meetings indicated that more needs to be done both within institutions and across provinces to continue to enhance the capacity of the overall transfer system. The national consultation validated this comment. For example, while larger institutions reported offering in-house equivalency systems which were populated locally, most did not have the capacity to automate work processes related to transfer students, pathways, and equivalency decisions. The BC transfer system was routinely noted as an exemplar in this area although smaller institutions in that province like other parts of the country reported lacking the resources and systems capacity to support automation and decision assignment and tracking. They indicated that creating a national

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[108] This was the case at the time of the research.

network to enhance incoming and outgoing official document exchange would free up resources and create opportunities for refocusing efforts to address these other gaps.

5.4   Prioritization Process for IT Projects, Constrained Resources, and Inflexible Systems

The findings indicate that prioritizing IT projects and organizational focus, a lack of resources and possibly expertise, and inflexible student information systems appear to be the main gaps/challenges to implementing/joining a national data exchange network and enhancing internal automation capacity. This finding was true regardless of province. Ranking within the survey suggests the first two remain the biggest challenges (i.e., prioritization and focus; resource and expertise gaps). The section below provides thematic findings shared by the participants in interviews and regional meetings.

IT governance and related priority setting, a lack of institutional focus on developing more robust data exchange and document digitization, a lack of resources and expertise, and inflexible systems appear to be the biggest impediments at the institutional level to creating a national network.

5.4.1   Organizational priority setting including for complex IT projects

According to the research, institutional respondents reported that resources are at times prioritized in favour of IT projects that address maintenance needs, government mandated projects, and enterprise projects focused on other IT needs within institutions (e.g., finance and human resources).[109] Participants acknowledged the importance of these projects; however, noted the impact of the various competing priorities. Most indicated the project lists are extensive, making it difficult to add more initiatives.

Participants in interviews and regional meetings emphasized the importance of engaging government and senior institutional leadership in the national data exchange project. They stressed the importance of capturing their support for any desired advancements for transfer or mobility. Notably, the importance of this becomes clear in the survey results that explored the degree to which onboarding to the national network will be impacted by a focus on other organizational priorities (Figure 18). Although less of a consideration for BC organizations, the survey respondents indicated this represents a significant barrier to participation.

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[109] One institutional representative reported relying on a service agreement with another institution for their student information system which impeded their ability to influence any changes or to onboard to a national data exchange network. This represents a unique situation likely most relevant to young or smaller institutions as most of the institutions across Canada have purchased a local licence for a student information system from a third-party vendor(s), use an in-house custom developed solution, or use a combination of both.
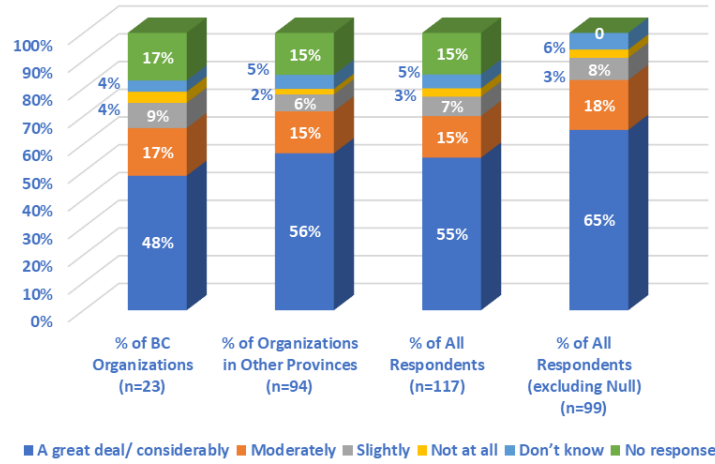
5.4.2   Limited resources

Across all consultation venues, organizational representatives raised the issue of limited resources which the survey data corroborated (Table 6). Examples cited included a lack of funding, staff expertise, and time. Institutions in smaller urban locations stressed that finding and keeping expert staff represented a challenge, even when funding was provided. Participants in interviews and regional meetings stressed the need for additional resources to support onboarding, for both institutions and application centres/data hubs.

Interestingly, out of 117 organizational respondents to the survey, 55% (28% + 27%) indicated that their organization had the project management expertise to handle onboarding to the National Network (Figure 19).[110] Similarly, 56% (32% + 24%) indicated IT expertise existed in-house as well. BC respondents reported less confidence in the in-house expertise (Figures 19 and 20).

Table 6: Impact of a Lack of Financial Capacity on Onboarding to the National Network

Potential Impediment	Region (BC n=23; Other provinces n=91)	A Great Deal/ Considerably	Moderately/ Slightly	Not at all	Don't Know	No Response	Total %
Lack of financial resources at my organization	BC	52%	22%	4%	4%	17%	100%
	Other Provinces	45%	33%	1%	6%	15%	"

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[110] All respondents (post-secondary institutions, application centres, councils on admissions and transfer) to the survey are included in this table.

Figure 19: Project Management Expertise Available to Support Onboarding to the National Network
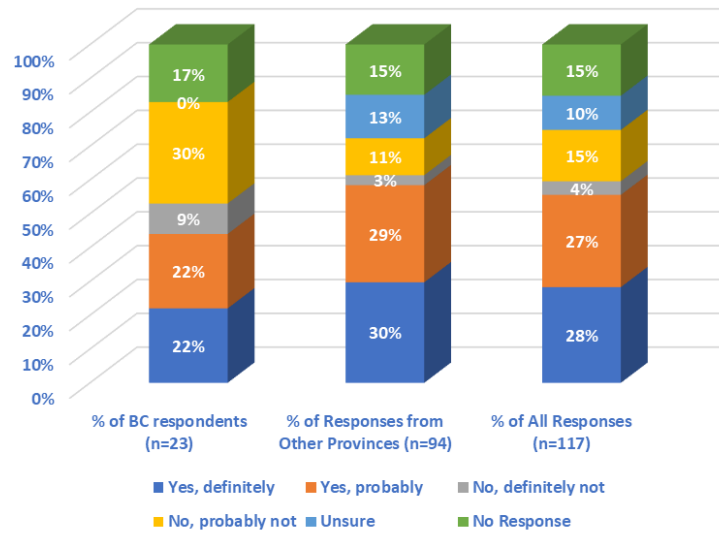
Figure 20: IT Expertise Available to Support Onboarding to the National Network
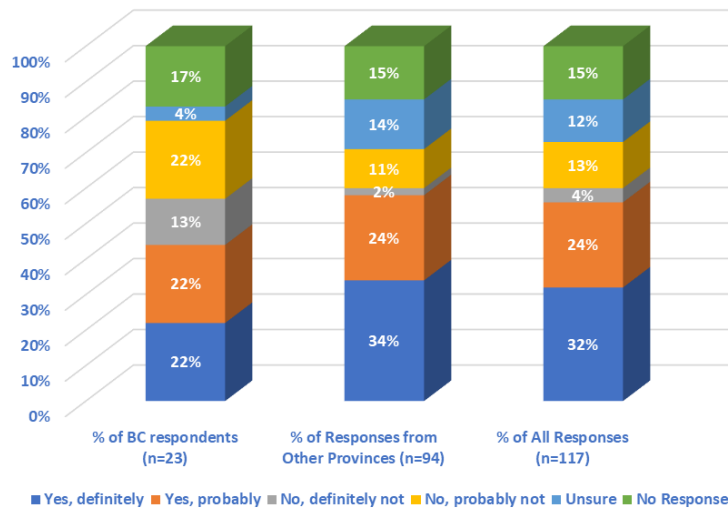
5.4.3   Inflexible IT systems

Participants reported that the institutional need to maintain older versions of student information systems sometimes impedes flexibility when attempting to connect to other systems or prevents them from receiving or sending documents or data using more advanced exchange formats. This appears to be more of an issue with BC institutions (Figure 21). Furthermore, the community suggested that institutions lack influence with student information system vendors to push for necessary customizations to address Canadian or provincially specific requirements.
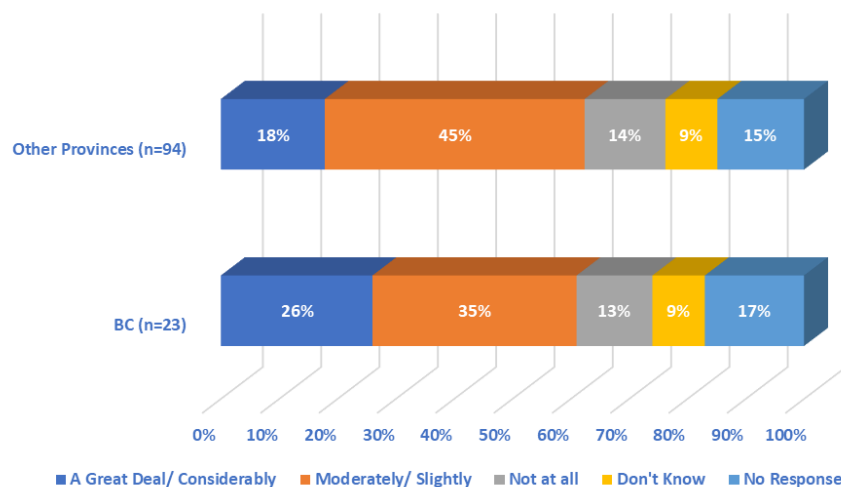
5.5   Other Gaps and Challenges Identified

Figure 22 highlights additional concerns identified that present barriers to onboarding to the national network. Similar findings are evident for BC and other provinces as these relate to a commitment to maintaining current processes and an inability to change current processes. However, a larger proportion from BC (39%) noted that a lack of support for a national network doesn't appear to be as large of an issue.

An *Other* category in the survey supported by a free form field facilitated respondents providing additional suggestions regarding potential impediments to onboarding to a national network. One institution noted privacy and data security considerations; another respondent spoke about the need to prioritize projects against other demands; and one of the application centres provided a series of helpful suggestions which spoke to the technical details of implementation.[111] This same respondent noted the need for service and data sharing agreements and other memorandums of understanding to manage the various partnerships involved in the data exchange process. One of the above respondents noted that the pace of change would be directly impacted by the capacity of the partners to participate, which speaks to the need for resources and focused priority setting to support onboarding to a national data exchange network. Two application centre respondents from different provinces suggested their provincial mandate might limit their ability to prioritize a focus on onboarding to a national network.

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[111] Examples cited: different institutional policies; different testing methodologies and requirements from potential trading partners; the need to support multiple standards and file formats (including cross-walking data standards, supporting multiple versions of the same standard (i.e., ensuring backward and forward compatibility), differences in interpreting data, mapping, etc. by various trading partners); workflow methodology differences of various trading partners (e.g., *not using requests or acknowledgements*, etc.); differences in operational support methodologies across various trading partners (e.g., the handling of system-level reporting, tracking, auditing, logging, and escalation processes for errors and exceptions).

Figure 22: Other Barriers to Onboarding to a National Network

Legend: A Great Deal/ Considerably · Moderately/ Slightly · Not at all · Don't Know · No Response

Lack of support for a national network:
- Other Provinces (n=94): 12%, 37%, 20%, 16%, 15%
- BC (n=23): 9%, 22%, 39%, 13%, 17%

Inability to change current processes:
- Other Provinces (n=94): 13%, 46%, 21%, 5%, 15%
- BC (n=23): 13%, 39%, 26%, 4%, 17%

Commitment to current processes:
- Other Provinces (n=94): 21%, 58%, 18%, 9%, 18%
- BC (n=23): 22%, 30%, 22%, 9%, 17%
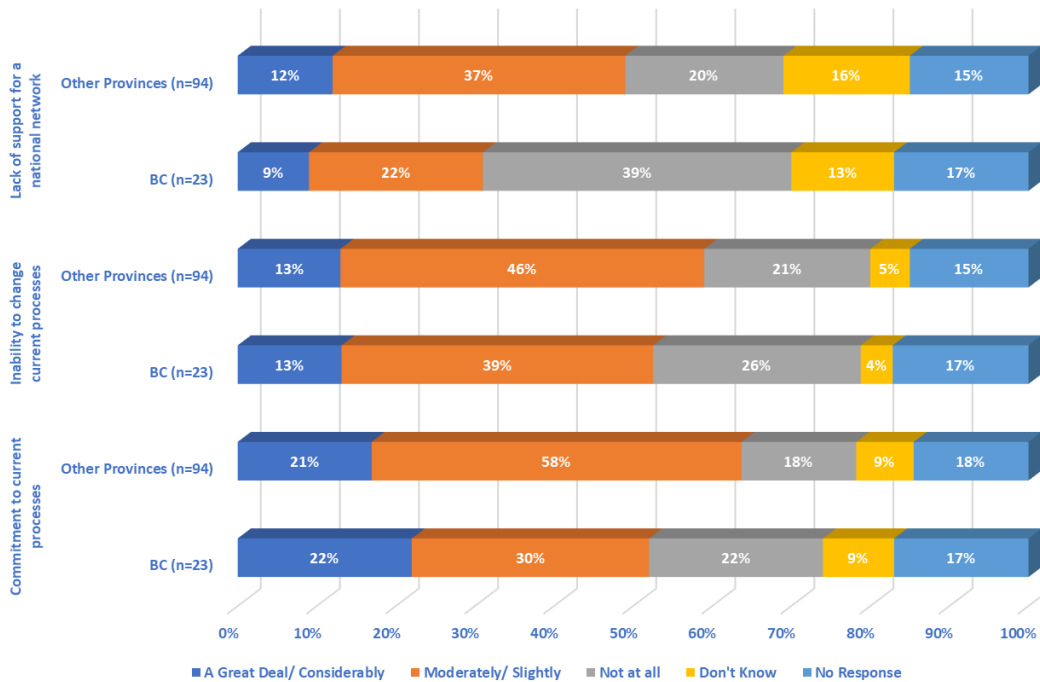
5.5.1   More National Tools to Support Assessment and Transfer

While not raised in the BC regional meeting and interviews, several institutional representatives who participated in the consultations in other provinces noted that a national transfer equivalency and pathway database does not exist. When probed further in the regional meetings and interviews, participants routinely indicated that this type of service would appear to enhance transfer and mobility. Unlike BC participants, it wasn't entirely clear to the participants from other regions how this tool would enhance efficiencies within institutions.

Some suggested a tool be created to facilitate comparing grading scales to enable more accurate and faster assessments of student documents. These people suggested the lack of either of these types of supports constrained assessment efforts at the institutional level for both in-bound international and domestic transfer from other provinces. The former corroborates findings from other research (Duklas, January 2019). These types of tools sit outside of the scope of the national student data exchange network; however, they illustrate other gaps that, if closed, would enhance institutional efficiency and consistent quality assured assessment of student documents when transferring between post-secondary institutions.

6.0 Section 6.0 – Findings: Recommendations

6.1 Overview

A final objective of the research included seeking recommendations from the higher education community about the anticipated benefits and needs for a national data exchange network to support transfer and mobility. The survey, interviews, and regional meetings provided multiple opportunities to share insights.

6.2 Benefit Recommendations

The survey requested respondents rank the importance of a pre-set list of benefits that must result from the national exchange network (Figure 23; listed in order of importance). The question allowed respondents to identify the level of importance for each benefit using a Likert scale.[112] A freeform field encouraged qualitative comments. These benefits serve as important indicators to guide priorities for the national network.

Top priority benefits recommended by the respondents from across Canada include the following:

- improving service for students;
- enhancing efficiencies for students;
- enhancing institutional efficiencies;
- enhancing improved service for institutions; and,
- enhancing student transitions between post-secondary institutions in Canada or for international students.

Enhancing study abroad and transition into the workplace appeared as lower priorities as evidenced by the percentages in the *moderately/slightly important* category.

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[112] Scale: v*ery important*, *important*, *moderately important*, *slightly important*, *neutral/no opinion*, and *not important* - Due to small 'n' counts, the table combines results for *moderately important* and *slightly important* and organizational type. The survey allowed only one ranking choice per benefit. The Figure excludes null responses and includes more than one response per organization (n = 106).

Figure 23: Anticipated Benefits from a National Network
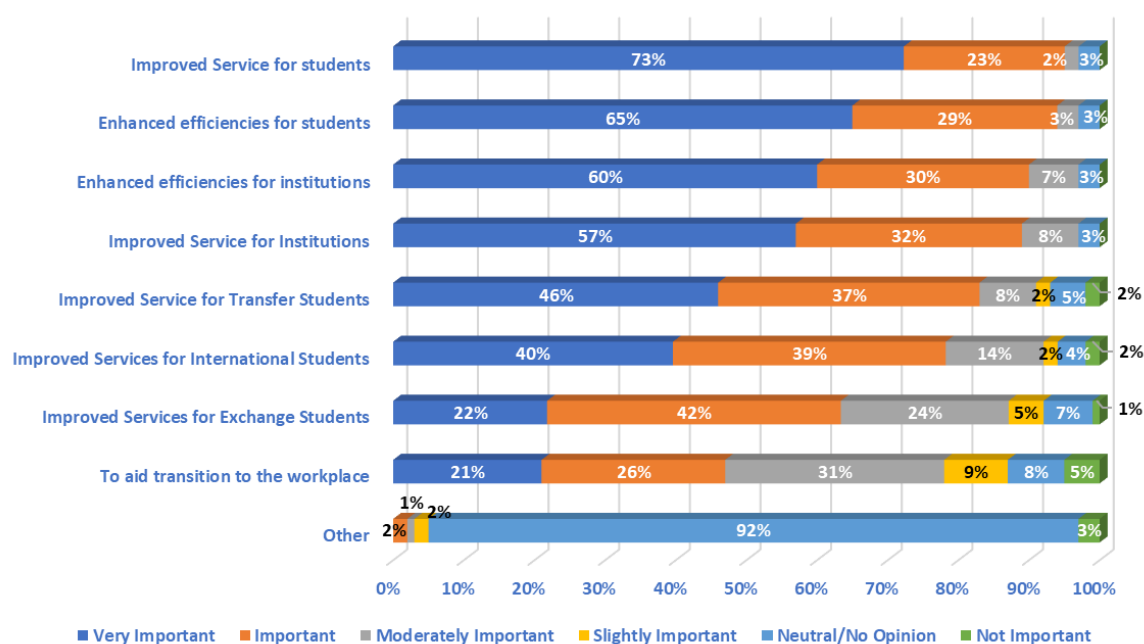
6.3 Funding, Operational Structure, and Governance Recommendations

Table 7 captures the thematic funding, operational, and governance considerations raised by the higher education community, all of which require further research and consultation. Governance was an area of concern raised and discussed further at the BCRA meeting.

Table 7: Suggested Next Stage Consultation Questions

Focus Area	Suggested Consultation Questions	Next Steps
Operational structure and governance	Which entity should own the network? An arm of government? ARUCC? Some other separately incorporated entity? What operational structure makes sense?	Further consultation needed
Trusted membership	What are the criteria for *trusted institutions*?	Further consultation needed A respondent advised allowing full participation of recognized private institutions with an associated fees structure.
Sustainability	How should the network be structured to ensure it can operate if funding goals remain unattainable?	Revenue models of network require further consideration One respondent suggested ensuring a flexible structure that could function without regular funding from an outside source.
Government support	What role makes sense for provincial and federal governments?	Engage government support; however, maintain a member-led network – This was considered important given the diversity of the provinces/territories and institutions.
Implementation support	What supports should be provided to smaller institutions?	Provide onboarding support for institutions, particularly small ones that lack resources and expertise

6.4 Other Implementation Recommendations

6.4.1 Overall

Throughout the survey, respondents provided insights in various freeform sections related to overall implementation matters. These are thematically represented below with details following in subsequent sections (Table 8).

Table 8: Implementation Suggestions from Qualitative Questions in Survey

Focus Area	Suggestions
Made for Canada versus *Made in Canada*	• *Made for Canada* does not necessarily mean *Made in Canada*; consider leveraging vendors from other markets with alternative and extensive experience in this area. • Avoid building the system from scratch; buy an existing system or extend a proven option.
Priorities	• Address high volume data exchange needs. • Prioritize exchange within Canada before exchanging internationally.
Implementation	• Stagger implementation • Introduce functionality incrementally - *Avoid trying to be everything to everyone all at once*. • Be flexible and support onboarding for institutions and application centres/data hubs.
Identity management	• Establish a way to connect student records from different institutions for the same student.
Working with existing hubs	• Work with existing Canadian hubs to the extent possible (assuming interest). • Connect through existing provincial hubs to avoid multiple exchange points.
Diversity	• Consider how to accommodate the different regions, some of which lack data hubs. • Establish connectivity between near provinces. • Include private post-secondary institutions.
Interoperability	• Plan for alternative functionality (band width, data storage versus data transfer) and ensure interoperability with other provincial and national/international networks. • Accommodate different forms of exchange (e.g., *PDF is viable, don't discount it*; it is *easier* to implement, as well). • Ensure the network supports interoperability and flexible data exchange. • Ensure data is provided in *raw* form (with no details provided), with multiple communication formats (HTTP, SFTP, Web Service, API, etc.), and uses existing PESC XML standards. • Standardize the exchange protocols and avoid being too flexible.
Future proofing	• Ensure the network is poised to adopt new technologies and approaches.
Privacy and policy	• Avoid data policies or agreements that might impede transition to the national network. • Given the different and stringent privacy requirements in Canada, consider options that avoid opening the data file being transmitted. They suggested doing so might impact on local privacy impact assessments.
Research opportunity	• Consider future research opportunities that a national data exchange network could bring to better understanding Canada's post-secondary transfer and mobility patterns (the *Clearinghouse* in the US was noted as an exemplar).

6.4.2   Recommendations for Online Services

Throughout the research process, the primary investigator asked organizations for advice regarding the types of online services that should be provided by the national network to enhance transfer and mobility. The options discussed included a website for the trusted organizations sharing data through the network, and an environment for students (e.g., a public facing website, online services, a portal, blockchain access through their phone).

6.4.2.1   Services for Organizations

• Most organizational respondents indicated the national network should provide a password protected website for organizations using the network.[113]
• As a support to the Canadian higher education brand, most supported the National Network providing a Canadian version of the Apostille appended to the electronic student records to demonstrate their authenticity and official nature.[114]

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[113] Seven percent and 5% respectively indicated that this was not needed; and the balance remaining indicated they didn't know or it wasn't applicable (with no further details provided).

[114] Apostille: a 'legal certification that makes a document from one country valid in another (provided that both are signatories to the 1961 Hague Convention Abolishing the Requirement for Legalization for Foreign Public Documents' (Oxford Dictionnaries, 2019). Note: as Canada is not currently a signatory to the Hague, the government provides the authentication criteria for Canadian documents, including academic documents (Government of Canada, 2017).

6.4.2.2   Services for Students

- Student Portal - Most respondents in the interviews, regional meetings, and survey expressed uncertainty about whether the national network should provide a student portal. Generally, the community feels the technology solution proposed may drive the necessity for a portal.
- Student Public Website - Consultation in regional meetings suggested two important considerations: (i) you need permission from students to move their data which requires a way to message and manage that process; and (ii) whether a student facing environment is needed depends on the national network model chosen. However, whatever technical solution is chosen for the network, permission management remains an important area for consideration.
- Online Services for Students - Most of those consulted expressed uncertainty regarding whether online services through the national network were necessary.

7.0 Section 7.0 – Conclusion

Advancing Student Mobility through Enhanced Data Mobility – A BC Focus sought to identify the current practices for data exchange in BC and to gauge the readiness of the province's post-secondary sector for implementing trusted student data exchange in support of transfer and mobility. It further sought to capture expert recommendations on the changes and supports needed to facilitate a national data exchange network. The study leadership aspires to use the findings to achieve the following:

- identify enhancements for student data exchange at the institutional, provincial, and national levels;
- provide research that will be of use to other BCCAT and BC initiatives and projects; and,
- inform policy development and resource prioritization for student data exchange as these relate to creating a national network.

This report is a companion study to an Ontario study called, *Advancing Student Transfer through Enhanced Data Mobility* and to the national project called the *ARUCC Groningen Project*[115] led by ARUCC in partnership with four national associations: the Pan-Canadian Association of Admissions and Transfer (PCCAT),[116] the Canadian University Council of Chief Information Officers (CUCCIO),[117] and the Canadian Post-Secondary Electronic Standards Council User Group (CanPESC).[118] The ARUCC project is a multi-year project focused on creating a national student data exchange network to facilitate transfer and mobility. As the partners of these three separate projects agreed to collaborate on the research and the findings from this study, select Sections within this report are replicated from the Ontario study, with modifications relevant to the BC context and findings made as appropriate.

These projects serve broader international goals including supporting the strategic aspirations of institutions and organizations such as Colleges and Institutes Canada and Universities Canada to increase the participation of in-bound international students studying in Canada and out-bound students seeking to study abroad.[119] Internationally, this proposal aligns with the Lisbon Recognition Convention (LRC)[120] and the Groningen Declaration Network organization (GDN),[121] each of which seek to improve student access to post-secondary education and subsequent mobility by enhancing recognition of prior post-secondary studies and quality assured practices in credential assessment and evaluation. The GDN focuses specifically on advancing digitization and trusted student data exchange as means to improve student and cultural mobility.

The following research questions guided the BC project:

1. What are the current practices and state of readiness for exchanging student data in BC?
2. What recommendations do BC post-secondary registrarial leadership and supporting organizations have for creating a national data exchange model to address identified business needs that build on the related expertise and efforts existing within the province?

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[115] http://arucc.ca/en/projects/task-force-groningen.html
[116] See https://pccatweb.org/pccat/ - members include representatives from Canadian colleges, institutes, and universities
[117] See https://www.cuccio.net/en/ - Note: a similar national association for colleges and institutes does not exist at the present time.
[118] See http://www.pesc.org/canadian-pesc-user-group.html - members include representatives from Canadian colleges, institutes, and universities
[119] See http://goglobalcanada.ca/ by the University of Ottawa Centre for International Policy Studies and the Munk School of Global Affairs at the University of Toronto
[120] See https://www.cicic.ca/1398/An-overview-of-the-Lisbon-Recognition-Convention/index.canada
[121] See http://www.groningendeclaration.org/

- What practices either current or suggested would result in more efficient student data exchange at the provincial and national levels?
- What areas for future research are suggested to advance discussions and activities in the area of student data exchange?

With respect to the first research question, the findings outlined in Sections 3.0 to 5.0 indicate the following:

1. Larger BC institutions appear to be better positioned to leverage automation opportunities that might result from electronic student document and data exchange. Smaller institutions appear to lack the technology infrastructure and resource capacities that will be needed to onboard to a national data exchange network.
2. BC is well positioned to engage in national and international student document and data exchange given the existence of EducationPlannerBC and the BC Ministry of Education's high school transcript depository and its related capacities.
3. Prioritizing a focus on onboarding all the post-secondary institutions to the provincial post-secondary transcript exchange system and capacities offered by EducationPlannerBC and the Ministry of Education will better position BC institutions to maximize potential opportunities with inter-provincial and international in-bound and out-bound document exchange and subsequent learner mobility.
4. The work of BCCAT and the University of British Columbia that focuses on expanding publicly available course equivalencies to include national and international decisions serves as an exemplar model for system coordination and will be a benefit to a national data exchange network.
5. In-bound and out-bound document pressures and the need to ensure officially verified academic documents are growing given enrolment increases; the resulting pressures impact across a host of student services and place increasing pressure on developing more scalable approaches to mitigating identity and document fraud.
6. Securing support from senior leadership and associated funding could potentially be a barrier to participation. Similarly, a commitment to current practices may be a barrier. Participation in a national network may be impacted by local IT and project management expertise.

Examples of organizations engaging in promising practices are noted in Section 3.0. One illustrative model involves the *China Higher Education Student Information and Career Center* (CHESICC) which is government mandated as the official source for most of the Chinese students' academic results (e.g., secondary credentials, Gaokoa results, etc.).[122] McGill University established Canada's first connection to CHESICC via the National Student Clearinghouse, an American not-for-profit organization that provides national data exchange and research supports to post-secondary institutions south of the border and around the world. In this example, students from China provide permission for CHESICC to send their official academic results directly to McGill through the National Student Clearinghouse. Other similar models exist around the world.

Section 6.0 contains the recommendations from the higher education community and concluding remarks. None of the participants involved in the research study indicated disagreement with creating a national network. In fact, most of the recommendations address implementation and governance questions. The benefits appear clear to the community and include service enhancements for students, processing efficiencies, and reduced fraud. Next steps for additional research include exploring data governance, operational governance models for the network, identifying a potential solution, and

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[122] See more details at CHESICC's website: https://www.chsi.com.cn/en/. The China Academic Degrees & Graduate Education Information service provides official verification of degrees. (see http://www.cdgdc.edu.cn/).

moving forward with implementation. This will include identifying pilot institutions, fleshing out the business cases, identifying the related data elements and mapping requirements, and conducting further consultation with the community.

The findings from this research will be of use to ARUCC and its partners on the national project; registrarial and pathway leaders involved in transfer and mobility practice and policy within higher education institutions; allied organizations such as BCCAT, EducationPlannerBC, the province's application and post-secondary transcript exchange service provider; and the government.

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9.0 Appendix A: Post-Secondary Institutions Interviewed

Institution	Region	Sector Affiliations	Other Details[123]
British Columbia Institutions Interviewed			
College of the Rockies	Cranbrook, British Columbia	BC Colleges, Colleges and Institutes Canada	Campuses: 7 Credential Offerings: diplomas, certificates, associate degrees, degrees, apprenticeship Enrolments: 2,009 full-time; 260 international; 330 apprentice; Website: http://www.cotr.bc.ca/
Douglas College	New Westminster, British Columbia	Colleges and Institutes Canada	Campuses: 2 Credential Offerings: degrees, associate degrees, post-degree and graduate diplomas Enrolments: 3,509 full-time; 6,787 part-time; 1,550 international Website: http://www.douglascollege.ca/
Kwantlen Polytechnic University	Surry, British Columbia	BC Association of Institutes and Universities (BCAIU), Polytechnics Canada, Colleges and Institutes Canada, Universities Canada	Campuses: 4 Credential Offerings: bachelor's degrees, associate degrees, diplomas, certificates, citations, apprenticeships Enrolments: 16,744 FTE domestic; 6,002 FTE international[124] Website: http://www.kpu.ca/
Langara College	Vancouver, British Columbia	BC Colleges, Colleges and Institutes Canada	Campuses: 2 Credential Offerings: certificates, diplomas, degrees, post-degree diplomas Enrolments: 6,388 full-time; 6,194 part-time; 2,942 international Website: http://www.langara.bc.ca/
University of British Columbia	Vancouver, British Columbia	Research Universities' Council of British Columbia (RUCBC), U15 Group of Canadian Universities, Universities Canada	Campuses: 2 Credential Offerings: Undergraduate and graduate degrees, certificates Enrolments: 37,366 undergraduate; 9,522 graduate; 15,000 part-time Website: http://www.ubc.ca/
University of Victoria	Victoria, British Columbia	Research Universities' Council of British Columbia (RUCBC), Universities Canada	Campuses: 1 Credential Offerings: Undergraduate and graduate degrees, certificates Enrolments: 14,304 undergraduate; 2,940 graduate; 4,500 part-time Website: http://www.uvic.ca/
Ontario Institutions			
Algonquin College	Ottawa, Ontario	Ontario Colleges, Polytechnics Canada, Colleges and Institutes Canada	Campuses: 5 Credential offerings: diplomas, certificates, degrees Enrolments: 21,106 full-time, 1,550 part-time, 1,300 international, 2,301 apprenticeship Website: http://www.algonquincollege.com
Cambrian College of Applied Arts and Technology	Sudbury, Ontario	Ontario Colleges, Polytechnics Canada, Colleges and Institutes Canada	Campuses: 3 Credential Offerings: diplomas, certificates Enrolments: 4100 full time; 168 part-time; 305 international; 100 apprentice Website: https://cambriancollege.ca/
Conestoga College	Kitchener, Ontario	Ontario Colleges, Colleges and Institutes Canada	Campuses: 5 Credential offerings: diplomas, certificates, degrees Enrolments: 13,775 full-time, 439 part-time, 2020 international Website: http://www.conestogac.on.ca/
Confederation College	Thunder Bay, Ontario	Ontario Colleges, Colleges and Institutes Canada	Campuses: 9 Credential Offerings: diplomas, certificates Enrolments: 8800 students Website: http://www.confederationc.on.ca/

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[123] Source for college and institute information (unless noted otherwise): Colleges and Institutes Canada. (2018). Our Members. Retrieved from https://www.collegesinstitutes.ca/our-members/member-directory/. Source for university information (unless noted otherwise): University Study Canada. Retrieved from https://www.universitystudy.ca – Note: this information was retrieved in Feb 2019 and is subject to change.

[124] http://www.kpu.ca/iap/iap-facts

Institution	Region	Sector Affiliations	Other Details[123]
Humber College Institutes of Technology and Advanced Learning	Toronto, Ontario	Ontario Colleges, Polytechnics Canada, Colleges and Institutes Canada	Campuses: 4 Credential Offerings: bachelor's degrees, diplomas, certificates, graduate certificates, apprenticeship programs Enrolments: 29,200 full-time; 23,000 part-time; 3400 international; 2000 apprentice Website: http://www.humber.ca/
La Cité	Ottawa, Ontario	Ontario Colleges, Association of Colleges and Universities of the Canadian Francophonie (ACUFC)	Campuses: 4 Credential Offerings: certificates, diplomas, advanced diplomas, graduate certificates, bachelor's, Enrolments: 4,557 full-time domestic; 316 international students[125] Website: http://www.collegelacite.ca/
McMaster University	Hamilton, Ontario	Council of Ontario Universities, U15 Group of Canadian Universities, Universities Canada	Campuses: 1 Credential Offerings: Undergraduate and graduate degrees and certificates Enrolments: 27,900 undergraduate; 4,200 graduate; 2,000 part-time Website: https://www.mcmaster.ca/
Ryerson University	Toronto, Ontario	Council of Ontario Universities, Universities Canada	Campuses: 1 Credential Offerings: Undergraduate and graduate degrees, certificates Enrolments: 27,600 undergraduate; 2,400 graduate; 13,000 part-time Website: http://www.ryerson.ca/
Trent University	Peterborough, Ontario	Council of Ontario Universities, Universities Canada	Campuses: 1 Credential Offerings: Undergraduate and graduate degrees, certificates Enrolments: 8,500 undergraduate; 500 graduate; 1,350 part-time Website: http://www.trentu.ca/
University of Guelph	Guelph, Ontario	Council of Ontario Universities, Universities Canada	Campuses: 1 Credential Offerings: Undergraduate and graduate degrees, certificates Enrolments: 24,000 undergraduate; 2,700 graduate; 3,500 part-time Website: http://www.uoguelph.ca/
University of Toronto	Toronto, Ontario	Council of Ontario Universities, U15 Group of Canadian Universities, Universities Canada	Campuses: 3 Credential Offerings: Undergraduate and graduate degrees, certificates Enrolments: 65,600 undergraduate; 17,900 graduate; 8,000 part-time Website: http://www.utoronto.ca/
York University	Toronto, Ontario	Council of Ontario Universities, Universities Canada	Campuses: 1 Credential Offerings: Undergraduate and graduate degrees, certificates Enrolments: 43,800 undergraduate; 4,400 graduate; 7,700 part-time Website: http://www.yorku.ca/
Alberta Institution *Note: this institution was added at its request.			
Medicine Hat College	Medicine Hat, Alberta	Comprehensive and Community Institution,[126] Colleges and Institutes Canada	Campuses: 2 Credential Offerings: certificates, diplomas, applied degree programs, college preparation, apprenticeship trades Enrolments: 8,000 students Website: http://www.mhc.ab.ca/

[125] https://www.collegelacite.ca/documents/10315/11593/La_Cite_SMA2_Final_Version_WEBFeb_16_2018.pdf
[126] The Government of Alberta's policy categories for post-secondary institutions follow a 'six-sector model' (Source: Government of Alberta. (Nov. 2007). Roles and Mandates Policy Framework. Retrieved from https://open.alberta.ca/dataset/f84f2391-0eda-45d3-a7c6-e19ca51a2d59/resource/1447ca1d-2370-4c2d-a55f-973197985e1b/download/4178234-2007-11-roles-and-mandates.pdf, p. 17).

10.0 Appendix B: Organizations Involved in the Research

Organization	Type	Region	URL	Sent Survey	Participated in Interview Process for ONCAT and BCCAT projects
BC Organizations Interviewed					
BC Ministry of Education	Government of British Columbia	British Columbia	https://www2.gov.bc.ca/gov/content/governments/organizational-structure/ministries-organizations/ministries/education	Yes	Yes
EducationPlannerBC	Application Centre	British Columbia	https://educationplannerbc.ca/	Yes	Yes
British Columbia Council on Admissions and Transfer (BCCAT)	Transfer and Pathway Organization; Data Repository Hub (for courses and agreements)	British Columbia	http://www.bccat.ca/	Yes	Yes
Organizations Interviewed from Other Provinces					
Alberta Council on Articulation and Transfer (ACAT)	Transfer and Pathway Organization; Data Repository Hub (for courses and agreements)	Alberta	https://acat.alberta.ca/	Yes	Yes
ApplyAlberta	Application Centre and Data Exchange Hub	Alberta	https://applyalberta.ca/	Yes	No
Campus Manitoba	Government of Manitoba	Manitoba	https://www.saskatchewan.ca/government/government-structure/ministries/education	Yes	Yes
Canadian Information Centre for International Credentials (CICIC)	Part of the Council of Ministers of Education, Canada (CMEC)	National	https://www.cicic.ca/	Yes	Yes
Council on Articulations and Transfer, New Brunswick (CATNB)	Transfer and Pathway Organization; planning a data exchange hub	New Brunswick	http://catnb.ca/	Yes	Yes
Maritime Provinces Higher Education Commission (MPHEC)	Inter-provincial research organization in the Maritimes	New Brunswick, Nova Scotia, Prince Edward Island	http://www.mphec.ca/index.aspx	No	Yes
Nova Scotia Council on Articulation and Transfer (NSCAT)	Transfer and Pathway Organization; Data Exchange Hub	Nova Scotia	https://www.mynsfuture.ca/	Yes	Yes
OCAS (the Ontario College Application Service)	Application Centre and Data Exchange Hub	Ontario	https://www.ontariocolleges.ca/en	Yes	Yes
Ontario Council on Articulation and Transfer (ONCAT)	Transfer Pathways Organization	Ontario	http://www.oncat.ca/	Yes	Yes
Ontario Universities' Application Centre (OUAC)	Application Centre and Data Exchange Hub	Ontario	https://www.ouac.on.ca/	Yes	Yes
Saskatchewan Ministry of Education	High school data repository	Saskatchewan	https://www.saskatchewan.ca/government/government-structure/ministries/education	Yes	No

Organization	Type	Region	URL	Sent Survey	Participated in Interview Process for ONCAT and BCCAT projects
SRAM (and through it to SRACQ, SRASL)	CEGEP Application Centres; Data Exchange Hubs	Québec	https://sram.qc.ca/ https://www.sracq.qc.ca/dossier/ https://srasl.qc.ca/	Yes - SRAM	Yes - SRAM

Note: this appendix was also included in the ONCAT study called, 'Advancing Student Transfer Through Enhanced Data Exchange'.

11.0 Appendix C: Overview of Regional Meetings Supporting the Research Process

Region	Type	Institutions and Organizations Invited	Audience	Number of Participants	Hosted by
BC Regional Meeting					
BC: pan-provincial meeting with the BC Registrars' Association	In-person meeting	All BC public and private post-secondary institutions	Registrarial leadership, BCCAT representative	29 registrars representing 29 institutions	Vancouver Island University
Regional Meetings held in Ontario *Note: funding provided by ONCAT for these meetings					
Oshawa/Durham	Virtual feedback session	Universities: Trent, UOIT Colleges: Durham	Registrarial and systems experts	4 people representing 2 institutions	Trent University
Kitchener, Waterloo, Saint Catherine's, London, Guelph, Hamilton	In-person feedback session	Colleges: Conestoga, Mohawk Universities: Guelph, Waterloo, Brock, Laurier	Registrarial and systems leadership and staff	18 people representing 6 institutions	Conestoga College
Ottawa, Kingston	In-person feedback session	Universities: Ottawa, Carlton, Queens, St. Paul's Colleges: Algonquin, La Cité	Registrar and systems leadership and staff, decanal leadership	11 people representing 3 institutions	Algonquin College
Sudbury	In-person feedback session	Universities: Laurentian Colleges : Collège Boréal, Cambrian	Registrarial and systems leadership and staff	5 people representing 2 institutions	Laurentian University
Ontario: pan-provincial session at the November 2018 Ontario college CRALO conference	In-person presentation and feedback session	All Ontario colleges across Canada OCAS	Registrarial and systems leadership and staff; representatives from other third-party organizations at conference (e.g., OCAS, ONCAT, vendors)	64 people from various colleges and allied organizations in Ontario	CRALO
Ontario University Registrars' Forum	In-person feedback meeting	All Ontario university registrars	Registrarial leadership	23 registrars	University of Toronto
Ontario University Council on Admissions	In-person feedback meeting	Ontario university admissions and liaison officers, registrars, ONCAT, International Baccalaureate Association, CRALO, Ontario Ministry of Advanced Education and Skills Development	Pan-provincial leadership in higher education	55 higher education leaders from across the sector	University of Toronto
Ontario College 'BOLT' (Banner) User Group	Virtual feedback meeting	Ontario college systems representatives for institutions that use Ellucian Banner	Pan-provincial system leadership in college higher education	7 people representing 7 Ontario colleges	Humber College
National Regional Meetings					
Canadian francophone post-secondary institutions	Virtual feedback meeting (conducted in French)	Colleges and universities across Canada that deliver francophone education[127]	Registrarial leadership	5 people representing 3 institutions	Organized by Primary Investigator for Project

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[127] The primary investigator invited members of the Association des collèges et universités de la francophonie canadienne (ACUFC), which includes 21 colleges and universities that deliver Canadian francophone education (http://acufc.ca/).

Region	Type	Institutions and Organizations Invited	Audience	Number of Participants	Hosted by
Canadian Association of Post-Secondary Electronic Standards Council User Group (CanPESC)	National workshop retreat meeting	Canadian and international institutions, organizations, and vendors involved in student data exchange	Data exchange experts	10 data exchange experts representing 7 institutions or application centres/data exchange hubs	CanPESC, PESC, Ontario Universities' Application Centre (OUAC)

Note: this appendix was also included in the ONCAT study called, 'Advancing Student Transfer Through Enhanced Data Exchange'.

12.0 Appendix D: Overview of Primary Canadian Organizations Involved in Post-Secondary Student Data Exchange

Region	Organizations	Transfer Organization	Application Centres	Data Hub	Data Exchange Services Provided (for admissions)			Total PSIs*	Total Organizations
					Application Data/ Document Exchange	Secondary School Transcript Exchange	PSI Transcript Exchange		
British Columbia (BC)	BC Council on Admissions and Transfer (BCCAT)	1						35*	38
	EducationPlanner BC		1		1		1		
	BC Ministry of Education			1		1			
Alberta (AB)	Alberta Council on Admissions and Transfer (ACAT)	1						25	27
	ApplyAlberta		1		1	1	1		
Manitoba (MB)	Campus Manitoba	1						9	10
New Brunswick (NB)	CATNB – Council of Articulations and Transfer New Brunswick	1					Planning	15	15
Newfoundland & Labrador (NF&LB)	No council or application centre							2	2
North West Territories (NWT)	No council or application centre							2	2
Nova Scotia (NS)	NSCAT – Nova Scotia Council on Admissions and Transfer	1				1	Planning	11	12
Nunavut (NU)	No council or application centre							1	1
Ontario (ON)	ONCAT	1						45	48
	OCAS Inc.		1		1	1	1	24 of 45 above	25 of 48 above
	OUAC – Ontario Universities' Application Centre		1		1	1	1	21 of 45 above	22 of 48 above
Prince Edward PEI	No council or application centre							3	3
Québec (QC)	CEGEP application centres[128]		3		3	3		48	51
	Bureau de coopération interuniversitaire (BCI)						1	19	20

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[128] Includes SRAM - service régional d'admission du montréal métropolitain; SRASL - Service Régional de l'admission des cégeps du Saguenay – Lac-Saint-Jean; SRACQ - Service régional d'admission au collégial de Québec.

Region	Organizations	Transfer Organization	Application Centres	Data Hub	Data Exchange Services Provided (for admissions)			Total PSIs*	Total Organizations
					Application Data/ Document Exchange	Secondary School Transcript Exchange	PSI Transcript Exchange		
Saskatchewan (SK)	Saskatchewan Transfer Credit & Pathways Council	1						8	10
	SK Ministry of Education			1		1			
Yukon (YK)	No council or application centre							2	2
Column Totals	Across all organizations	7	7	2	7	9	5	225	241

* Counts for private post-secondary institutions are included in select jurisdictions given the different quality assurance approval processes across the various regions. PSI counts are taken from government websites; not all are included as jurisdictions vary in terms of their quality assurance approach for defining trusted institutions. Inclusion in this chart is not intended to suggest every institution or organization is interested in participating in the national data exchange network. Rather, it is intended to demonstrate the potential scope of interest in a trusted national network. The numbers could fluctuate and are also dependent on future protocols for membership in a national network which have yet to be determined.

Note: this appendix was also included in the ONCAT study called, 'Advancing Student Transfer Through Enhanced Data Exchange'.

13.0 Appendix E: Detailed Data Findings

Table 9: Type of Data being Exchanged – BC versus Other Provinces

Region	BC Findings (n=18)				Other Provincial Findings (n=72)			
Data Category	Sending	% of BC Respondents	Receiving	% of BC Respondents	Sending	% of Respondents from Other Provinces	Receiving	% of Respondents from Other Provinces
Admissions data	6	33%	11	61%	48	67%	44	61%
Co-curricular data	1	6%	2	11%	8	11%	8	11%
Diploma data	6	33%	4	22%	35	49%	20	28%
Financial Aid data	10	56%	10	56%	51	71%	45	63%
Graduation Confirmation data	5	28%	1	6%	47	65%	11	15%
Language Proficiency data	1	6%	6	33%	10	14%	35	49%
PSI Transcript data	5	28%	8	44%	50	69%	51	71%
Proof of Enrolment Confirmation data	5	28%	3	17%	40	56%	13	18%
Secondary Transcript data		0%	9	50%	10	14%	54	75%
Other categories of student data electronically exchanged	1	6%		0%	2	3%	2	3%
Other examples cited	Sending: Graduation confirmation data Receiving: US Department of Education (Financial aid data); the College Board, ACT, TOEFL, and Naviance (Parchment) (Admissions info)				Respondents cited 'enrolment data beyond the transcript' without further details			

Table 10: Data Exchange and Data Storage Formats

Region	Data Format	EDI (ANSI X12)	Flat File	JSON	PDF	PDF/A	PESC XML	Other XML	Other (e.g., excel, publish into online databases, CSV, Access, Oracle, etc.)
BC PSIs (n=18)	For Sending	2	4		7		7	4	2
	% of BC Respondents	11%	22%	0%	39%	0%	39%	22%	11%
	For Receiving	2	**8**		**9**	3	**8**	**4**	2
	% of BC Respondents	11%	**44%**	0%	**50%**	17%	**44%**	**22%**	11%
	Local student data storage practices*	3			6		5	5	3
	% of BC Respondents	17%	0%	0%	33%	0%	28%	28%	17%
Other provinces (n=72)	For Sending	**19**	**30**	5	**35**	8	21	**45**	6
	% of Respondents from Other Provinces	**26%**	**42%**	7%	**49%**	11%	29%	**63%**	8%
	For Receiving	**26**	**29**	4	**39**	3	22	**39**	4
	% of Respondents from Other Provinces	**36%**	**40%**	6%	**54%**	4%	31%	**54%**	6%
	Local student data storage practices*	15	2		31		13	33	32
	% of Respondents from Other Provinces	21%	3%		43%		18%	46%	44%

Table 11: Data Storage Location Practices

Data Storage Practices	BC PSIs (n=18)		Other Provincial PSIs (n=72)	
Physical location on-site	14	78%	62	86%
Physical location off-site	7	39%	19	26%
In a hosted cloud storage	6	33%	16	22%
Other		0%	4	6%
Other details cited	One BC PSI reported using BCNET		Other provinces cited: Dossier étudiant partagé UQO, UQAR, UQAT; Skytech et réseau interne; hosted service onsite; laserfiche	

Table 12: Student Information Systems (SIS) used by Post-secondary institutions

Region	BC PSIs (n=18)		Other Provinces PSIs (n=72)	
Banner	4	22%	19	26%
Colleague	5	28%	6	8%
Peoplesoft		0%	12	17%
PowerCampus	1	6%	2	3%
Custom developed	4	22%	14	19%
Other	3	17%	19	26%

Other examples cited[129]	Jenzabar, Orbis, Rasors Edge, Clock, Unit4 student management system	Blackbaud, Agresso, Skytech, OnBase, Campus Management, Elevate, Crossroad

*Table 13: Online **Enrolment** Verification Services Provided – Post-secondary Institutions (Survey Results)*

Region	Yes	Yes, offered 'In-house'	Yes, offered through a third-party service	Not offered	No response
BC PSIs (n=18)	8	7	1	8	2
	45%	39%	6%	44%	11%
Other Provinces PSIs (n=72)	23	21	2	45	4
	32%	29%	3%	63%	6%

*Table 14: Online **Credential** Verification Services Provided*

Region	Yes	Yes, offered 'In-house'	Yes, offered through a third-party service	Not offered	No response
BC PSIs (n=18)	2	1	1	14	2
	12%	6%	6%	78%	11%
Other Provinces PSIs (n=72)	16	5	11	52	4
	25%	7%	15%	72%	6%

Table 15: Post-secondary Interest in Micro-credentialing and Badging

Region	BC PSIs (n=18)		Other Provinces (n=72)	
Yes, my PSI is engaging in micro-credentials or badging initiatives.	1	6%	2	3%
We are planning to do so.	2	11%	9	13%
No, we are not.	10	**56%**	52	**72%**
Don't know	3	17%	5	7%
No Response	2	11%	4	6%

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[129] References are noted verbatim from the survey responses.

Region	BC PSIs (n=18)	Other Provinces (n=72)
Comments or examples of micro-credentialing initiatives cited	'Early exploratory stage' or 'investigating' was cited by four with no details provided; some indicated they were offering them through Continuing Education (e.g., considering badges for courses like First Aid, Bear Awareness, Forklift Operators, etc.). One PSI indicated they have built a process that allows students to take non-credit courses or certificate programs that, after assessable assignments are also completed by the students, can be used as micro-credits (not micro-credentials) which can add up to replace some of the required credit coursework in some programs. They noted uptake was extremely rare.	Examples cited: Continuing education badges for select topic areas (or investigating this area); co-curricular badging under exploration; pilot projects underway in areas such as Business, Engineering, Continuing Studies One respondent indicated there are some concerns being raised about micro-credentialing without providing details.

Table 16: The Degree to which Onboarding to the National Network will be Impacted by a Focus on Other Organizational Priorities

	BC Organizations	% of BC Organizations	Organizations in Other Provinces	% of Organizations in Other Provinces	All Respondents	% of All Respondents	All Respondents (excluding Null)	% of All Respondents (excluding Null)
A great deal/ considerably	11	48%	53	56%	64	55%	64	65%
Moderately	4	17%	14	15%	18	15%	18	18%
Slightly	2	9%	6	6%	8	7%	8	8%
Not at all	1	4%	2	2%	3	3%	3	3%
Don't know	1	4%	5	5%	6	5%	6	6%
No response	4	17%	14	15%	18	15%	Not included	Not included
Column totals	23	100%	94	100%	117	100%	99	100%

Table 17: In-House Expertise to Handle Onboarding to the National Network (n=117)

Type of Expertise	Respondents	Yes, definitely	Yes, probably	No, definitely not	No, probably not	Unsure	No Response	Grand Total
Project management expertise	BC Responses	5	5	2	7		4	23
	% of BC respondents	**22%**	**22%**	9%	30%	0%	17%	39%
	Responses from Other Provinces	28	27	3	10	12	14	94
	% of Responses from Other Provinces	**30%**	**29%**	3%	11%	13%	15%	27%
	All Responses	33	32	5	17	12	18	117
	% of All Responses	28%	27%	4%	15%	10%	15%	100%
IT Expertise	BC Responses	5	5	3	5	1	4	23
	% of BC respondents	**22%**	**22%**	13%	22%	4%	17%	39%
	Responses from Other Provinces	32	23	2	10	13	14	94

Type of Expertise	Respondents	Yes, definitely	Yes, probably	No, definitely not	No, probably not	Unsure	No Response	Grand Total
	% of Responses from Other Provinces	**34%**	**24%**	2%	11%	14%	15%	27%
	All Responses	37	28	5	15	14	18	117
	% of All Responses	32%	24%	4%	13%	12%	15%	100%

Table 18: The Impact of Inflexible Systems on Capacity to Onboard to the National Network

Potential Impediment	Region (BC n = 23; Other Provinces n = 94)	A Great Deal/ Considerably	Moderately/ Slightly	Not at all	Don't Know	No Response	Total %
Inflexible IT systems (SIS, LMS, etc.)	BC	26%	35%	13%	9%	17%	100%
	Other Provinces	18%	45%	14%	9%	15%	100%

Table 19: Potential Impediments to Onboarding to a National Data Exchange Network

Potential Impediment	Region (BC n = 23; Other Provinces n = 94)	A Great Deal/ Considerably	Moderately/ Slightly	Not at all	Don't Know	No Response	Total %
Commitment to current processes	BC	22%	30%	22%	9%	17%	100%
	Other Provinces	21%	58%	18%	9%	18%	"
Inability to change current processes	BC	13%	39%	26%	4%	17%	"
	Other Provinces	13%	46%	21%	5%	15%	"
Lack of buy-in for a national platform solution	BC	9%	22%	39%	13%	17%	"
	Other Provinces	12%	37%	20%	16%	15%	"

Table 20: Ranking of Benefits that must result from the National Network (listed in order of priority)

Benefits	Very Important	Important	Moderately Important	Slightly Important	Neutral/No Opinion	Not Important
Improved Service for students	77	24	2		3	
	73%	23%	2%	0%	3%	0%
Enhanced efficiencies for students	69	31	3		3	
	65%	29%	3%	0%	3%	0%
Enhanced efficiencies for institutions	64	32	7		3	
	60%	30%	7%	0%	3%	0%
Improved Service for Institutions	60	34	9		3	
	57%	32%	8%	0%	3%	0%
Improved Service for Transfer Students	49	39	9	2	5	2
	46%	37%	8%	2%	5%	2%
Improved Services for International Students	42	41	15	2	4	2
	40%	39%	14%	2%	4%	2%
Improved Services for Exchange Students	23	45	25	5	7	1
	22%	42%	24%	5%	7%	1%
To aid transition to the workplace	22	28	33	10	8	5
	21%	26%	31%	9%	8%	5%
Other		2	1	2	98	3
	0%	2%	1%	2%	92%	3%

Region	No or limited intra-provincial/ territory high school to post-secondary exchange	No intra-provincial electronic post-secondary to post-secondary exchange	No or limited inter-provincial high school exchange	No or limited inter-provincial post-secondary to post-secondary exchange	No system-wide international exchange	No system-wide capacity to confirm registered student status at post-secondary institutions (from admission offer to graduation)	Limited national quality assured resources and tools to support admissions and transfer
British Columbia	Exists	Exists – not all post-secondary institutions onboarded (work in progress)	X – students can individually order and send their transcripts outside of province; bulk exchange with post-secondary institutions outside of province does not exist	X - 2 institutions only	X	X	Extensive provincially focused resources and tools available: province-wide application and transcript exchange exists for supporting applicants into BC institutions; high school province-wide transcript exchange exists; post-secondary transcript exchange exists with institutions being onboarded over time; province-wide pathway and course equivalency student database exists; extensive provincial transfer supports exist; a pilot project between BCCAT and University of British Columbia being pursued at time of research to enhance national and international course equivalency improvements
Alberta	Exists	Exists	X - AB and SK planning	X	X	X	Provincially focused: province-wide pathway and course equivalency student database exists; ACAT system building capacity towards representing equivalencies outside of province
Manitoba	X	X	X	X	X	X	Provincially focused: province-wide online course system exists
New Brunswick	X - NB planning	X - NB planning	X – NS & NB planning	X - NS & NB planning	X	X	Provincially focused: Province-wide pathway and course equivalency student database exists; Support available for PLAR; Extensive transfer and trend research available through MPHEC
Newfoundland & Labrador	X	X	X	X	X	X	
Northwest Territories	X	X	X	X	X	X	
Nova Scotia	Exists	X - NS planning	X - NS and NB planning	X - NS and NB planning	X	X	Provincially focused: Province-wide pathway and course equivalency student support exists Extensive transfer and trend research available through MPHEC
Nunavut	X	X	X	X	X	X	
Ontario	Exists	Exists	X	X - 11 only through OUAC	X	X	Provincially focused: Province-wide pathway and course equivalency student database exists through ONCAT; extensive research available
PEI	X	X	X	X	X	X	Extensive transfer and trend research available through MPHEC

Region	No or limited intra-provincial/ territory high school to post-secondary exchange	No intra-provincial electronic post-secondary to post-secondary exchange	No or limited inter-provincial high school exchange	No or limited inter-provincial post-secondary to post-secondary exchange	No system-wide international exchange	No system-wide capacity to confirm registered student status at post-secondary institutions (from admission offer to graduation)	Limited national quality assured resources and tools to support admissions and transfer
Quebec	Exists	Exists	Exists	X - CEGEP to OUAC only	X	X	Provincially focused: Inter-university provincial system exists to support studying at another university
Saskatchewan	X - SK planning	X	X - SK and AB planning	X	X	X	
Yukon	Exists - Through BC Ministry	X	X	X	X	X	

"X" equals *Does not exist;* Source for data: interviews, website reviews, ARUCC Groningen Project (http://arucc.ca/en/project-overview.html) – Findings as of July 2018; subject to change.

Note: this appendix was also included in the ONCAT study called, 'Advancing Student Transfer Through Enhanced Data Exchange'. Further details added to BC section in this version.