Digital Government

CASE STUDY SERIES

PULLING BACK THE CURTAIN ON DIGITAL TRANSFORMATION:

The Public Service Commission Application Rationalization Project:

PART I

'OPERATIONAL MATTERS'

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Contents

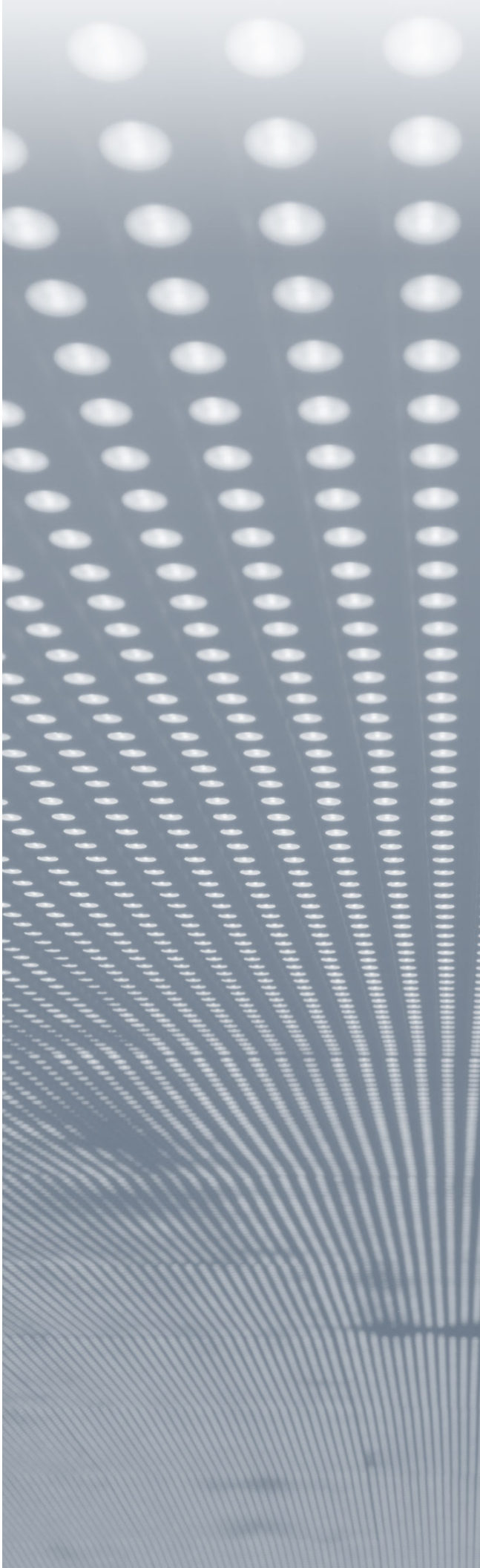
EXECUTIVE SUMMARY

Digital government is now widely celebrated and sought after but not always successful. It can produce checkered results or outright failures. Greater work is needed to distill learnings and best practices on how digital projects can be successfully undertaken. This two-part case study examines the near decade-long Public Service Commission of Canada's (PSC) Application Rationalization (AR) project. The AR project was launched to modernize and streamline essential public service testing services and outdated back-end systems that store and manage employment tests, related data, and other crucial supports provided by PSC to a range of Government of Canada partners. It was undertaken in a context when the PSC itself was undergoing significant staffing changes, organizational restructuring, and modernization.

AR suffered repeated delays, cost overruns, and outright project failures resulting in successive rescoping of the project to deliver workable products and services in 2020. Although the AR project highlights the importance of determined project team vision, intent and objectives, these characteristics were not clearly defined during multiple stages of the project. The project exemplifies the complexity of large scale digital government modernization. It required effective working relationships among various units and teams within departments, effective project management and governance, and attempts to deploy digital ways of working in public service environments that may feature cultural, organizational, resource, or leadership constraints.

This deep dive into the AR project focuses on a project with acknowledged failings and challenges. The study was undertaken with the expressed goal of surfacing key lessons learned and best practices to be shared within the Government of Canada and to others in the digital government space. Part I examines the direct and problematic operational and technical aspects of the AR project. Part II focuses on governance and performance management challenges and lessons. Together, these cases provided a fulsome analysis and broad suite of applicable learnings on a concrete digital government initiative.

Shining a light on missteps and failures is never easy but it is essential for advancing digital government. We thank the PSC who not only provided resources and independence to carry out this study. It also provided complete access to required documents and facilitated interviews with current and previous staff. They were candid and thoughtful in reflecting on the challenges and lessons to be drawn for students and communities of digital government practice. The accuracy and any errors in this case study are the authors alone.



1 INTRODUCTION

The Government of Canada is the country's largest employer with a core public administration complement of 287,978 personnel as of 2019 (Treasury Board Secretariat, 2020). This complex organization is staffed by employees that fulfill an array of duties spanning technical, scientific, administrative, and managerial categories, to name a few. The Public Service Commission of Canada (PSC) is responsible for ensuring the public service's professional, non-partisan status, and is a core institution that fulfills enterprise functions spanning the public service (PSC 2020a). The PSC operates business lines, through the Personnel Psychology Center (PPC), that support core functions for employee assessment and hiring. These include employee test accommodations, second language testing, occupational and leadership testing, 360-degree feedback, and departmental recruitment exams. To deliver these the PSC operates a complex information technology architecture including in-house development of applications and data management.

Launched in 2011 the Application Rationalization (AR) project was undertaken to modernize the various PSC IT infrastructure for testing applications and to ensure their continued viability and improve their functionality and user friendliness. There were real concerns the systems were not sustainable, limited the effectiveness of the PSC, and were costing too much to maintain. After a challenging start marked by poor project definition and scoping the next decade involved successive budget overruns, staffing and capacity issues, and product development and delivery delays. Mid-way through the project major staffing changes occurred with agile methods and new project management techniques adopted. Interviews and document analysis revealed initial aims and objectives were ultimately watered down, deliverables simplified, and functionalities and features were ultimately abandoned.

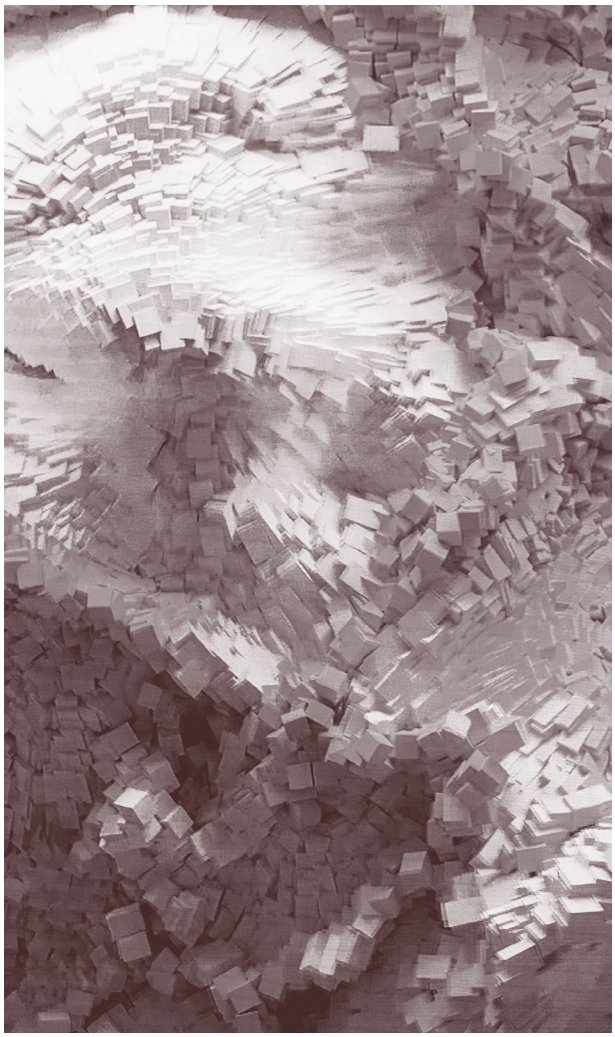
The AR case is an essential read for those interested in digital government as it exemplifies attempts to deal with two major issues in parallel - modernizing foundational technological systems and applications while concurrently optimizing a substantive program or service to improve efficiency and improve usability. Based on extensive document analysis and 11 in-depth interviews conducted with current and former PSC staff, Part I analyzes the AR project journey and surfaces a number of key learnings. It highlights how crucial early project budgeting, scoping, and specification work is and the serious costs associated with starting projects without appropriately resourced and dedicated teams. Part I also showcases the

pitfalls of only partially adopting agile methods, mid-way through a project cycle, within a project framework that remains 'waterfall' in nature. It demonstrates the issues that may arise when product development work is undertaken in outdated IT environments with teams working with inadequate tools. Positive learnings are also explored including the ability of PSC staff to deliver and build operational applications and products despite significant resource and tool inadequacies, and with shifting project goals. As of July 2020, the AR project is close to completion but was stalled by the outbreak of the COVID-19 pandemic with some features fully operational but others requiring additional development and testing.

2 ESSENTIAL CONTEXT:

The Public Service Commission of Canada

The official mission of the PSC is "To promote and safeguard a non-partisan, merit-based and representative public service that serves all Canadians" (Public Service Commission 2020b). As such it supports core functions associated with hiring and recruitment of public servants. The PSC manages critical testing processes and backend systems that facilitate the vibrancy of Canada's non-partisan professional public service. It ensures the merit-based hiring standards that the PSC is mandated to uphold for the entire public service.



The PSC has a long history of modernization. In the late 1960s Canadians began to see important changes as the Public Service Employment Act (PSEA) and Public Service Staff Relations Act (PSSRA) came into effect. The PSEA gave the PSC the responsibility for all the elements of the staffing process and the PSSRA created a collective bargaining regime in the civil service. Amendments that took place in the 1990s also expanded to afford greater flexibility for managers to respond quickly to changing operational requirements, or to allow employees to acquire new skills and enable the PSC to prescribe standards of competence to measure merit. The 2003 Public Service Modernization Act (PSMA) ushered in a new era of

human resources management in Canada's federal public service as the Public Service Employment Act emphasized the values of merit, non-partisanship, fairness, access, transparency and representativeness across the federal public service. Additionally, the PSMA, and its four supporting pieces of legislation, reorganized human resources management functions and responsibilities and it fundamentally changed the way federal public sector employees are currently hired, managed, supported and led. The PSEA effectively modernized staffing in the public service with a new definition of merit that moves away from the rules-based concept of "best-qualified" to a values-based approach that allows managers to hire more efficiently and to find the candidates who make the best fit for the organization.

The PSC has a long history of ensuring public servants are up to the job with initial testing services dating back to 1882, as part of the Civil Service Commission, and slowly expanded as the department progressed into a recruitment agency in 1908 (Testing in the Public Service of Canada 2009). It remains front and center in the Government of Canada's testing services and resources to ensure that important human resource management and personnel appointment decisions are well made (Testing in the Public Service of Canada 2009). The testing infrastructure, capabilities, and applications involved have evolved over the years. By 2010, an Internal Audit of Cost Management of Information Technology was conducted to assess the management of Information Technology Services Directorate's (ITSD) costs and the unit's efficiency and effectiveness. The audit found that PSC needed more integrated business and IT planning, meaning that the ITSD would take steps to improve the resource

allocation and investment prioritization processes to increase the transparency of IT operations in an effort to more effectively convey IT business value to help the PSC deliver on its mandate.

In order to deliver on its mandate, the PSC has expanded its assessment services. According to the PSC's 2014-2015 annual report, it has continued to increase testing capacity, with over 500 facilities and approximately 1,500 certified public service employees across Canada and abroad qualified to administer e-testing services as of the end of 2015 (Public Service Commission, 2015). The PSC also adapted a standard recruitment process in 2019 to take advantage of the in-person nature of the recruitment events: testing took place before applicants applied through GC Jobs. As reported in the PSC's Building Tomorrow's Public Service Today 2018-2019 annual report, this approach resulted in a 300% increase in qualified candidates over 2 years (from 20 to 80 a year), and a decrease in vacancies, from 36 to 21, with a projected further decrease to 8 by March 2020 (Public Service Commission 2019a). Most recently, the March 2020 "live" date has been extended due to the COVID 19 pandemic, which caused further delays in the project timeline.

2.1 Modernizing the Functionality of an Essential Institution

The 2000 Report of the Auditor General of Canada described the framework for human resources management in the public service, as controlled by the PSC, as “unduly complex and outdated” and “cumbersome, costly and outmoded.” In 2001, the Prime Minister committed to modernizing the public service so that it would continue to be “innovative and dynamic” (Office of the Auditor General of Canada, 2015). Early on in the PSC’s modernization efforts, a small allotment of IT resources were devoted to the conceptualization, consultation and research to modernize the critical system of Test Scoring and Result Reporting.

Both IT and program enhancements needed significant modernization in order to build reliable systems, streamline business processes and ensure that HR and testing information is readily available and accessible to all who need access. Long before the official AR project the PSC recognized the need to modernize vulnerable assessment systems crucial to the internal government processes. In the effort of modernizing an essential institution and to enhance public service operability and efficiency, the test result, ordering and inventory and test definition functions of the PSCs were of particular interest. They represent core capabilities that enable the PSC to fulfill its mandate. All of this context is important to keep in mind to understand why AR was launched - as part of a broader attempt to ensure core systems and functionalities were sustainable and modern.

3 RATIONALIZING PSC TESTING APPLICATIONS

AppRat (AR) is short for "application rationalization": the process by which application-based functions are streamlined for efficiency, standardized and centralized. The AR project is specific to the PSC's assessment systems, which reside within the Personnel Psychology Centre (PPC). This project has been executing since Fiscal Year 2010-2011 with the official objective of AR being the development of "User friendly interfaces and efficient management of PSC standardized tests and services from ordering through to delivery and test defense. The solution should be accessible, secure, seamless, and offer self-service to PSC clients" (PSC 2017, p.2). In other words, the objective was to consolidate operations under a common operating system in order to enhance interoperability, avoid duplication and waste, and permit organizations within the PSC to build on a common framework.

Incremental improvements and other changes to PSC applications had reached a point where few additional improvements could be made. Incompatibility between applications also created new problems, some of which could not be solved effectively within the existing system. A complete overhaul was necessary. Yet, the AR initiative was considered "low priority" until 2012, and while important changes were made in 2012 and 2014, AR was not considered "high priority" until 2017 when a request was made for the Executive Management Committee (EMC) to approve a deep dive analysis, which resulted in scope, funding, and the adoption of new Agile ways of working.

The AR initiative was originally conceived as an initiative that included the rationalization of:

- The Ordering Management Module (OMM)
- Online Training Facility (OLTF) Test Definitions and Catalogue Plan
- Catalogue Inventory Management Module (CIMM)
- Test Definition (TD)
- Test Migration (TM)
- APOLLO-CAMM

However, CIMM and the OLTF Catalogue Plan were de-scoped in 2018, when priority was placed on high throughput applications. In its current guise, AppRat consists of two "products" OLTF Test Definition (TD) and Apollo-CAMM, crucial for PSC recruitment and testing. AppRat also includes a Test Migration "sub-project" which entails transferring data from the old TSRR (which is being decommissioned as part of the AppRat initiative) to the new TD system.

Apollo-CAMM and TD are intended to be modern and flexible tests and test results management applications that facilitate PSC and its external clients to administer a variety of testing services across Canada that are reliable, secure and accessible. Although the new systems lack some of the functionality of the old, these applications are, on the whole, an improvement over the TSRR system. Not only because TSRR relies on obsolete "end of life" technology, but also because TSRR failed to meet security guidelines as laid out in the Security Assessment and Authorization framework. Moreover, TSRR did not comply with the Government of Canada's 2014 Common Look and Feel policy pertaining to digital services.

Apollo-CAMM is intended to serve as the "centralized source for candidate test data," and will replace the TSRR by bringing together candidate information, test history and scores, and other reporting functions. The Test Definition (TD) plan aimed to add a module to the OLTF environment that would allow authorized users to view, edit and manage Test Definitions (such as test availability, test block management, scoring keys, test content and measures). Development of the module is part and parcel to decommissioning the TSRR, as it is intended to replace the TSRR Test Definitions function.

The TSRR Test Migration (TM) Plan entails migrating and converting some four million pieces of PPC test data spanning a thirty-year period from the old TSRR system. The IT resource team oversaw migration, while the PPC subject matter experts (SMEs) applied user acceptance testing (UAT), after which tests were to be migrated to the production environment to be scored using the Scoring Web Service (SWS), which will replace the old TSRR scoring function.

TABLE 1 • AR Project Costs and FTE Allocations

Fiscal-year	ITSD			PPC			Total
	Salary	Non-salary	Total	Salary	Non-salary	Total	
2011-14	372,360	108,354	480,714	192,740	0	192,740	673,454
2015-16	225,870	65,010	290,880	25,390	0	25,390	316,270
2016-17	564,111	287,505	851,616	8,332	0	8,332	859,948
2017-18	637,000	907,000	1,544,000	391,853	12	391,865	1,935,865
2018-19	1,000,000	1,400,000	2,400,000	376,116	144	376,260	2,776,260
2019-20	977,000	932,000	1,909,000	316,857	4,687	321,544	2,230,544
2020-21	125,000	112,500	237,500	163,866	1,461	165,327	402,827
Total (2011-20)	3,901,341	3,812,369	7,713,710	1,475,154	6,304	1,481,458	9,195,168

Source: Provided to the authors by PSC, August 2020. Note the first row is the total spent over the first three years for assessment and planning prior to beginning the development.

The project began in 2011 and in its first three years cost approximately four hundred and eighty thousand dollars but as per Table 1 these costs expanded dramatically. This, as detailed below, reflects an increase to the scope and scale of the AR project as well as staffing and other operational requirements.

The new applications were expected to drastically reduce maintenance downtime, system outages and associated work stoppages. TD and Apollo-CAMM are also intended to permit greater autonomy for PPC staff when completing routine tasks, such as managing assessment tools, reducing the number of intervention requests directed to the Help Desk. Moreover, the AR would empower the PSC to leverage modern data reporting tools, which will permit the PSC to glean information about which PPC assessment features are used, and with what frequency, by users with particular roles. Finally, the modern programming frameworks and design used in the AR would facilitate maintenance and upgrading, allowing new business needs to be identified and integrated into the TD and Apollo-CAMM systems.

4 A CHALLENGING START:

Project Scoping, Specifications, and a Shifting IT Environment

AppRat (AR) began in 2011 as an IT project driven by the PSC Chief Information Officer (CIO). The early project period was dominated by activities and ultimately challenges involving the scoping of the project and detailed specification work around what the project would deliver. The project was driven by the IT side of the PSC that had noted an urgent need to replace, or at least fix existing backend systems that underpinned key PSC operational activities. The initial decisions around project specifications were made through an ad hoc group that included IT and some staff from the business side of the PPC.

Importantly, business requirements were not developed upon the initiation of AR. Rather, AR was intended as a replacement —a rationalization— of existing systems. The intention, at the start, was to convert desktop-based applications to web-based applications and streamline applications for user friendliness and to reduce maintenance costs. However, according to some interviewed problems arose as government-wide requirements mandated by Shared Services Canada (SSC) limited possibilities regarding access and security (Public Service Commission, 2019b, p. 20). Ultimately, although it was not evident early on, a one-to-one replacement strategy proved to be infeasible and resulted in significant challenges for the project as time went on (Interview 7).

During the early documentation and project development work, the Government of Canada moved to a shared IT infrastructure through the creation of SSC which became a department in 2012. SSC was created to manage and modernize IT for 43 departments. Its remit included servers, data centers, HR, and IT budgets, which saw it become a massive player in the Government of Canada's technical waterfront. The decision to create a shared IT infrastructure through SSC while allowing departments to continue to manage and develop applications and related programs and services has not been without its own difficulties (Office of the Auditor General, 2015). Several PSC staff interviewed noted challenges in working with SSC in their operational dealings as the AR project advanced. One respondent noted "so if you need storage space, if you need a server, it takes you maybe around six months to get it with Shared Services Canada" (Interview 5). The ongoing effects of having SSC now managing servers and other crucial IT

infrastructure meant that the AR team was unable to secure the IT development 'environments' it required. Several respondents noted that the SCC had a large number of other projects and priorities which meant that AR was not at the top of the list.

Operationally, the IT department first set about developing open source options. The PSC invested approximately a million dollars in a new environment with some of the technologies that the PSC wanted to leverage. However, the PSC's requested new environment was not properly conceived of by the PSC and when returned by SSC was not functional with the existing PSC needs and thus the decision was made revert back to the existing legacy environment.

At the outset of the project, the Second Language Evaluation – Billing information System (SLE-BIS), TRAK and Test Scorer Tracking System (TSTS) were identified for decommissioning with the rationale being that they would constitute "quick wins" requiring relatively little development work. Prior to 2017, the initiative was ITSD led on a part-time basis. Consistent with a waterfall project management approach, this work focused mostly on documenting the existing systems and determining project and product specifications.

2013-14 involved establishing business requirements for the new Ordering Management Module and Catalogue Inventory Management Module (OMM-CIMM). In 2014-15, the focus was reoriented toward high throughput non-Java PPC applications after Shared Services Canada (SSC) announced that non-Java applications would no longer be supported on the GC network infrastructure (Public Service Commission 2019b, p.20). Priority was given to decommissioning TICS, which was written in MS Access, and TSRR, which was written in Open Road. The replacement applications for TICS and TSRR were OMM/CIMM and CAMM. This highlights an ongoing issue with changes in the requirements on an IT/IM basis, as well as the needs to meet the functional expectations of the business side of PSC, which themselves were not always clear or well documented.

"We've never really hired new people with new skill sets from the outside; didn't leverage consultants too much or professional services for expertise. So [the] focus was really on reskilling the team there and hiring external people" (Interview 7).

By 2014-2015 it was evident that the problematic approach to scoping the project, including missteps around specifications of product and business needs, resulted in challenges in moving the AR forward. Indeed, based on interviews and official documents it appears that the first line of code was not written until 2017. Documentation exercises undertaken in 2014-2015 revealed the scope was too broad and complex for the project to be managed according to one schedule. The project was therefore broken out and to be managed as four sub-plans through the clarity of a dashboard tool. The sub-plans are TSRR Test Migration (TM); OLTF Test Definition (TD) and catalogue; OMM/CIMM, and Apollo-CAMM.

The fourth CIO joined the PSC in 2015, after an interim appointment had been filling the role since 2013. The new CIO brought a particular vision and approach to managing the AR project as part of the broader IT/IM suite of responsibilities. Staff interviewed noted that the new CIO dedicated significant time and resources to a much broader IT renewal and modernization which has direct implications for AR, one of which was personnel churn. Some staff

were intentionally nudged off the project while those that remained underwent additional training.

Personnel churn was not entirely by design, however, nor was it unequivocally positive. In 2016 PSC mandated that hiring and promotion within the IT shop would be contingent on the employee holding an acceptable post-secondary educational program in computer science, information technology, information management or another specialty relevant to the position, which resulted in loss of talent and institutional memory. In the words of another respondent:

I can't count the number of people who left because of that decision who were experts in PPC systems. It was a decision that was made for laudable reasons but the impact of that decision in my mind on IT and on this project was substantial. It meant that all the individuals who didn't have a university degree but who were very effective and in some cases even high performers in the organization realized 'I don't have career opportunities here that I will have in another organization' and they left en masse, in droves (Interview 3).

Capacity gaps and staffing were lasting issues for the AR project. Particularly for technical staff, at middle management and at the executive levels who had to invest in training and on-boarding. As another respondent explained: "Another one was their turnover of employees, people leaving and having to onboard new resources, that was a challenge to the project. As well as getting resources that are the right fit in terms of resources. People who have the qualifications that are required to do the project, and on our side, as hindsight, having people who know business. And not just projects" (Interview 6).

On one hand, interview respondents pointed to the need to bring in new personnel versed in modern approaches. Yet, on the other hand, respondents talked at some length about loss of institutional memory that accompanied personnel churn. The major issue seems to have been that knowledge of legacy systems was not widely held but was crucial for effective documentation and data migration to the new rationalized system. Entirely new staff, no matter how

adept at agile and modern programming tools, therefore, could not efficiently execute the AR initiative without input from long-time employees with knowledge of legacy systems. This was compounded by the lack of documentation on the business or programs side of what exactly was required.

5 MID-PROJECT PIVOT:

Adopting Agile, Continued Descoping, Persistent IT challenges

Towards the latter part of the 2015-2016 fiscal year, executive management approved to move to agile scrum methods in order to work as a more development oriented team. "Agile" is a term used to describe the experimental, trial-and-error nature that has been taken from the technology sector and applied to government program and service design and delivery (Mergel 2016, Mergel, Gong, Pertot 2018). Agile practices contrast sharply with the conventional "waterfall" approach to product development often used as a proxy for government policy making and project management more generally. Teams across government are adopting agile approaches as part of process and business redesigns, project management, and software development approaches (Mergel 2016, Mergel, Gong, Pertot 2018; Mergel, Ganapati, Whitford 2020).

This required the Business and IT team to have certain documents in place prior to starting a sprint cycle, including an epic document, the Minimum Viable Product (MVP) Release Roadmap and the Product Backlog. With documentation and work style adjustments set in place for the team to adopt Agile, the maintenance of a waterfall approval process, varying departmental capacity and a lack of adequate resources limited the PSC's full adoption of Agile. Interviews revealed that there was pushback from various quarters prompted by employee fatigue, significant turnover, the great number of business requirements that needed to be implemented in the project and the ambitious scope of work (Interview 8). In 2016 the PSC devoted significant time and resources to on-boarding agile for PSC Business and IT departments. By the start of 2017 agile methods including planning, documenting, coding, reporting had been introduced in the development teams and an agile coach was hired on contract. The push for an agile coach came from IT leadership who thought that the project team would benefit from a few months of expert coaching on agile best practices. The coach assisted the team in moving from a pure waterfall method to an agile hybrid method, which involved daily stand-up meetings and deployment sprint schedules.

At this point in the project, the adoption of agile emerged as both a challenge and an opportunity. Although the PSC brought in agile coaches and

undertook two rounds of agile training in the 2015-2017 period, employees were not assigned a specific role according to scrum methodology. As one respondent noted, "Everyone had a different idea of agile" (Interview 6). In addition, the move to a semi-agile from a waterfall approach also signaled that the project's leadership had to re-evaluate the project's scope in order to get a comprehensive and usable product at the end of the modernization process (Interview 4). The introduction of the contracted agile coach resulted in significant change in system development and impacted resourcing and training requirements as the project's scope continued to simultaneously transform. The ongoing changes in the project's capacity, resources and delivery expectations made the team develop more realistic timeframes and funding given various interdependencies with other PSC approved projects.

In addition, the agile method could simply not be pursued to its fullest form due to a lack of general team understanding and alignment between the PSC Business and IT teams that collaborated on AR. As more technical work emerged in the application's development, the team made an effort to plan and execute end-to-end testing and a deployment work schedule. It became difficult for the Business and IT project team members to follow a traditional and regimented agile approach as limited resources created an environment for iterations to be fictional and theoretical, rather than real and physically ready to be translated on to different environments for testing (Interview 7). The team also analyzed and improved resource allocation so that it assures workload is mapped to work capacity, and also improved their performance metrics for the general project and program predictability. For the sub-project, improvement implementation began regarding the planning for the tests being migrated and scored by the new IT scoring service (PSC 2019a, p.20).

Finally, there were technical issues and constraints. The project team was operating in a legacy development and test environment. The incompatibility of multiple environments (development, testing, quality assurance) featured

different configurations of hardware and software, which made the agile process more difficult if not impossible as it hampered quick deployments and testing. As one respondent put it, "one thing would work perfectly on two environments and then when we hit a new environment things are implemented completely differently, [which] was almost like going back to step zero to figure out what was going wrong" (Interview 4).

Thus, the lack of consistent available resources across PSC sectors created issues for the newly integrated team as product deployment schedules were attempted without success. Again, this was not exclusively attributable to the PSC but also the lack of responsiveness from SCC in delivering to ensure the PSC work could be completed.

The AR modernization project exemplifies what we term "faux-gile". That is an approach where agile is only partially implemented, and within a waterfall framework which leads to incongruities and suboptimal outcomes as neither approach is being applied in full.

> ***"Do Waterfall or do Agile. Don't try to do a mix of both. And if we want to do Agile, the PMO, the project management's office needs to be aligned with the latest Agile approach right? So you cannot ask the Agile folks to report using a Waterfall approach. If you want to do Agile, do Agile. If you want to do Waterfall, do Waterfall. But don't mix them together because it's confusing" (Interview 8).***

However, the agile methods used in this AR, coupled with the descoping detailed below, were useful in breaking through longstanding blockages and getting products delivered. AR was not considered "high priority" until 2017 when repeated delays and cost overruns attracted greater attention from management to move this project forward. A deep dive analysis was completed in 2017 to surface key issues and provided recommendations. The principal findings included a clear confirmation that the assessment systems

were vulnerable and lacked accessibility. Specifically, that the scope and complexity of the projects presented significant challenges which were documented and are being actively managed; the timelines, budget and resource requirements were significantly underestimated and had to be revised to reflect the number and complexity of the projects; that using PSC resources was preferable to out-sourcing due to the sensitivity of data, the steep learning curve and complex interoperability between systems; and finally that a significant gap existed in the documentation of the systems architecture which made modernization difficult (Public Service Commission 2017). Analysis revealed the sober recognition that after spending $1.8M of the approved $2.9M project budget, only 30% of the 'earned value', the expected work for the cost and personnel time, had been achieved instead of the forecasted 60% (Public Service Commission 2018a). In response, the project was substantially de-scoped, dropping the modernization of key PPC systems and key functionality. Further attention was placed on how agile methods and project management could be improved along with reviews of the project team structure and major resources invested in building integrated and dedicated teams for the AR project in the BDSD, ITSD, and PPC.

Continued challenges over the next two years saw a realignment exercise in April-May 2018 implemented to produce quantifiable performance estimates. The EMC approved a further reduction in the TSSR scope in June to "as is functionality of the current minimum viable product," provided additional resources of $1.1 million and extended the project schedule to March 31, the end of fiscal 2019. Descoping was justified under the assumption that "Continuing the project as is would require another partial year to complete the MVP. De-scoping the project will enable the release of a functional version of the system (v1) by year-end" (Public Service Commission 2018b).

After a change of CIO in July 2018, additional challenges came to light regarding delays associated with the transition to agile, environment instability, human resource attrition within the ITSD and workload underestimation. These challenges necessitated extending the time horizon yet again in late 2018 to June 2019 for TD and December 2019 for CAMM-APOLLO. Subsequently, emphasis was placed on developing thorough backlog documentation, rigorous end-to-end testing on each product component emerging from sprints, implementing associated high-rigour performance measurement, ensuring that all incoming staff received adequate training in agile methods, and allocating workshare according to capacity.

2019 saw further unplanned challenges continue to add to the delays and challenges for AR. One included a major unplanned challenge regarding the unavailability of a stable pre-production test environment caused by expired dependencies and missing data in the migration process. The issue was that data migrated from TSSR was incompatible with the replacement OLTF platform. The unstable environment problem was exacerbated by coding inconsistencies that arose from manual deployment of DataBase (DB) scripts. These problems resulted in a 3-4-month delay completing the Apollo-CAMM data conversion process, as implementation of Apollo-CAMM is dependent on the implementation of Test Definitions, which depend on complete migration of tests from TSRR. The consequence was a bottleneck between the product backlog and sprint cycles, as neither user testing nor internal testing could proceed without a stable pre-production environment. Thus, only some scheduled functionality was being completed. Interview respondents were clear that backlogs in obtaining environments were created by relying on SSC, which faced challenges in meeting delivery dates (Interview 8). By February 2019, the management was apprised of the fact that the schedule and cost estimates were out of alignment with progress on the project. Consequently, an additional (and final) request of $1.2 million was

made to wrap up AR. As one PSC staff explained, "it was like 'Oh, look at us, we don't have enough money or schedule – like the schedule's wrong and the money's wrong.' And it seemed to be a surprise – well it was a surprise to me" (Interview 1).

Management made two changes in 2018-2019 in an attempt to overcome technical and operational hold ups. On the technical side, they implemented DB scripts using Flyway as a solution to consistency problems associated with manual coding, which led to automated data migration to the OLTF. On the governance side, management established an Ad hoc Change Advisory Board (CAB) in order to expedite implementation of the pre-production environment by circumventing the need to wait for approvals previously granted the Monday of each work week. Nevertheless, interview respondents indicate that the approvals process was counterintuitive to agile: *"this was really, really, it is a heavy process because being in a project that you're trying to do frequent deployments in the agile methodology it was always in conflict with the way, with CAB advisory board wants stuff done and it slowed down the process immensely. So at one point we had to sit down with some of the managers of this advisory board to get a way to be able to deploy more frequently as the agile methodology would actually require for us to, more frequent deployments is a lot better for us so we can see progression. We had a lot of conflicts and it took a long time. We battled that for at least a year to get better processes in place. And even today it's still a fight" (Interview 2).*

In August 2019, pressure to meet revised timelines coupled with persistent issues regarding compatibility across environments came to a head. "March, April, May, June, we never got an earned value of what we should. Which means the project is not meeting its milestones, we're slipping behind" (*Interview 1).* As this respondent put it, *"the teams were just under so much pressure; almost*

crumbling." To salvage morale, a new project manager was brought in. *"I'll tell you, night and day. The team became motivated again" (Interview 1).* The managerial change and final budget request is reported to have set AR on the home stretch, albeit significantly descoped vis-à-vis the original vision which, according to multiple respondents, was overly ambitious.

2020 Project Completion, COVID-19, and Project Wind Down

Internal documents reveal that the overall assessment of the AR project were positive but given the projects history it continued to be 'red' in January 2020. This in spite of the introduction of agile methods in 2017, repeated project descoping, and project extensions and the provision of new additional resources (Public Service Commission of Canada, 2020c). Assessments indicate that the test migration and test definition aspects of AR were under control, but that Apollo remained problematic, though a successful demo was conducted in February 2020 according to staff interviewed. Enduring issues associated with the functionality of the APOLLO product in the three different IT environments and decisions to test every possible test definition instead of focusing on a selection of the most frequently used tests resulted in continued scheduling delays (Public Service Commission of Canada, 2020d). The PSC's introduced a 'close out' strategy to try and bring the project to a successful conclusion with an emphasis on improved collaboration amongst the ITSD and PPC staff but also continued attempts by the ITSD project manager and FAD to improve accuracy in measuring progress. By spring of 2020, at the time this case study was completed, the COVID-19 pandemic resulted in the AR product moving to a holding pattern with only essential maintenance work being done. The TD product was reported to be ready, albeit not yet "live," while respondents indicated additional work was required to get APOLLO to complete that aspect of AR.

6 KEY CHALLENGES AND LESSONS LEARNED

The above review of the major developments and evolution of AR points to several key challenges. Some are common to large scale transformation and digital government initiatives, but others were particular to the PSC and AR projects. Interviews also raised a series of important learnings that participants had taken away from their AR experiences that are certainly of value to others tackling important digital government modernization work. They are detailed under each of the challenges.

6.1 A Poor Start:

Inadequate Project Planning, Specification Work, and Interdepartmental Collaboration

One of the earliest challenges noted by a broad range of participants was around the project planning and specification of work. The project began as a relatively small IT driven refresh and evolved to become a massive business transformation project - to only to be rescoped several times to eventually deliver something more basic than originally intended. Too much time was spent early on in trying to develop specifications for builds that were inadequately informed by the business side of the PSC and were led by IT staff with limited business analyst support, and certainly inadequate engagement of the business side. As one respondent put it, “Both IT people and we as clients maybe didn’t understand from the get-go the complexity of building what we required, and I think on the IT side maybe underestimating the level of complexity of our features in the product” (Interview 6). This resulted in serious and lasting issues in being able to clearly define and communicate what AR would do and to ensure it served the functional business lines of the organization. A lack of focus on the business transformation - seeing this as an IT infrastructure system and program update - causes massive delays early on and problems in the ongoing development work. As two respondents explained:

Business was never the focus at the beginning. The business or transformation or improvement of the business, whatever you want to call it – even eight years ago – streamlining the business, that was never the focus of the project. And if that's not the focus of the project then, especially in this instance, we're losing a huge opportunity (Interview 1).

This is probably one of my biggest takeaways from that project. If you're not willing to invest in rethinking a business process, policies and programme regulations, then you're probably not ready for a new system anyway (Interview 7).

Further, those in the IT side of the project noted significant pressures and concerns as they were left to try and define and specify what objectives were. The lack of business transformation guiding the project intensified challenges later down the road as the project visions changed as new CIOs and PSC direction expanded the scope of the project. As one respondent explained "I didn't never really understand why the business wanted us to do the requirement. Later on I figured out that probably because they don't understand the business and they don't understand the system and there were many reasons for that" (Interview 8). In short, there was a lack of consistent and coordinated articulation of what AR was going to do, and the specific and concrete specifications of how it was to transform and deliver on the objectives, and a clear lack of definitive ownership and accountability for the project. IT staff felt like they were working without adequate specifications, and the business side felt that IT was driving the specifications work without understanding the business. The result was a succession of false starts and massive expenditures of energy and resources to repeatedly document and revise clear parameters to enable the work to get done.

Another major issue noted by several staff interviewed was a lack of a dedicated project team. Owing to the IT side launching the project it was not adequately staffed by a permanent full-time project team that included sufficient staff from the business side; that is, there was insufficient representation of business interests on the IT team initially responsible for the project's direction.

When asked for their key lessons learned one respondent answered "I think we should not have started any work without having a dedicated team from the program, from the business, doing the transformation and working on that. And not, like, saying OK we're going to give you this person for two months and this person for a month, and this person for a few weeks. That's, I think, the biggest things I would change." (Interview 5). Others noted that there simply was not the required staff and resources to complete the project leading to repeated descoping exercises. The corrosive effects of early missteps in defining the project vision, specifications, and resourcing the right team would have enduring effects on the development and repeated need for project descoping.

! KEY LESSONS LEARNED

Ensure that a project is appropriately scoped: Take great care in landing on realistic project objectives and understanding the required resources to achieve them. If possible, get the sign-off of all units or groups that will be required to achieve your goals, or understand the risks they are raising by not signing off.

Understand what is being transformed: Those involved in early decisions around a project scope and deliverables need to "understand the business" and the 'technical requirements' (systems, software, capacity, costs and benefits) if they are to transform it.

Ask the right questions, early and often. Executives in particular noted they did not ask the right questions or ask them early or often enough. For new executives coming in they need to ask (and understand) project history by reviewing key documentation on decision points and project management. It was also highlighted that executives need to overcome intimidation of 'tech' aspects of projects and seek out the staff that can help them ensure they understand how tech and business needs and constraints play out.

- Ensure IT and non-IT projects components are clearly demarcated and that personnel from both are involved early and collaborating well.
- Ensure that there is a dedicated team. Projects that are taken on on a part-time or side of desk basis are more prone to failure and ensuring that staff are focused on the project improves odds of securing early, and sustained wins.
- Ensure that budget and project costing are realistic and appropriate: costing and estimates need to accurately match specific and detailed project objectives.
- Communicate clearly with staff the project goals and be consistent in messaging: if project goals or objectives are evolving ensure they are communicated early.
- Establish adequate governance early on: be sure to provide some oversight and clear strategic direction but seek to minimize unnecessary process and bureaucratic gatekeeping.
- Revisit project management practices after a year and regularly thereafter: ensure that project management is effective, adequately resourced, and subjected to regular monitoring and evaluation.

6.2 Technical Challenges

Digital government often includes a range of new ways of working (agile, design thinking, interdisciplinary teams) but this should not discount the importance of the IT aspects of modernization and transformation projects. As mentioned in a February 2019 change request "the ability to address frequent system issues is risky as there is only one person within the organization who knows the coding language upon which TSRR is based." The AR case makes clear the significance of several IT specific challenges including a lack of documentation on legacy systems and architecture, insufficient and unstable IT environments, and rapidly evolving technological requirements and expectations for accessibility and other needs (PSC 2017, p. 9).

Some of the technical challenges were affected by managerial decisions and other aspects of governance. The Shared Services Canada (SSC) dependency was a source of frustration among many of the technical personnel interviewed for this study. There was also inconsistency among managers regarding preference for open source approaches versus out of the box software. Although the legacy systems used Open Road and Oracle, an early decision to implement open source software was reversed mid-course as it was not suitable for the project given its needs and the available resources and departmental capabilities. There was also some indication from interview respondents that the latest technology was not leveraged for AR. *"The main problem is that we're using technology that is 10 years old, it's like asking somebody from construction to use a handsaw and a nail with a hammer. I mean people are not using these tools anymore. But we're stuck with them. It's really frustrating" (Interview 8).* Moreover, non-current versions of dated technology contributed to problems identified above regarding compatibility between environments as well as the ability for different teams to work effectively. *"when deploying from one environment to another it was always, like, people pointing fingers, you know? 'It's not our network it's the*

code … We never really had access to the resources that were needed to quickly fix those problems" (Interview 8).

Limitations with respect to server capacity and human resources were also cited by interview respondents as hindrances. In many cases, these problems were institutional: "I would say red tape, sometimes I even say red duct tape because sometimes the processes are really sticky… the main one for the technical side is not being able to do continuous deployments. So everything is being automated. Having that would have helped us a lot for sure" (Interview 2). AR also suffered given the lack of investments in modernizing the approaches, tools, and capacities of the IT branch more generally. Without the right resources and working environment attracting top technical staff was all the more challenging. As one respondent explained,

> The IT shop had stagnated in the use of not just technology but methods, so it was a push throughout to try to modernize the entire IT organization. Also, to track the talent from the private sector who were used to working in this manner. They wouldn't come to a government department if they were used to working with the modern methods, modern technology, they would be completely turned off and just turn down jobs if we didn't really change the way we worked (Interview 7)

IT was clear however that the ITSD team had several talented and dedicated staff who have worked tirelessly to maintain legacy systems and find workarounds to challenges given the suite of available tools and software. One of the most specific and costly technical issues repeatedly

documented in internal reports and emphasized by those interviewed were the significance of data migration issues, specifically test migration and data corrections for some four million records that have impacted the project's delivery. One respondent indicated that "this project never took into account the workload needed to do data migration, and I'll tell you it was probably half the project in my estimation" (Interview 1). In fact, closer scrutiny found that data migration/data integrity issues account for the majority of the $693K variance (PSC 2020c, p. 7). The issues with data migration were linked to some of the other technical issues already cited, primarily a lack of investment in sustainable methods and staff, but also failures in appropriate documentation which lead to challenges for newer staff tasked with taking on the challenge. Someone explained "data is never as clean as you want it to be, and in an IT system there's always decisions in the design of a database that were done at the time, and then when you try to translate it to your newer database it never quite fits. And when you don't have the documented business requirements of the original design, and the changes of that design, you could call it drift; it drifts over time. And then you're trying to map the data, and it never quite works" (Interview 7). Apart from drift in design, unnecessary business complexity was cited by interviewees as a bane when it came to migration.

Lastly, the requirement to comply with policies and work with SSC, and their challenges to deliver given the low priority status of AR, resulted in significant spillover effects for AR. Several staff interviewed noted that they were essentially waiting for the SSC to deliver the infrastructure that was needed to advance AR deliverables. One interviewee captured the sentiment of issues flowing from major SSC delays by explaining "The core system, the thing that I need, it's like having a car without any engine. You have a car ready to go, no engine and the garage tells you we'll give you an engine don't worry. When? I need to plan my trip; I need my car to go to work. Don't worry it's coming. Well I ended up waiting three years for that" (Interview 8). Many respondents also dwelled on the challenges of having technical environments that were incompatible and the legions of time and resources spent on issues of compatibility where functions worked in one environment. That is, that the PSC own internal IT evolution resulted in serious compatibility issues. As one respondent put it:

Everything was constantly colliding with each other. They'd have multiple – say you needed a component application to be ready. In order to be able to test TD, you needed the scoring mechanism to be working but that's not urgent, was not in the right environment. There are a lot of bugs and efforts being expended trying to fix things that weren't actually issues apart from how systems were deployed or with regard for application builds were being deployed (Interview 9).

Operating environments, availability of tools and resources, and the impacts of government wide IT and IT/M shifts were major lessons learned communicated by technical and non-technical staff interviewed. Key lessons included:

Invest appropriately in maintaining your IT infrastructure and suite of essential programs. Band-aid and partial approaches to funding well operating IT infrastructure and essential architecture will eventually cause major challenges (and likely cost more to replace).

Ensure compatibility in your IT 'environments' (e.g. testing and Q/A) to allow for development work to be tested without issues.

Provide IT staff with the right tools for the job or be prepared for the costs of dated and inadequate alternatives. Examples included the lack of automation in the testing and Q/A with issues occurring due to manual input and human error.

Create and ensure a culture of IT documentation and build corporate institutional memory for IT/IM. Legacy systems that are undocumented and require reverse engineering to understand, operate, or fix drastically impact project timelines.

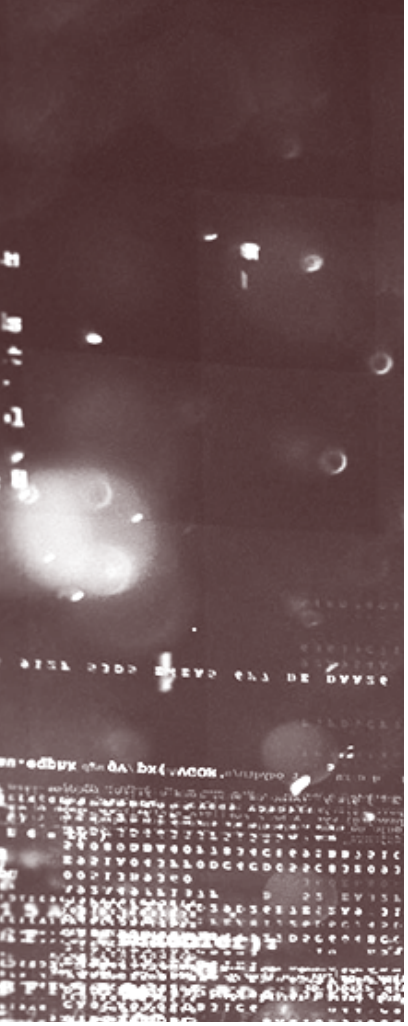
Avoid credentialization for the sake of credentialization. Ensure you have the capacity and capabilities to do the work required to crucial IT systems and products (e.g. dev-ops, Q/A).

Build in contingencies and review them often: if you are going to be forced to work with a corporate/enterprise wide IT/IM body. In this case dealings with SSC provided challenges and resulted in major project failures due to lack of appropriate contingencies.

Understand the trade-offs in software used: between open source and non-open source software, and in commercial off the shelf versus self-built applications and systems. Ensure adequate thought and commitment must be provided to avoid major swings in what is used which produces cascading effects for how project work is undertaken.

Project Management Challenges

One of the clearest challenges in the AR case was project management. Part II of this case study explores aspects of performance management and governance in more detail but challenges flowing from the churn of project managers, the approaches used by specific managers, and the general project management techniques and approaches were quickly apparent. Research suggests AR featured 8 project managers from 2011-2020 with most hired on contract from outside of the public service. The churn in project managers was clearly an issue with several respondents noting the resource intensity of going through transitions to new project managers. As one interviewee put it, *"we are on approximately the eighth or ninth project manager from IT on this project. As you can imagine, eight project managers in eight years doesn't make – is not conducive to really effective management of a project" (Interview 3).* While not always problematic, external project managers often required considerable time to familiarize themselves with PSC and public sector ways of working and cultures. Moreover, departures in Project Managers were problematic in some instances as they failed to document work or systems resulting in losses of institutional memory and knowledge that served to undercut the project's smooth progression. Staff interviewed noted that project managers could become indispensable in a problematic way if they were the sole source of institutional knowledge, as one respondent put it *"if they leave, they leave with the whole project and all the knowledge" (Interview 1).* They went on to explain that the role of the project manager requires the person to carry a wealth of knowledge regarding project expectations and scope, as well as the variety of leadership capabilities needed to communicate internally and externally in order to complete project tasks (Interview 1). Therefore, when previous project managers moved on from the PSC project, team morale and momentum would also be affected, and it would become the team's job to catch his or her replacement up to speed without losing progress. In the case of AR there were also tensions flowing from difference in the styles of project managers with some staff reporting that some project managers were too aggressive or sought to micromanage too much, producing tensions in the team



and exacerbating pressures from resource constraints. As one staff put it, *"the project manager on the project has to be like, they have, the role has to be, they have to follow their boundaries of the role that they've been given. They have to make sure that they don't overstep their boundaries and get too involved in the details of the project, they have to stay at the high level" (Interview 2).*

Many interviewed were candid and empathetic in noting that project managers faced significant challenges in coordinating various parties involved in the project from the IT side, which is not a homogenous group in and of itself, and the business side of the AR project. Some noted that there were frictions and tensions 'turf wars' over resources or authorities and permissions to work in particular environments or in the sequencing and management of development and testing work. As one staff member put it, *"dev has had some hiccups between clients and devs and also, I would say between devs and QA which are on the same side, you know, IT. I would say that communication was lacking" (Interview 6).*

From a project management standpoint, a clear challenge was managing and shifting resources and key working techniques and processes to adapt to the changing vision and on the ground challenges. Several PSC staff interviewed noted that in addition to the technical challenges owing to legacy systems and the late introduction of agile, there were more fundamental questions about the capacity of PSC to take on and execute a project of this size, given it had begun as an IT initiative and involved multiple systems and products. Several staff noted that churn in staff beyond the project manager as a major challenge one respondent indicated *"on my team there's a lot of turnaround, there's a lot of people leaving and new people coming in. So that takes a toll on our ability to meet deadlines because we're always looking for – doing hiring, trying to find people who have the right qualification or experience to help us with the project" (Interview 6).* The sense from more than one staff with long-term involvement in the AR project is that the project management challenges were simply too great, that regardless of who was in that role early decisions and existing resources and technical challenges, along with unexpected and external challenges such as the creation of SSC in 2011 resulted in a project that simply should not have been taken on. As one staff summarized:

We had a small shop doing small scale projects and we tried to take on much more than we could chew. This probably if anything should have been done externally. They should have tendered out the project if they really wanted to replace it. Or they should have just held on really tight to all the nice bells and whistles that they wanted to add because we got really caught up in the bells and whistles and a lot of money got spent there (Interview 9).

Ensure a strong culture of consistent documentation is introduced and maintained. Project managers need to ensure that adequate documentation exists to avoid issues during transitions to new staff or project development work. A consistent issue in AR was the lack of documentation costing massive time and resource losses for sleuth work, reverse engineering, and guess work.

Be cautious in using external project managers: PMs that are on contract from outside of the public service can lack a familiarity with cultural or departmental histories and practices requiring steep learning curves or resulting in team tensions. If using external PMs be sure to seek out a good fit and ensure adequate on-boarding.

Avoid unnecessary churn and frequent changes in project managers but do not be afraid to go bring on a new project manager if a project manager's approach proves toxic for the overall project (e.g. micromanaging or contributing to degradation of project team morale).

Ensure adequate processes are put in place for reporting and evaluation. See Part II of the case study for detailed examination of metrics and performance management. For project management this also extends to ensuring appropriate documentation of work as it is completed to avoid staff leaving with all of the project specific knowledge.

Avoid sunk cost traps: it was clear from speaking with senior folks involved in the project that some thought the project should have been terminated long ago when the scope and scale issues were first picked up. Executives need to be prepared to pull the plug on projects early if they are going to fail, or ensure they are properly resourced and fully backed as priorities.

6.4 Key Challenges of Adopting Agile in a Waterfall World (Faux-Gile)

The change in CIO in 2015 and subsequent adoption of agile scrum methods surfaced multiple key challenges. Those interviewed universally noted that agile was only partially adopted, or a blended or hybrid form of agile was at work. As one PSC staff person explained *"and being in government you can't be a true agile, the organization's not agile. The agile methodology was just actually done within the development team and with the clients in QA. So, I would call it an agile hybrid approach because you couldn't, you couldn't follow to the letter the whole agile process" (Interview 2).* As another put it there were some successes in using agile methods but they were applied in an incohesive way, explaining *"they tried to implement certain aspects of Agile but not far enough along and it wasn't well enough understood by both the solution side, ITSD, and the client side. So what wound up happening was each picked their own piece. Cherry-picked their own piece that would work and make their work easier but not understanding that it was going to make everything else harder (Interview 9).*

Ultimately, the PSC's team faced challenges when attempting to adopt a full Agile work methodology due to a number of factors regarding inadequate resourcing, a lack of topic knowledge and tools and the overwhelming nature of the application rationalization undertaking. Before JIRA, a modern Agile and product management tool was adopted, Microsoft Excel spreadsheets were used to log project progress. A lack of tools made for a difficult environment for PSC to onboard new members and to catch new folks up to speed as quickly as possible. Not only did staff have to work on project tasks, but also learn a new way of reporting, communicating and delivering their work, as the waterfall environment persisted but with additional agile checkpoints. One agile methodology checkpoint included the daily stand up meetings that both AR team members and senior leadership attended, which set out to speed up agile development goals and to allow teams to work more openly and identify blockers as soon as possible. As one PSC staff person revealed, "the conversations that needed to be had around that former iteration of the steering committee, they weren't happening. Because you can't have the kinds of frank discussion with leadership, and between leadership, when you've got employees in the room" (Interview 5). Too many voices around the table attributed to an unproductive decision-making environment and ultimately maintained the traditional waterfall hierarchies that worked to limit the flourishing of an agile workplace and successful product deployment targets.

Make decisions about project methods early and be consistent in applying them: Be sure to understand whether agile methods or waterfall approaches are better suited to your project. Take care in understanding the benefits and costs of both and what will work for your project and organizational culture and capacity.

Avoid faux-gile: avoid partially adopting agile methods, or adopting them mid-project cycle, while retaining 'waterfall' frameworks and techniques linked to project management.

Invest early and responsibly if pursuing agile (scrum or other). Ensure that resources and authorities are put into the chosen agile method. Onboarding most, if not all, key staff should be early and well supported.

Ensure that there is a baseline among all staff involved: in the process, including executives and project managers. Senior staff have to understand what agile is to support it.

Ensure that staff at senior levels understand how they can support agile. Determine practical and concrete ways that executives and managers can remove roadblocks, support work being done, and provide strategic direction and guidance.

Ensure you have the tools and infrastructure you require to maximize agile's effectiveness. If your IT infrastructure or capability won't allow you to practice agile, recognize that may be a major barrier and address that first.

Ensure that reporting and decision-making processes support agile methods and techniques. Do not add bureaucratic or heavy processes that will prevent agile methods from being fully realized.

Right size the project team(s): Too big a team can reduce the effectiveness of agile methods (e.g. stand ups and reviews). Think about the size and composition of staff who are going to be hands on with the project.

6.5 Budget and Resource Allocation Challenges

Staff involved in the AR project at various points in time noted that there were failings around how budgets were calculated and in how the AR project was resourced. This led to early challenges in accurate forecasting of staffing - and developer staff in particular - being available for AR. Interviews made clear that resource shortages were a broader problem for ITSD with impacts for a range of IT projects including AR. Budget documents indicate that there has been an upward trend in resourcing and staffing numbers, with full time staff equivalents (FTEs) nearly doubling in since 2011 (see Table 2). It confirms the limited financial and human resources available during the early AR period.

TABLE 2 • ITSD ten-year budgetary trend

Fiscal Year	Year-End							
	Salary			Non-Salary		Total Salary & Non-Salary		
	FTE	Budget	Actuals	Budget	Actuals	FTE	Budget	Actuals
2011-12	67	5,547,701	5,520,772	3,345,929	3,323,119	67	8,895,630	8,843,891
2012-13	63	5,682,084	5,660,382	2,464,688	2,325,888	63	8,146,772	7,986,271
2013-14	61	5,495,119	5,446,793	2,123,609	2,066,624	61	7,618,728	7,513,417
2014-15	60	5,446,976	5,290,070	2,438,078	2,360,667	60	7,885,054	7,650,737
2015-16	67	5,722,637	5,660,252	2,759,141	2,510,927	67	8,481,778	8,171,179
2016-17	79	6,411,291	6,105,198	4,373,210	4,196,668	79	10,784,501	10,301,867
2017-18	99	7,886,013	7,845,509	6,262,143	5,807,316	99	14,148,156	13,653,825
2018-19	111	8,641,195	8,627,194	7,597,799	7,442,768	111	16,208,994	16,069,962
2019-20	120	9,605,981	9,569,555	6,319,268	5,706,780	120	15,925,249	15,276,335
2020-21 Forecast (as at July 30th)	122	9,514,982	9,673,208	5,735,056	5,735,056	122	15,250,038	15,408,264

Source: *Provided by the PSC to the authors 7/30/2020.*

Resource issues were presented less about having the required financial assets to advance the project, but again were linked to not having the appropriate staff resources particularly when there were issues that required urgent attention. PSC staff noted that there was often a requirement to 'borrow' or wait on staff resources located in other units or working on other projects which contributed to major delays. As one respondent put it when asked about resources:

I think the project was tremendously under-resourced. For example, in the first few years IT had one to two resources dedicated to this. At its maximum, which is not far off where we are now, IT had upwards of 30 resources dedicated to it. I don't think the scale was appreciated. The ability to estimate how much the project is going to cost and how long it will take to do on this has been really bad. Really bad. I mean they always talk about Class D estimates in IT and these are Class ZZZ" (Interview 3).

Others interviewed noted that as increased resources became necessary, they were available, with the exception of some specialized and technical staff that were required to develop particular systems or products that had been built in house. Key lessons learned included:

Ensure that costing is accurate and associated to concrete deliverables and milestones. Staff noted that inadequate early resourcing was a major issue and that in future projects they would ensure that costs are linked to concrete deliverables - product development, coding hours, etc.

Appreciate the risks of spending more up front to save in the long run. Respondents noted that additional resources to properly cost and design the specifications (e.g. hiring a business analyst) would have added to initial costs but lowered the overall costs.

Ensure that resource allocations are linked to outcomes and monitor adequately. Part II of this case study will provide more in-depth examination of this, but it was clear that respondents felt the metrics for reporting were not the most accurate, nor did they facilitate budget adjustments as required.

7 CONCLUSION

Like many public sector organizations, the PSC recognized that their existing suite of IT systems and applications were dated and required urgent attention. The AR project speaks to the massive challenges of digital government transformation. In this specific case, updating the client-oriented products and services provided by the PSC to other federal partners suffered due to the inability to effectively integrate the needs and requirements of an IT modernization with a fundamental business transformation, and do so in a clear and consistent way from the project's launch.

Several rich learnings emerge from both an examination of the decade-long initiative related to how projects are scoped and consistent in communication and execution of the work - and secondly the issues with attempting to adopt agile methods when a project has already been designed with a waterfall framework. Clear missteps and changes in substantive direction combined with a lack of documentation - on both the IT and programs side – along with the loss of institutional memory and knowledge, particularly on the IT systems at hand, produced challenging working conditions and massive budget overruns and delays. AR failures are however also attributable to the broader system in which the PSC, and AR team were operating. In particular, staffing and resource changes to the PSC more generally with significant turnover both in leadership but also in operational staff. The Government of Canada's shift towards a shared IT infrastructure through the SSC also compounded many AR challenges insofar as it resulted in delays for viable environments to develop and test products. As one staff summarized:

Some people like me like to revisit history a little bit and suggest that AR is not becoming a success, but I think if you go back to the original scope of the project it was about revamping seven or eight different systems. It was going to take three years and it was going to cost somewhere around a million. Nine years later it's not just about a portion of a system. Its cost I would say probably is in excess of $10 million and it delivers on very little (Interview 10)

Despite this view and the many challenges and failures identified above, this study also provides tremendous learning for those seeking to undertake similar work. Many of the pitfalls and challenges could have been avoided, mitigated, or dealt with more fully and sooner. Importantly, the lessons learned above are generalizable to those thinking of adopting agile methods and that involve considerable transformation of business and IT infrastructure and applications. The steps taken by the PSC since 2019 have proven decisive in delivering AR, albeit with a much reduced scope than originally planned. Staff have stepped up and worked with capacity and tools that were available, and in ways that have challenged longstanding practices and departmental culture. Part II of this case study helps further clarify how governance and performance management undercut effective AR completion and provides additional lessons learned. Shining a light on challenging projects and acknowledging missteps and poor decisions is never easy, however as the many lessons learned above make clear they need not be repeated by others and can serve as guidance and learnings to help ensure effective digital government.

REFERENCES

Government of Canada. (2010). Internal Audit of Cost Management of Information Technology - Final Report https://www.canada.ca/en/public-service-commission/services/publications/internal-audit-cost-management-information-technology-final-report.html

Mergel, I. (2016). Agile Innovation Management in Government. Government Information Quarterly 33(3), 516–23;

Mergel, I., Gong, Y., Pertot, J. (2018). Agile Government: Systematic Literature Review and Future Research. Government Information Quarterly, 35(2): 291-98.

Mergel, I, Ganapati, S., Whitford, A. (2020). Agile: A New Way of Governing. Public Administration Review (ahead of print).

Office of the Auditor General of Canada.(2015). Report 4 – Information Technology Shared Services. Ottawa. https://www.oag-bvg.gc.ca/internet/English/parl_oag_201602_04_e_41061.html

Public Service Commission of Canada. (2015). Annual Report (2014-2015. https://www.canada.ca/content/dam/canada/public-service-commission/migration/arp-rpa/2015/rpt-eng.pdf

Public Service Commission of Canada. (2017). Executive Management Committee Deep Dive. Presentation provided by Public Service Commission of Canada.

Public Service Commission of Canada. (2018a) Project Review: Rationalization of Assessment Systems. Presentation to Executive Management Committee, June 2018. Provided to the authors by the Public Service Commission of Canada.

Public Service Commission of Canada. (2018b). Executive Management Committee Change Request document. Provided to the authors by the Public Service Commission of Canada.

Public Service Commission of Canada. (2019a). Building Tomorrow's Public Service Today 2018-2019. https://www.canada.ca/content/dam/psc-cfp/documents/publications/annual-report/ar2019-en.pdf

Public Service Commission of Canada. (2019b). Application Rationalization Stream 1, Project Charter. GCDOCS# 1719909, June 13, 2019. Provided to the authors by the Public Service Commission of Canada.

Public Service Commission of Canada. (2019c). Application Rationalization Project. Schedule & Financial Forecast Review. Presentation provided by Public Service Commission of Canada.

Public Service Commission of Canada. (2020a). About us. https://www.canada.ca/en/public-service-commission/corporate/about-us/raison-d-etre.html

Public Service Commission of Canada. (2020b). Vision, Mission and Guiding Principles. https://www.canada.ca/en/public-service-commission/corporate/about-us/vision-mission-guiding-principles.html

Public Service Commission of Canada. (2020c). AppRat Financial Update Sep 2020 Final VP, November 25. Presentation provided by Public Service Commission of Canada.

Public Service Commission of Canada (2020d). Application Rationalization Project Status Update for IMITC: January 2020. Presentation provided by Public Service Commission of Canada.

Government of Canada. Testing in the Public Service of Canada (2009). https://www.canada.ca/en/public-service-commission/services/public-service-hiring-guides/testing-public-service-canada.html

Treasury Board Secretariat (2020). https://www.canada.ca/en/treasury-board-secretariat/services/innovation/human-resources-statistics/population-federal-public-service.html

ANNEX 1 • ACRONYMS

1. Glossary and Acronyms

Term or Acronym	Definition
ACIIS	Assessment Center Integrated Information System
APOLLO	Term used to represent CAMM application
AR	Application Rationalization Project
ARC	Architectural Review Committee
BA	Business Analyst
BDSD	Business Development and Systems Division
SMC	Sector Management Committee
BPO	Business process optimization (BPO) refers to optimizing organizational activities by reducing and eliminating inefficient operational activities or enhancing value-adding activities.
BRD	Business Requirements Document
CAMM	Candidate Assessment Management Module
CIO	Chief Information Officer
DG	Director General
EA	Enterprise Architecture
ELs	Effort Levels
EMC	Executive Management Committee
EPIC	Document that defines the scope of an Agile project
FAD	Finance

Term or Acronym	Definition
FY	Fiscal Year
IM/ITC	Information Management / Information Technology Committee
IT	Information Technology
ITSD	Information Technology Services Directorate
OIMS	Order and Inventory Management System
OLTF	On-Line Training Facility
MVP	Minimum Viable Product
PIA	Privacy Impact Assessment
PMF	Project Management Framework
PPC	Personnel Psychology Centre
PSC	Public Service Commission
SA&A	Security Assessment and Authorization
SBD	Services and Business Development
TBS	Treasury Board Secretariat
TD	Test Definition
TSRR	Test Scoring Result Reporting
UX	User eXperience

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