

# **DRDC – Toronto Research Centre Individual Behavior and Performance Section Mental Health and Resilience Capability Review**

*Suggestions from scientific and research operations staff for greater access of external research capabilities*

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## Abstract

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Following the Defence Research and Development Canada (DRDC)'s agency-level review of science and technology (S&T) capabilities in 2015, Research Centres, Centre Directors (CDs) and their staff were asked to start developing practical and long-term options for ***greater access of external S&T capabilities***. At the DRDC – Toronto Research Centre, a one-day retreat was held in July 2016 with scientific and research operations staff from the Individual Behaviour and Performance Section (IBPS) to start planning for greater access. Following the retreat, senior Defence Scientists in each research domain in IBPS were asked to lead more in-depth discussions with scientific and research operations staff for future greater access of external S&T. These more in-depth discussions were meant to be a first step towards: 1) defining S&T capabilities needed to support activities within a given research domain, 2) identifying external S&T capabilities currently and previously accessed, 3) identifying mechanisms and incentives for future greater access, and 4) generating suggestions that can be used in a more formal planning activity with section, centre, and agency level staff (i.e., immediate line managers, chief scientists, centre directors, human resources, and external relations staff). This document summarizes suggestions for greater access of external S&T capabilities within the mental health and resilience research domain.

## Significance to Defence and Security

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This document is intended as a resource for future formal planning activities for greater access of external S&T within the mental health and resilience research domain.

## Résumé

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À la suite de l'examen des capacités en matière de sciences et technologie (S et T) réalisé en 2015 à l'échelle de l'agence Recherche et développement pour la défense Canada (RDDC), les centres de recherches, les directeurs des centres et les membres du personnel ont reçu le mandat de commencer à élaborer des options pratiques et à long terme pour assurer un meilleur accès aux capacités externes de S et T. En juillet 2016, au Centre de recherches de Toronto, on a organisé une journée de réflexion réunissant le personnel des opérations scientifiques et de recherche de la Section du comportement et de la performance de l'individu (SCPI) dans le but d'entamer la planification d'un meilleur accès. Après cette journée de réflexion, on a demandé à des scientifiques chevronnés de la Défense de chacun des domaines de recherche de la SCPI d'animer des discussions plus approfondies avec le personnel des opérations scientifiques et de recherche pour assurer un meilleur accès aux capacités externes de S et T. De telles discussions plus approfondies devaient représenter une première étape en vue de : 1) définir les capacités de S et T nécessaires au soutien d'activités dans un domaine de recherche donné; 2) déterminer les capacités externes de S et T qui font ou ont déjà fait l'objet d'une évaluation; 3) déterminer les mécanismes et les incitatifs pour assurer un meilleur accès; et 4) formuler des suggestions qui pourront servir lors d'une activité plus officielle de planification au sein du personnel d'une section, d'un centre ou de l'agence (soit les supérieurs hiérarchiques immédiats, les scientifiques en chef, les directeurs de centre, le personnel des ressources humaines et des relations extérieures). Le présent document est un résumé des suggestions qui ont été formulées pour assurer un meilleur accès aux capacités externes de S et T dans le domaine de la recherche en santé mentale et résilience.

## Importance pour la défense et la sécurité

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Le présent document se veut une ressource pour de futures activités officielles de planification en vue d'assurer un meilleur accès aux capacités externes de S et T dans le domaine de la recherche en santé mentale et résilience.

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# 1 Background and Objectives

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Recently, “[Defense Research and Development Canada] (DRDC) has reviewed its [science and technology] (S&T) capabilities (i.e., its investments in people and resources) in most domains in order to align investments with current and future needs of the organization and of the [Department of National Defense and the Canadian Armed Forces] (DND/CAF). This [review] was not driven by the need to generate savings or reductions, but to equip DRDC to answer future S&T questions. [The review] identified which S&T capabilities should be maintained or augmented, which could be shifted to new work areas, and which need to receive less investment *and shift to greater knowledge access and external partnerships* [emphasis added]” [1].

“In late 2015, the Research and Development Executive Committee (RDEC) endorsed several recommendations to rebalance resources across DRDC’s S&T capabilities, and directed the Director General (Science and Technology) Centre Operations (DGSTCO) to develop implementation options. Having studied the RDEC direction in greater depth, the DGSTCO Executive recognized that the implementation in [some].. areas will cross centre boundaries” [2], whereas implementation in other areas may be unique to a given Research Centre. “Research Centres, Centre Directors (CDs) and their staff will therefore need to develop practical and long-term options for *greater access* [emphasis added]” [2], both focusing within their centres and across all centres.

In July 2016, a one-day retreat was held at Denison Armory to jump start discussions around long-term strategies and plans for greater access and external partnerships at the DRDC – Toronto Research Centre. The retreat was limited to the Individual Behaviour and Performance Section (IBPS) at DRDC – Toronto Research Centre. Almost all of IBPS activities have traditionally had a significant access component (combination of industry, academia and allies). Thus, IBPS was seen as a logical choice for undertaking an initial review to: 1) identify existing collaborative networks and knowledge access, 2) forecast how these existing networks should be or could be expanded, and 3) identify incentives and mechanisms that could be used to expand knowledge access and external partnerships. The starting point for these discussions was existing in-house capabilities and current gaps in in-house capabilities. IBPS defence scientists (DSs) and research technologists (EGs) participated in the retreat.

Following the retreat, senior scientists in each research domain in IBPS were asked to pursue more in-depth discussions with DS and EG personnel contributing to that domain. One-on-one and small group meetings were conducted between August 2016 and January 2017 by the first author. This document summarizes the main themes that emerged from the retreat and the follow-up in-depth discussions.

This document is intended as a resource to help guide more formal planning activities within the mental health and resilience domain for greater “access” of external S&T. It is recognized some of these planning activities will take place at the local (IBPS and DRDC – Toronto Research Centre) level; however, sister organizations such as the Director General Military Personnel Research and Analysis (DGMPPRA) that also conduct research within this domain will likely also undertake planning activities for greater access of external S&T; Some of the suggestions in this reference document may have cross-centre relevance and may be of use to DGMPPRA and other sister organizations . Finally, it should be noted that many of the recommendations in this

document to increase access of external capability, especially with respect to incentives and mechanisms (e.g., new funding programs and mechanisms), will likely be implemented at the organizational (ADM S&T) level; thus, this document may be used as a resource for agency-level planning activities as well.

## **2 Some Background: Mental Health and Psychological Resilience Research at DRDC – Toronto Research Centre**

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Since the late 1990s, DRDC – Toronto Research Centre has undertaken research supporting soldier mental health and well-being. Early work focused on gaining a better understanding of the experiences of soldiers deploying in peace support operations. During the mission to Afghanistan, research sought to assess the post-deployment reintegration experiences of soldiers. Toward this effort, a multi-dimensional measure to assess and monitor family, work and personal post-deployment reintegration of Army personnel coming back from Afghanistan and of Air Force personnel was developed and validated. Research also sought to better understand the specific challenges faced by Reservists and Augmentees at various phases of the deployment cycle in order to better meet their needs. Ongoing research focuses on ways to test and optimize psychological resilience training in Canadian Armed Forces (CAF) personnel. This work has led to significant changes to training content, delivery, timing and dosage and has culminated in a randomized control trial. Research using epidemiological surveys to capture trends over time in the CAF with respect to accessing mental healthcare is also an active research area. This work captures both improvements in access to mental healthcare and areas of need, setting the stage for the next generation of investments in mental healthcare policy in CAF. Additional research foci include attitude formation and change, especially with respect to mental health, psychological resilience, and mental health service use, and moral and ethical decision-making, ethics training, and moral injury. Finally, efforts are underway to better understand the biological underpinnings of various operational stress injuries such as Posttraumatic Stress Disorder (PTSD) and to discover biomarkers of mental illness, recovery from mental illness, and optimal mental health.

### **3 Internal Capability in the Mental Health and Psychological Resilience Domain: Current Gaps**

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Historically, research in the mental health and psychological resilience domain has been conducted by scientists in the Psychology (previously the Resilience and the Stress and Coping) group. The training and background of scientists in the group have often been in Social and Abnormal Psychology, Applied Social Psychology, Clinical Psychology, Quantitative Psychology, and Industrial / Organizational Psychology; scientists with training and background in Clinical Neuroscience, Cognitive Neuroscience, Medical Sciences, and Physiology have also contributed to mental health and resilience research.

An important area of expertise in mental health and psychological resilience that cuts across almost all research activities is survey development and validation and psychometrics. It should be noted that the Psychology group used to have two senior scientists to support these important activities; both scientists have left in the last couple of years. The psychology group currently has no access to such expertise externally. A decision needs to be made as to whether this fundamental area of expertise that cuts across so much of the work that we do needs to be supported internally through the hiring of new DSs or externally through a memorandum of understanding (MOU) with a university/or universities. An important consideration here is the fact that most psychometric research has a timeline of multiple years—whether it is the initial development or the full validation of a scale is concerned. Thus, if hiring of term DSs is not an option, the access options that are put into place should be able to support long-term working arrangements, lasting 2–5 years per project. Another consideration in scale development, validation and psychometrics is that CAF clients and stakeholders in the Mental Health and Psychological Resilience domain, the Directorate General Health Services, the CAF Surgeon General's office, and the Army also currently lack scientists with this type of expertise but reach out to DRDC – Toronto Research Centre / IBPS to support research needs multiple times a year. Many of these requests are unexpected, unsolicited and require immediate action. Again, any MOUs with universities would have to be able to respond to such requests relatively quickly.

Another important area of expertise in mental health and psychological resilience that cuts across many research activities is study design for and statistical analysis of data from complex, large, epidemiological/population health surveys, and large public health interventions (i.e., randomized control trials, or RCTs). In recent years, there has been an increasing shift towards complex population health surveys (versus smaller, more opportunistic surveys) and intervention research (e.g., workplace mental health and psychological resilience interventions) from the Director General Health Services (DGHS). Current gaps in expertise in IBPS include design (e.g., sampling) of large, complex surveys and analysis of data from such large, complex surveys (i.e., population health, epidemiology, biostatistics), and advanced statistical analyses for data from RCTs. There seems to be some capability within DGMPRA for large survey design, however access to that capability by IBPS researchers has not been formalized previously. Currently, the Road to Mental Readiness (R2MR) RCT project is accessing this expertise at DGMPRA for the first time for the validation of various scales used in the RCT. Current and future experiences with accessing this capability within DGMPRA should help clarify what portion of IBPS scale development and psychometrics activities can be supported by DGMPRA and what portion may need to be supported through other means. Currently, informally reaching

out to our colleagues at DGMPPRA to access their scale development and psychometrics expertise when the need arises within a project such as R2MR has been sufficient; however, in the future, access efforts may need to be included in the formal DRDC program formulation process.

Regarding population health, epidemiology, and biostatistics expertise, DGHS has hired a number of researchers in these domains in recent years, however, given the ambitious mental health research program (and large number of research projects) of DGHS, it is unlikely that IBPS researchers can rely on this capability. Historically, for survey design and analysis of complex data we have accessed expertise from other federal public research departments (e.g., Statistics Canada) and academia. The means of access (i.e., various contracting mechanisms put in place in an ad hoc fashion) to meet specific project requirements that arise are at times time-consuming and not efficient; these may be improved upon by MOUs and standing offers, given that these capabilities are expected to cut across multiple future research activities.

Two additional, related in-house capability gaps in the Mental Health and Psychological Resilience domain include Bioinformatics and Big Data. Currently, a number of researchers in IBPS are leading efforts to uncover “biomarkers” for operational stress injuries (OSIs) such as posttraumatic stress disorder (PTSD). The analysis of biological samples collected as part of these efforts (i.e., Bioinformatics) requires access to very specific types of analytic expertise. Currently, we are using various contracting mechanisms in an ad-hoc fashion with universities to meet specific project requirements. Future efforts to access such expertise should be improved upon through longer-term MOUs and standing offers.

With respect to Big Data, it should be noted that both DND and Veterans Affairs Canada (VAC) healthcare systems are moving from a paper to a digital capture of health care data. In fact, both departments are currently implementing the same system (i.e., Client-Reported Outcomes Monitoring Information System (CROMIS)), with the hope of coordinating joint mental health outcomes research programs in the future. “CROMIS is a national, web-based software suite that supports ongoing, session-by-session client-reported mental health outcomes tracking. Although the client reports the outcomes, the data base does not have information that can be used to identify the individual” [3]. The databases that will be generated from systems such as CROMIS in future years will be large and complex enough that traditional data processing applications may be inadequate to analyze them. Access to external capabilities [both private (e.g., IBM, Microsoft, Oracle) and academic] for Big Data analyses will require MOUs and standing offers.

## 4 Past and Present External Collaborations and “Access” of External Capabilities

Table 1 below summarizes past and present collaborations of IBPS DSs with external partners, both academic and industrial. It should be noted that many of these collaborative relationships were fostered through personal/professional initiatives by defence scientists, **not** as part of a systematic organizational (DRDC-level or DRDC – Toronto Research Centre level) effort. Many collaborative relationships with academia were formed **before** the defence scientist joining DRDC (in which case, they tend to be long-standing), others after the defence scientist joining DRDC, in which case, they tend to be “ad-hoc”, (i.e., formed in order to fill a specific project requirement). Historically, there has been significant variability in support from management in initiating and maintaining these collaborative networks (e.g., with some managers viewing these as a distraction and others being more supportive).

*Table 1: Past and present external collaborations of IBPS.*

<b>Institution/ Organization/ Industry partner</b>	<b>Department</b>	<b>Overarching Research Area(s)</b>	<b>Specific Research Area</b>
Queen’s University	Psychology	Social-Personality; Clinical	Suicide; measurement
Queen’s University	Psychology	Social-Personality	Attitudes
Queen’s University	Psychology	Social-Personality	Romantic relationships
Queen’s University	Business	Organizational Behaviour	Emotion regulation
University of Toronto	Business	Organizational Behaviour	Power; aggression
University of Ottawa	Psychophysiology	Psychophysiology	EEG
Royal Ottawa Hospital	Various Departments	Psychophysiology	PTSD
University of Toronto – Mississauga	Psychology	Social Cognition	Social cognition

<b>Institution/ Organization/ Industry partner</b>	<b>Department</b>	<b>Overarching Research Area(s)</b>	<b>Specific Research Area</b>
University of Toronto	University Health Network, Sick Kids, Women's College Hospital	Psychology- psychiatry  Centre for Applied Genomics	Mood, biomarkers  Bioinformatics- biostatistics
McGill University	Psychiatry, Douglas Hospital	Psychology- Psychiatry	PTSD; mental health services research; epidemiology and biostatistics
Veterans Affairs Canada	Research Directorate	Epidemiology; Health Economics; Physical and Mental Health	PTSD; mental health services research; veterans' transition; chronic pain
Mental Health Commission of Canada	Research	Workplace Mental Health Interventions	Intervention efficacy research
York University	Psychology	Social-Personality	Stress; coping
McMaster University	Psychiatry	Neuroscience and Behaviour	PTSD; mindfulness; mood machine learning
McMaster University	Psychology	Neuroscience and Behaviour	PTSD
University of Western Ontario	Psychology	Neuroscience and Behaviour	PTSD; mindfulness; fMRI; EEG; neurofeedback
Walter Reed Army Institute of Research (WRAIR)	Psychology, Psychiatry	Neuroscience and Behaviour	Mood; biomarkers

<b>Institution/ Organization/ Industry partner</b>	<b>Department</b>	<b>Overarching Research Area(s)</b>	<b>Specific Research Area</b>
University of London (United Kingdom)	St. George's Hospital Medical School	Statistics and Epidemiology	Statistics; epidemiology
University of Calgary	Psychiatry	Neuroscience and Behaviour	Mood; biomarkers
IBM	Watson Infrastructure	Big Data	Miscellaneous
Human Systems Incorporated	Research	Field-Survey Research	Post-deployment reintegration / transition
CAE	Research	Field-Survey Research; Data Management	Training; mental health
Various Other Defense Contractors	Research	Field-Survey-Focus Group-one-on-one Interviews	Mental health and reintegration

Table 2 below summarizes various mechanisms that have traditionally been used by EGs to increase in-house research support capability through access of external capabilities. In small-group discussions, the EGs emphasized that due to the variability of the number and type of projects that are approved each fiscal year (FY), and as well, the unpredictability of the various delays to project timelines (e.g., approvals for access to the study population, contracting), it is difficult for the EG group to maintain a balanced workload within any given FY and to plan ahead for accessing external resources. Thus, external resources are accessed on an as-needed, ad-hoc basis; consequently, external access is neither efficient nor timely in many cases. A number of internal processes (e.g., project formulation, approval, the way in which EG support is requested by DSs, division of labour for accessing external research support capabilities (DS-led versus EG-led)) also need to be improved irrespective of the issue of greater access of external research support functions in the future.

*Table 2: Past and present access of research support capability by IBPS EGs.*

<b>Institution/Organization/Industry Partner</b>	<b>Type of Capability Accessed</b>	<b>Means of Access</b>
Various Defense Contractors	Printing (survey questionnaire booklets, consent forms, and information sheets)	Regular procurement, contracting
Miscellaneous	Data collection, management	Casual Employment
Miscellaneous	Programming, data entry	Co-op, high school student work placements
Reserve Force members	Data collection, management, analysis	Personal connections with the reservist community
Canadian Forces Environmental Medicine Establishment (CFEME) bioscience officers	Data collection, management, analysis	Personal connections within CFEME
Academia: Students working towards bachelor's, master's or Ph.D.'s	Data collection, management, analysis	Academic affiliations of various DSs

## 5 Future External Collaborations and “Access” of External Capabilities

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### 5.1 Goals

Moving forward, the *goal* for the Mental Health and Psychological Resilience research domain is to increase the network of external collaborative resources, both within academia and industry. An additional *goal* that goes beyond the size of this collaborative network is to increase the ease and efficiency with which the network can be accessed. In small group and one-on-one discussions with IBPS DSs and EGs, a number of mechanisms and incentives were proposed to optimize the size of the collaborative network, and the ease and efficiency of access.

### 5.2 Mechanisms/Processes

A number of mechanisms and processes were proposed in order to improve access of external capability in the future. First and foremost, a number of DSs, especially junior DSs, noted that the Centre currently does not hold any sort of annual research day, which many research and scientific organizations do. In the past, researchers working within the Centre would have a day or two during Program Review to hear about their colleagues’ work. However, Program Review was not open to external collaborators. In discussions around increasing access, there was a consensus that a research day (or research week) during which DRDC – Toronto Research Centre scientists present current work and network with external collaborators would be a good starting point for reaching out to *local* external resources and for networking with potential *local* collaborators, while keeping cost to a minimum.

In a related vein, both DSs and EGs noted that a number of weaknesses of our *internal* project formulation, approval, and implementation processes would ideally be targeted for improvement as we start planning for greater access of external S&T capabilities. For academic partners (and especially for junior researchers who are tenure-track), inefficiencies and long delays from project formulation to implementation are likely to be significant deterrents to collaboration with DRDC, even when significant funding is offered.

Currently the Canadian Institute of Military Veteran Health Research (CIMVHR) provides the best opportunity to connect with external partners at the *national* level, however, given that the annual conference held by CIMVHR (i.e., the Military Veteran Health Research Forum (MVHRF)) is only 2.5 days, there is limited opportunity to showcase DRDC – Toronto Research Centre mental health and resilience research programs, projects, and priorities and to network with external collaborators. It should be noted that CIMVHR has provided some support and funding for researcher-initiated efforts to connect at a more local level (e.g., the Greater Toronto Area (GTA)-Ontario collaborative group formed by Dr. Don Richardson, MD., and Dr. Maya Roth, Ph.D., both of VAC). These efforts currently rely on ad-hoc support from CIMVHR and are not well-publicized. They need to be formalized and better publicized. Furthermore, they should be extended beyond DND, DRDC, VAC and academic researchers to also include industry partners.

Current mechanisms of contracting both through usual procurement processes within DRDC and within the CIMVHR have limitations. While many DSs and EGs foresee continuing to use these mechanisms in the near future, partly as a result of the current lack of alternatives, they would like to see improvements in a number of areas. These include the speed and ease with which such contracts can be put in place, and a shift towards larger contracts for multiple years that allow a number of projects to be supported [e.g., Standing Offers, Task Authorization Contracts (TACs)], on an ongoing basis.

A number of programs exist within the public service for accessing expertise from other federal departments (e.g., secondments and Interchange Canada) [4]. However, these are poorly publicized and poorly utilized. A more proactive approach by Human Resources (HR) departments to help DSs and EGs to utilize such programs would include the steps of publicizing these programs within each section and centre and as well testing to see how well they work within specific projects; These carefully chosen “case studies” can establish how well these programs work and their strengths and weaknesses.

Establishing Memoranda of Understanding (MOUs) with various local and national universities would provide an additional long-term mechanism through which we can access external knowledge and expertise. A number of universities in the GTA house departments whose research programs have significant conceptual overlap with the work done at DRDC – Toronto Research Centre / IBPs in the mental health and resilience domain (e.g., the Centre for Addiction and Mental Health (CAMH) at the University of Toronto, and the Investigating Methods to Prevent, Assess, and Care for Trauma (IMPACT) Lab at Ryerson). MOUs with these and other research labs and departments within academia should be long-term and spearheaded by DRDC External Relations, with DS involvement as needed.

Engaging the Canadian academic community beyond the usual mechanisms of contracts and MOUs by standing up new organizational structures is important for long-term expansion of our collaborative network. Towards that end, a Defense Centre for Excellence in Human Systems Performance (HSP) is being stood up to form “a multidisciplinary, academic-led network of affiliates and stakeholders from across Canada, brought together to find innovative solutions to defence and security HSP challenges” [5]. While the Centre of Excellence in HSP currently does not include Mental Health and Psychological Resilience research as a focus area, including this research domain in the Centre for Excellence for HSP should be considered in the future.

In the past, some VAC/DND/DRDC researchers were able to use various international exchange programs (e.g., FULBRIGHT) to visit and collaborate with international external partners. However, these international exchange programs are not well-publicized and are infrequently used. In the mental health and psychological resilience domain, a number of opportunities exist at research labs in allied countries (e.g., Walter Reed Army Research Institute, King’s Centre for Military Health Research, and the Australian Centre for Posttraumatic Mental Health).

In addition to exploring the use of international exchange programs, participation in expert panels through the North Atlantic Treaty Organization (NATO) and the Technical Cooperation Program (TTCP) by DSs should continue to be encouraged. While the re-organization and restructuring taking place in some of these international programs (e.g., TTCP) has led to the temporary suspension of international activities within various domains, including the Resilience and Mental Health domain, there are many previous examples of DSs accessing the S&T capabilities that exist within our international partners as part of their TTCP and / or NATO panel member activities.

### **5.3 Incentives**

DRDC – Toronto Research Centre has a number of incentives it can offer to both academic and industry partners for collaborative endeavors. The first and foremost of these incentives is funding. It is important to note that there are a number of mechanisms in place whereby external collaborators can access DRDC (or joint DRDC, DND, VAC) research funding through DRDC’s partnerships with Canada’s research funding organizations in social sciences and health. For instance DRDC now has a partnership with the National Science and Engineering Research Council (NSERC), the Discovery Grant Supplements program, in addition to its long-standing and successful DND/NSERC Research Partnerships Grant program [6]. Current MOUs with large funding organizations such as NSERC, and the Canadian Institutes of Health Research (CIHR) should be further enhanced and expanded in order to engage academic partners in military and veteran mental health research. Establishment of Research Chairs in military and veteran health would also ensure longer-term, sustained research efforts within academia.

Another important incentive for academic partners, especially in the domain of mental health and psychological resilience is access to a unique population and unique work context. In a number of research topic areas (e.g., exposure to traumatic stress, posttraumatic stress disorder), academic researchers are highly motivated to access the CAF population as potential research participants. However, the caveat here is that access to CAF personnel will have to be approved with the CAF chain of command first. The CAF chain of command for access to study populations in the Mental Health and Resilience domain includes the DGHS and the CAF Surgeon General and as well the chain of command within each force element (i.e., Army, Navy, etc.). DRDC has traditionally played an informal facilitator role in linking academic partners with the right chain of command within the CAF. In the past there has been some lack of clarity as to how DRDC can best play this facilitator role. In the future, there needs to be a framework in place that spells out the process by which access to CAF members as potential research participants can be facilitated by DRDC researchers.

The CAF/DND has been a leader in developing and implementing psychological resilience training in the workplace setting (i.e., the Road to Mental Readiness (R2MR) program); workplace mental health and resilience research is increasingly an area of specific interest within the larger field of mental health and occupational health, both for first-responder organizations and civilians. Few employers in the first-responder or civilian sector can match the size of DND/CAF and most lag behind in their ability and commitment to develop and implement evidence-informed interventions. DRDC – Toronto Research Centre has a very active research program in psychological resilience research (i.e., implementation research, efficacy, training, development of apps, etc.), and is therefore a very attractive partner to other organizations with an interest in this area (e.g., the Mental Health Commission of Canada (MHCC), the Royal Canadian Military Police (RCMP), WRAIR, etc.).

### **5.4 Special Considerations, Caveats, and Conclusions**

As we move towards a greater access model, there is some uncertainty among scientific staff as to how much of that access will take the form of “collaboration” among equal partners and how much of it will take the form of “outsourcing”. While current communication suggests maintenance of in-house research capability (and thus the continuance of collaborations), there

needs to be a strategic plan as to what the appropriate balance of “collaboration” (i.e., DRDC and external partners working together) and “outsourcing” (i.e., DRDC minimally involved, only to provide guidance or oversight) will look like. Higher, organizational-level agreements with external partners (e.g., MOUs) will need to be flexible enough to support both models.

Additional concerns include how the DS Professional Development and career progression will be impacted by greater access of external S&T. Current DS career progression guidelines have an implicit assumption that DSs will develop strong programs of research to meet CAF/DND research needs and expectations at each DS level for each of the seven domains (Knowledge and Expertise, Personal Interactions and Communication, Creativity, Productivity, Impact, Recognition, and Responsibility) reflect this implicit assumption. To give just a few examples, it is unclear how a scientist who spends most of his/her time overseeing “outsourced” projects can “develop comprehensive expertise in his/her defence scientific field and understand the impact on related fields” (DS5 expectations for Knowledge and Expertise) [7] or can “develop complex frameworks that reside in different conceptual approaches” (DS 5 expectations for Creativity) [8].

EGs also have a number of concerns, including whether they can expect long-term job security (if their research support tasks are handed over to the bachelor’s level or graduate students of academic partners). Additionally, there is some concern about how the nature of the EG job may change if many of our research activities are taken over by external partners.

Finally, both DSs and EGs who participated in the in-depth discussions regarding greater access of external S&T for the Resilience and Mental Health research domain and who helped author this reference document recommend that a careful look at our own internal processes for project formulation, approval, and implementation be taken prior to attempting to fully engage external partners. As discussed in the previous sections of this report, greater access of external partners is unlikely to succeed if existing weaknesses in our internal processes are not addressed. Furthermore, previous external collaborations have raised a number of issues around sharing of intellectual property (IP) and copyright. These issues need to be specifically addressed in MOUs, contracts, and agreements.

With these caveats, DSs and EGs are enthusiastic about moving towards a model of greater external access that allows us to make even larger contributions to DND/CAF research priorities than we have in the past.

## 6 Conclusion

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This reference document captures the informal suggestions made by DSs and EGs in the IBPS for greater access of external S&T in the Resilience and Mental Health research domain. Some key themes to highlight among these suggestions are the following: 1) There are a number of capability gaps within this research domain, the most noteworthy of which is scale development and psychometrics. However, even where we have in-house capability (e.g., workplace mental health interventions), the current levels of demand in this research domain far outstrip supply. Thus, greater access of external S&T in the Resilience and Mental Health domain is a must; 2) there is a wealth of experience among the scientific staff in accessing external S&T on an as-needed, or ad-hoc basis for specific projects and many lessons learned for what works well and what does not; this wealth of experience helped generated a large number of informal suggestions that can be found in this reference document; however, the scientific staff will need to work closely with immediate line managers within their centres, and HR and external relations staff within DRDC to take these experiences and informal suggestions and turn them into a formal plan for greater access; and 3) while the scientific staff appreciate the justification for greater access and the viability of a number of mechanisms and incentives, they have some concerns regarding the impact of greater access of external S&T capabilities on their scientific career development; ideally, these concerns should be explicitly addressed in formal planning for greater access to help maintain employee engagement in the process.

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## Annex A Formatting Tips

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Below you will find helpful tips that will make your document look better and will help the Publication Officer to finalise the work required to get it ready for publishing.

### A.1 General Tips

- Do not use the hyphenation option provided by MS Word—it is not recommended.
- Ensure that the pages in the Front and Back matter are appearing in the correct order—see Table 2-1 in DRDC Publishing Reference Manual.
- Make sure that the Table of Contents, the Reference Section, and every new annex starts on a new, odd-numbered page.
- If you need to copy/paste text into your document from another source, use “Paste Special” and copy the text as “Unformatted Text” so as not to copy in any other unwanted coding that could corrupt your document, like Section Breaks.
- Be aware of the Styles that are attached to your text, headings and captions—they should all be named “DRDC”.
- If you need to place information in multiple columns, insert a multi-column Table instead to format the text—inserting columns using MS Word inserts Section Breaks, which can corrupt the format of your document.
- Do not spend a lot of time inserting hyperlinks into your document as they will be removed once the document is converted to PDF (Note: The PDF version of your document will be published with Bookmarks, which will help the reader navigate through the information).
- Do not use “underlining” for text, unless it is a [hyperlink](#)—if you need to apply emphasis, use bolding.
- There is no need whatsoever to insert a Section Break into your document—the Publication Officers will ensure that any Section Breaks required will be inserted during the formatting stage.
  - ♦ *Suggestion: If you feel there is a need, please add a note for the Publication Officer and they will contact you to discuss this requirement.*
- If you need to insert a Landscape page into your document, be aware that you have two options—you may insert it yourself (using the instructions provided on the SharePoint site ... use of these instructions is **strongly recommended**) or you may just note that the page should be landscape and the Publication Officer will format it for you.
- Check your references to ensure that there is only one reference per entry/number.

### A.2 Tips for Figures and Tables

- Ensure that figures and tables are placed directly after their reference in the text, or shortly thereafter ... they should not appear two or three pages after their first reference.

- Place figures inside a table to control their placement.
- Pay attention to the size of the fonts used in your figures and tables—take time to consider the readability of the printed version.
- Make sure that captions are placed properly—for tables they should appear **above** the table, and for figures they should appear **below** the figure ... they should also carry a period at the end “.”
- Insert captions properly using the function provided by MS Word<sup>1</sup>—if you don’t, your captions may not appear in the listings ...
  - ♦ *Tip: Copy/paste an existing caption in the Template and then just update the number (click on F9; do a Print Preview; or right-mouse click and update the field).*
- Take care when inserting sub-captions so they aren’t mistaken for paragraph text.
- If you have a landscape figure/table, place it in a landscape orientation and format the page appropriately—don’t force it onto a portrait page so that the reader of the electronic version needs to either adjust their monitor or tilt their head.
- Ensure that figures and tables in annexes carry the annex number and that the numbering reset to “1” at the beginning of each new annex.

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<sup>1</sup> MS Word 2003 = Insert/Reference/Caption; MS Word 2010 = Reference ribbon / Insert Caption.

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<p>4. AUTHORS (last name, followed by initials – ranks, titles, etc., not to be used)</p> <p style="text-align: center;"><b>Fikretoglu, D.; Blackler, K.; Boscarino, C.; D'Agata, M.; Muller-Gass, A.; Nazarov, A.; Pickering, D.; Saunders, D.; Smith, I.</b></p>		
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Following the Defence Research and Development Canada (DRDC)'s agency-level review of science and technology (S&T) capabilities in 2015, Research Centres, Centre Directors (CDs) and their staff were asked to start developing practical and long-term options for *greater access of external S&T capabilities*. At the DRDC – Toronto Research Centre, a one-day retreat was held in July 2016 with scientific and research operations staff from the Individual Behaviour and Performance Section (IBPS) to start planning for greater access. Following the retreat, senior Defence Scientists in each research domain in IBPS were asked to lead more in-depth discussions with scientific and research operations staff for future greater access of external S&T. These more in-depth discussions were meant to be a first step towards: 1) defining S&T capabilities needed to support activities within a given research domain, 2) identifying external S&T capabilities currently and previously accessed, 3) identifying mechanisms and incentives for future greater access, and 4) generating suggestions that can be used in a more formal planning activity with section, centre, and agency level staff (i.e., immediate line managers, chief scientists, centre directors, human resources, and external relations staff). This document summarizes suggestions for greater access of external S&T capabilities within the mental health and resilience research domain.

À la suite de l'examen des capacités en matière de sciences et technologie (S et T) réalisé en 2015 à l'échelle de l'agence Recherche et développement pour la défense Canada (RDDC), les centres de recherches, les directeurs des centres et les membres du personnel ont reçu le mandat de commencer à élaborer des options pratiques et à long terme pour assurer un meilleur accès aux capacités externes de S et T. En juillet 2016, au Centre de recherches de Toronto, on a organisé une journée de réflexion réunissant le personnel des opérations scientifiques et de recherche de la Section du comportement et de la performance de l'individu (SCPI) dans le but d'entamer la planification d'un meilleur accès. Après cette journée de réflexion, on a demandé à des scientifiques chevronnés de la Défense de chacun des domaines de recherche de la SCPI d'animer des discussions plus approfondies avec le personnel des opérations scientifiques et de recherche pour assurer un meilleur accès aux capacités externes de S et T. De telles discussions plus approfondies devaient représenter une première étape en vue de : 1) définir les capacités de S et T nécessaires au soutien d'activités dans un domaine de recherche donné; 2) déterminer les capacités externes de S et T qui font ou ont déjà fait l'objet d'une évaluation; 3) déterminer les mécanismes et les incitatifs pour assurer un meilleur accès; et 4) formuler des suggestions qui pourront servir lors d'une activité plus officielle de planification au sein du personnel d'une section, d'un centre ou de l'agence (soit les supérieurs hiérarchiques immédiats, les scientifiques en chef, les directeurs de centre, le personnel des ressources humaines et des relations extérieures). Le présent document est un résumé des suggestions qui ont été formulées pour assurer un meilleur accès aux capacités externes de S et T dans le domaine de la recherche en santé mentale et résilience.

14. **KEYWORDS, DESCRIPTORS or IDENTIFIERS** (Technically meaningful terms or short phrases that characterize a document and could be helpful in cataloguing the document. They should be selected so that no security classification is required. Identifiers, such as equipment model designation, trade name, military project code name, geographic location may also be included. If possible keywords should be selected from a published thesaurus, e.g., Thesaurus of Engineering and Scientific Terms (TEST) and that thesaurus identified. If it is not possible to select indexing terms which are Unclassified, the classification of each should be indicated as with the title.)

resilience; capability; review