Defence Research and Development Canada | Recherche et développement pour la défense Canada

DEFENCE R&D DÉFENSE

Challenges and Opportunities for Defence and Security Science in the Human Domain

David R. Mandel

Defence R&D Canada
Technical Report
DRDC Toronto TR 2012-124
July 2013

Canada

Challenges and Opportunities for Defence and Security Science in the Human Domain

David R. Mandel

Defence R&D Canada – Toronto

Technical Report
DRDC Toronto TR 2012-124
July 2013

Principal Author

Original signed by David R. Mandel

David R. Mandel

Sensemaking and Decision Group, Socio-Cognitive Systems Section

Approved by

Original signed by Keith Stewart

Keith Stewart

Section Head, Socio-Cognitive Systems

Approved for release by

Original signed by Joseph V. Baranski, Chief Scientist

Joseph V. Baranski, Chief Scientist

Chair, Knowledge and Information Management Committee

Abstract

The present document constitutes a White Paper submitted in advance of an inter-governmental US defence and security workshop entitled The Neurobiology of Political Violence: New Tools, New Insights. The author outlines some of the challenges and opportunities faced by the scientific and practitioner communities in attempting to forge robust, productive partnerships. The paper begins with a discussion of the basic requirements for success in plan execution. The author then discusses the importance of triangulating multiple considerations to ensure the integrity of plan success. Several challenges to and opportunities for scientist-practitioner partnerships in the human domain are then discussed.

Résumé

Le présent document constitue un Livre blanc déposé avant l'atelier intergouvernemental américain en matière de défense et de sécurité intitulé « La neurobiologie de la violence politique : nouveaux outils, nouveaux regards ». L'auteur souligne quelques-unes des difficultés et des possibilités auxquelles sont confrontées les collectivités de scientifiques et de praticiens en essayant d'établir des partenariats robustes et productifs. Le document commence avec une discussion sur les exigences de base visant la réussite de l'exécution des plans. L'auteur discute ensuite de l'importance de la triangulation de considérations multiples afin d'assurer l'intégrité de la réussite des plans. Ont ensuite été discutées nombre de difficultés et possibilités relatives aux partenariats entre les scientifiques et les praticiens dans le domaine humain.

This page intentionally left blank.

Executive summary

Challenges and Opportunities for Defence and Security Science in the Human Domain:

David R. Mandel; DRDC Toronto TR 2012-124; Defence R&D Canada – Toronto; July 2013.

Background. The present document constitutes an unpublished White Paper originally written for an inter-governmental US defence and security workshop entitled, *The Neurobiology of Political Violence: New Tools, New Insights*. The aim of the workshop was to explore the role of neuroscience and behavioural science in assisting the defence and security communities with their science and technology requirements in the human domain. The present report reproduces that White Paper as a DRDC Technical Report so that it may be disseminated for use by a wider audience.

Description. The aim of this document is to outline some of the challenges and opportunities faced by the scientific and practitioner communities in attempting to forge robust, productive partnerships. The paper begins with a discussion of the basic requirements for success in plan execution. The author points out that plans often fail because decision makers do not pay adequate attention to the confluence of necessary conditions for plan success.

In the second part of the document, the author discusses the importance of triangulating multiple considerations to ensure the integrity of plan success. The importance of triangulating evidence in science is briefly discussed as a prelude to discussing the importance of triangulating multiple considerations to ensure plan success within government and between government and non-governmental partners, such as academia. Two approaches to partnering with scientists are presented: the client-centric model and the partner-based model. The advantages of the latter, less hierarchical approach for forging robust scientist-practitioner partnerships are discussed.

The remainder of the paper highlighted several challenges to and opportunities for scientist-practitioner partnerships in the human domain. Some of the challenges identified include those that are conceptual. For instance, the author discusses how the "technology readiness level" concept might be replaced by an "impact readiness level" concept. Incoherence in orienting concepts, such as "radicalization", is also identified as a key challenge. Other challenges discussed focus on the potential for misaligned interests and cultural differences to impede the success of scientist-practitioner partnerships. The author proposes that an important opportunity for improving the chances of partnership success involves structuring opportunities for extended dialogue between scientists and practitioners. The author suggests that workshops, though stimulating, are generally insufficient to meet this need.

Sommaire

Challenges and Opportunities for Defence and Security Science in the Human Domain:

David R. Mandel ; DRDC Toronto TR 2012-124 ; R & D pour la défense Canada – Toronto; July 2013.

Contexte. Le présent document constitue un Livre blanc déposé avant l'atelier intergouvernemental américain en matière de défense et de sécurité intitulé « La neurobiologie de la violence politique : nouveaux outils, nouveaux regards ». L'atelier avait pour but d'explorer le rôle de la neuroscience et de la science du comportement à aider les collectivités de la défense et de la sécurité à l'égard de leurs besoins scientifiques et technologiques dans le domaine humain.

Description. Le document a pour but de souligner quelques-unes des difficultés et des possibilités auxquelles sont confrontées les collectivités de scientifiques et de praticiens en essayant d'établir des partenariats robustes et productifs. Le document débute avec une discussion des exigences de base visant la réussite de l'exécution des plans. L'auteur fait remarquer que les plans échouent souvent parce que les décideurs ne portent pas une attention adéquate à la confluence des conditions nécessaires pour la réussite des plans.

Dans la deuxième partie du document, l'auteur discute de l'importance de la triangulation de considérations multiples afin d'assurer l'intégrité de la réussite des plans. L'importance de la triangulation des données probantes en science est brièvement discutée comme prélude à la discussion de l'importance de la triangulation de considérations multiples dans le but d'assurer la réussite des plans au sein du gouvernement et entre des partenaires gouvernementaux et non gouvernementaux, comme le milieu universitaire. Deux approches à l'égard du partenariat avec les scientifiques sont présentées : le modèle axé sur la clientèle et le modèle fondé sur le partenariat. On discute des avantages de ce dernier, sans l'approche hiérarchique relative à l'établissement de partenariats robustes entre les scientifiques et les praticiens.

Le reste du document porte sur les nombreuses difficultés et possibilités relatives aux partenariats entre les scientifiques et les praticiens dans le domaine humain. Certains des enjeux identifiés comprennent ceux qui sont conceptuels. À titre d'exemple, l'auteur discute de quelle façon le concept de « stade de développement d'une technologie » pourrait être remplacé par un concept de « stade de développement des répercussions ». L'incohérence dans les concepts d'orientation, comme la « radicalisation », est également identifiée comme un enjeu clé. D'autres problèmes discutés ont porté sur des intérêts mal alignés et des différences culturelles qui risquent de nuire à la réussite des partenariats entre les scientifiques et les praticiens. L'auteur propose qu'une importante possibilité d'améliorer les chances de réussite des partenariats compred l'échange de dialogues élargis entre les scientifiques et les praticiens. L'auteur estime que les ateliers, quoique stimulants, ne suffisent généralement pas à répondre à ce besoin.

Table of contents

This page intentionally left blank.

On the Success of Plans

For our purposes here, let me begin with a general notion of a plan. A plan simply involves the implementation of a scheme for translating a goal into its realization. The scheme may be more or less articulated, and its implementation more or less formalized.

In a military context, a plan (according to the foregoing notion) can pertain to tactical, operational, or strategic levels of war. It may apply equally to the level of grand-strategy, which transcends a purely military focus.

The main point I would like to make here is that for a plan to succeed, *all* of the *necessary* conditions must be met.

Because a single necessary condition that is unmet is, by definition, sufficient to thwart the success of a plan, the probability that a plan will fail ought to be roughly proportional to the number of necessary conditions entailed.

This is true, however, only in a fairly restricted range corresponding to the upper limit of working memory (let us be generous and say 7±2 necessary conditions, in honor of George Miller's 7±2 "chunks" of information).

Beyond that limit, there ought to be a discontinuity represented by a steep rise in the probability of failure, which should quickly reach its asymptote.

Hence, most complex plans fail—unless great care is paid to meeting all the necessary conditions for success—or unless one is extraordinarily lucky, the latter being, by definition, a low probability event class.

Of course, meeting all the necessary conditions for the success of a plan is not necessarily sufficient to ensure its success. The success of a plan requires that at least one sufficient condition for success be met. Usually, all the necessary conditions form part (but not necessarily all) of the sufficient condition (or "super-condition") for the success of a plan.

Disregard of the foregoing simple formulation—namely, that the success of a plan boils down to meeting all of the necessary conditions plus at least one sufficient condition for success—is, I propose, why most great ideas nevertheless fail.

How is this relevant to the present discussion regarding what neuroscience can contribute to our understanding of political violence?

It is relevant because the defense and security community's interest in social, behavioral, and cognitive science—and *neuro*science—is also goal (and plan) oriented.

Science is of interest precisely because it would seem to offer the potential of raising the probability of success for at least some plans that the defense and security community hope to implement so that the goals they map onto might be effectively realized.

Triangulation as an Orienting Concept

Success in harnessing the behavioral and brain sciences for such goals requires many things. In this paper, I'll try to couch these in terms of a set of considerations that must be *triangulated*, if we are to make the most of our scientific investments. I'll introduce most of those considerations in the form of various challenges and opportunities they pose for the defense and security establishment.

I like the term triangulation because of its importance even in purely scientific terms. We triangulate different sources of evidence to ascertain how much confidence we should have in various hypotheses.

Triangulation of this sort can take various forms. For example, one would likely express greater confidence in a hypothesis that received support from three studies coming from three independent laboratories than from three studies coming from a single lab. It would be even better if the three investigators in the separate labs had a history of disagreement. Their agreement in the given case would thus signal a difference from the background, and hence be more informative.

Triangulation across independent sources is often informative precisely because we do not want to count redundant information as if it were non-redundant, and we would rather spend our time assessing the probative value of unique pieces of evidence than spend our time wondering whether the information at our disposal is in fact unique.

Similarly, scientists often triangulate findings from different types of data (e.g., choice measures, reaction times, and patterns of neural activation) in an effort to ascertain the strength of support for various hypotheses, models, or theories.

Indeed, Oshin Vartanian and I (e.g., Vartanian & Mandel, 2012a) have recently argued that the most significant contributions of social and cognitive neuroscience to our understanding of decision making will have more to do with its potential to provide new forms of empirical tests of putative formal and final causation—namely, tests of structural and functional models or theories of decision making—than with its potential to reveal the material causes—namely, the neural substrates—of decision making.

Some thinkers also triangulate findings and ideas across fields or disciplines in order to identify apparent inconsistencies that might need to be resolved before a broader theory that exhibits as much internal coherence as a current narrower theory could be advanced.

For instance, a number of experimental psychologists (e.g., Sloman, 1996; Stanovich & West, 2000) have posited that there are two distinct systems of thinking and reasoning—one that is evolutionarily older, more intuitive, and automatically invoked (sometimes called "system 1") and a more recently evolved system that is rule-governed and that requires more effort to bring to bear on a problem or task (sometimes called "system 2").

It would seem that cognitive neuroscience could yield important evidence for testing the strength of such accounts (Vartanian & Mandel, 2012b). If distinct reasoning systems are in fact invoked under different circumstances, then we should be able to identify variations in the pattern of neural activation as a function of the system presumably invoked under a given set of conditions.

In other words, neuroscience would allow us to triangulate our extant behavioral findings with neural findings from experiments specifically designed to provide rigorous tests of theoretical propositions or predictions.

In the realm of defense and security science, triangulation takes on significance in other ways. The scientist's activities must be triangulated with the goals and interests of stakeholders.

Both the scientists and the immediate stakeholders in the defense and security community ought to also triangulate their intent and behaviors with prescriptive considerations that go beyond the immediate goals and plans being served. These considerations may have to do with legal or professional obligations, moral and ethical principles, or considerations of accountability to broader constituencies.

Failure to triangulate considerations in this manner can lead to the unintentional subversion of goals and plans at higher levels of decision-making. Science that nourishes a few trees but harms the forest of which they are part metaphorically depicts this type of failure.

For instance, a government's strategic objectives may involve a "whole of government" approach. For the government's strategic plan to work effectively, there must be "interoperability" among the various governmental departments involved in implementing the plan. This is another way of saying that the goals, plans, and actions of those various departments must be triangulated amongst themselves and with the broader objectives they are meant to serve.

This, in itself, is no simple matter. Interoperability can fail because the higher-level goals are not clearly communicated, internally inconsistent, or even absent. Gordon Adams (see Adams, February, 2010), for instance, in discussing the Quadrennial Diplomacy and Development Review suggests the potential for this type of failure:

> "Whole of government" is an attractive bumper sticker. But it seems as though State isn't asking fundamental questions about strategy and mission: What is the "whole of government" supposed to be doing, and what is the civilian mission in that mix?

Even when high-level strategic goals are thought out and communicated clearly, interoperability can fail if the departments involved do not act in a coordinated manner, if they compete for resources rather than cooperate, if they have large power imbalances, etcetera.

The interoperability imperative naturally extends beyond the practitioner communities of civil servants and military personnel that represent the major organizational branches to the myriad of other professionals that provide support services.

Government-contracted scientists fall into the latter category. If, for instance, a scientific program is designed to support a military operation, which inadvertently causes a major diplomatic setback, then was the scientific effort productive? Ultimately not, since the operational objective was only a part of a larger strategic objective that required other mid-level objectives to also be met.

Navigating this issue is no easy matter since the locus of responsibility for such inadvertent errors is often opaque. Upper-level decision-makers have a responsibility to communicate their intent clearly to mid-level decision-makers and planners.

Those at the mid- or lower-levels who act as the interface with the scientific community can adopt a client-centric or partner-based approach, and that decision will influence the degree to which scientists might accept some responsibility for preventing interoperability breaches and other planning failures.

In the client-centric approach, the scientist is there to provide a fairly well defined service for the client stakeholder, usually specified in terms of a set of deliverables. Unless advice giving is part of the deliverables, advice is unlikely to be offered. Unsolicited advice is simply not encouraged in the client-centric model, which reflects a top-down approach to governing science for defense and security aims.

In the partner-based approach, by contrast, the practitioners and scientists develop a partnership in which both sides shape the research agenda. In this approach, scientific advice is much more likely to offered spontaneously since the partnership culture invites unsolicited advice giving.

The Canadian defence and security science and technology agency that I work for (DRDC) moved from a client-centric to partner-based approach a number of years ago, and defense scientists are encouraged to take on the role of trusted advisors, as well as knowledge integrators, knowledge generators, and risk mitigators.

This has been a beneficial change since it has created an opportunity for a more open dialogue between the scientists and practitioners. In the former client-centric system, the client tended to ask for X and the scientist tried to deliver X. In the current partner-based system, when the practitioner says, “I want X”, the scientist might respond, “Okay, but before I go ahead, have you thought about Y, or how X might cause unintended effects A, B, and C?” Simply put, the partner-based approach encourages feedback to defense and security stakeholders early on in the process, usually before a firm set of requirements or deliverables are established.

Accordingly, a partner-based approach offers better prospects of mitigating the risk of planning failures since the planning process benefits from the input of divergent perspectives early on.

Challenges and Opportunities for Defence and Security Science in the Human Domain

In much of the remainder of this paper, I want to highlight some of the types of challenges that the defence and security community faces in partnering with scientists to achieve objectives in what is commonly referred to as the "human" or "cognitive" domain.

Not all of the issues discussed are unique to the behavioral and brain sciences, but I do believe that these areas pose some distinct challenges. Moreover, the examples exemplify the challenges and opportunities. They are not intended as a comprehensive list.

Transitioning from a TRL to IRL Mindset

Let me give an example from my own organization. A couple of years ago, after the research group I led was established, I sought sponsorship for a multi-year research project from the intelligence thrust advisory group, the interface between DRDC and the intelligence branch of the Canadian Forces.

One of the first questions I was asked was "What's the TRL for this project?" After asking what a TRL was—a *technology readiness level*, I learned—I said that the question didn't make sense in the context of the proposed research since I wasn't proposing to conduct research that was designed to culminate in technology.

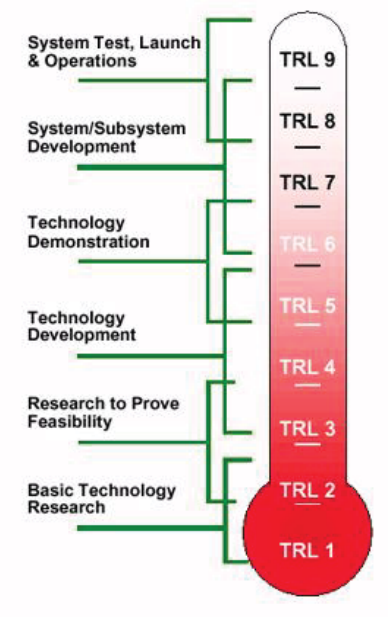

Figure 1. NASA Technology Readiness Levels

The research I was proposing involved behavioural science research largely aimed at validating the effectiveness of training practices for intelligence analysts and also assessing the predictive accuracy or "calibration" of analysts' probabilistic forecasts.

The project was sponsored in the end, but the failure of the work to fall into the TRL conceptual mold may have prompted some degree of scepticism. Had the agency been less flexible, the mismatch might have significantly reduced the chances of such work being.

Such challenges can also be opportunities to influence the organizational thinking. Technology is an enabler for achieving desired effects, but it is not an end in itself. Moreover, not all enablers of desired effects are technological.

Accordingly, research proposals might be more profitably assessed in terms of IRLs rather than TRLs—namely, in terms of what I call *impact readiness levels*. How significant will the impact of the work likely be? What goals will the work enable? When will that impact start to be realized? Within my own agency, this conceptual shift is now taking place, with the concept of impact (as well as integration) being promulgated as a key concept at the highest managerial level.

A simple conceptual realignment such as that could make a big difference not only in terms of what gets funded but also how the funded research is directed. There are, however, no guarantees that such realignments will take place when they should. Default concepts or practices tend to be deeply entrenched. In my organization, the conceptual shift has had a profound effect leading to a significant realignment of the organizational structure and S&T program.

The TRL notion appears to be still well entrenched in the US Department of Defense (see Department of Defense, 2009). New concepts must have the momentum to overcome the status quo. That they "make sense" is seldom sufficient. Timing, audience, and delivery all usually matter.

Whether a shift from the TRL mindset to an IRL mindset is a necessary requirement for defence and security planning success vis-à-vis the behavioural and brain sciences remains to be seen. I would argue that, in any case, such a shift would increase the probability of success.

Conceptual Opaqueness: "Radicalization" as a Case in Point

A different sort of conceptual challenge involves confronting vague and/or ambiguous concepts that are proposed as orienting concepts for scientific research. For instance, take the concept of *radicalization*, which was of interest to the workshop organizing committee for which this paper was originally written.

In 2008, I participated in a NATO Advanced Research Workshop on radicalization. This workshop brought together a select group of experts, who presumably had some common understanding of what the term *radicalization* meant.

I was struck, however, by the lack of consensus on the meaning of the term and by the extent to which discussion of radicalization was subjective and opinion-based. I was also surprised that the participants did not take the opportunity at the start of the workshop to assess the degree to which they shared a common definition of the term (this was suggested by one of the participants early on in the workshop, but rejected by the organizers).

Towards the end of the workshop, I was a member of a task group assigned to propose future NATO research on radicalization. My proposal was simple: start by examining what current definitions exist and work towards a NATO standard. In 2009, at least, when I was undertaking that analysis, neither NATO nor the US Department of Defense has a definition of radicalization in their respective dictionaries, despite the widespread currency of the term in the defense and security community, not to mention the associated "studies" communities (e.g., terrorism studies).

My own examination (see Mandel, 2010) revealed a range of governmental and non-governmental definitions, most of which defined radicalization in subjective, evaluative, and/or exceedingly vague terms that would make the use of the term problematic for analytic or scientific purposes.

For instance, according to the Netherlands' General Intelligence and Security Service (AIVD), *radicalism* refers to "the active pursuit of and/or support for far-reaching changes in society which may constitute a danger to the continuity of the democratic legal order (aim), possibly by using undemocratic methods (means) which may harm the functioning of that order (effect)" (p. 10).

The report goes on to state, "by extension, then, radicalisation is the process of increasing readiness to pursue such changes – possibly by undemocratic means – and/or to encourage others to do so" (2007, p. 10).

The AIVD definition highlights the relative and evaluative aspects of radicalism by defining it in terms of activities or support for activities that threaten a particular, existing, and valued social order (namely, the liberal democratic system of the West). How one understands the existing order, and how one values the various aspects of that social order, will presumably influence which intentions or activities are seen as being radicalized.

The definition of radicalization is also subjective in the sense that it has much to do with the perception of threat. For instance, according to the Ministry of Foreign Affairs of Denmark, "Radicalisation is the phenomenon of people embracing opinions, views and ideas that *could* lead to acts of terrorism" (2007, p. 8, my italics).

According to the Dutch and Danish definitions, which link the ascription of radicalization to the perception of threat, observers with differing threat perceptions may legitimately disagree on whether an actor has been radicalized. That is, observers who perceive threat would be correct in calling the actor radical, while observers who do not perceive threat would, likewise, be correct in *not* calling the same actor radical.

Even among terrorism scholars and counter-terrorism practitioners in the West there is a wide range of viewpoints that would seem to befuddle efforts to agree on which groups or individuals are radicalized, if that ascription were to be tied to subjective assessments of threat.

For instance, by such a definition, the oft-invoked distinction between radical and moderate Islam might break down, if one were also to regard moderate Islam as a threat to liberal forms of democracy. This sort of argument is precisely what some scholars have proposed. MacEoin (2006), for example, claims that many self-described moderates are sympathetic to the views of their more vocally radical counterparts, but that they practice a form religious dissimulation called *taqiya* in order to present themselves as moderates to the West.

It is difficult to see how science can inform our understanding of concepts plagued by subjectivism, relativism, imprecision and other undesirable definitional qualities. Scientists might help the defence and security community arrive at more precise and less subjective definitions of terms like radicalization. Or they might persuade them to abandon such terms altogether.

Of course, the analysis and refinement of concepts is even more within the purview of philosophy. Perhaps because philosophers don't develop technologies, however, there are few of them employed by, or engaged with, the defence and security community.

As with the previous challenge, here too a failure to address the integrity and relevance of concepts used in the realm of defence and security science within the "human domain" (itself a rather imprecise term) can impede the success of the community's various plans.

Misaligned Interests

Effective partnerships between the defence and security establishment and the scientific community it enlists are also essential for planning success. Yet the default conditions for such partnerships are hardly what one might call favourably predisposed.

First, there is a bias in the behavioural and brain sciences in favour of pure rather than applied science. Even the label *pure* indicates a predisposition to view science that is not strictly theoretical as being adulterated or inferior. As my colleague, Peter Suedfeld, put it, experimental psychologists have long suffered "physics envy." Perhaps their often demeaning attitude towards science aimed at solving practical problems in favour of revealing general truths seems to be a vestige of that slowly fading sentiment.

Social psychologists, for instance, are also apt to quote Kurt Lewin, the field's appointed patriarch, who wrote that "there is nothing so practical as a good theory" (Lewin, 1951, p. 169). As far as I can tell, Lewin's interests were invariably motivated by practical problems, even if his theorizing and research were generalized beyond the motivating problem. This does not appear to be so for the majority of today's behavioural scientists.

As I have discussed elsewhere (Mandel, 2009), all too often, academics in behavioural science are motivated to develop partnerships with applied communities in order to test their theories on participants other than the usual undergraduate convenience sample or in real-world contexts that might bolster their work's external validity and perceived relevance.

Few, however, seem intrinsically motivated to put aside theory testing in order to solve an applied problem. (I say "intrinsically" because funding and/or remuneration could prove to be a sufficient extrinsic motivator in some cases.)

Of course, for the defence and security stakeholders, the prospect of partnership is aimed at satisfying practical objectives. The potential significance of misaligned interests for the realization of both sides' goals hardly needs further elaboration. The goals of the two sides do not need to be the same, but for the partnership to satisfy both sides, those goals should be triangulated so that significant disparities could be identified and suitably negotiated.

Cultural Biases

The success of scientist-practitioner plans and objectives will also depend on how well differences in organizational and professional cultures are managed. Each profession has not only its own formal code, but an informal one as well. Both shape the behaviour and thinking of the relevant members, but the informal code is often harder to modify since it corresponds to the shared reality or internalized norms of a professional group's members. Just as individuals have personal biases, professions or communities of practice have shared biases.

Earlier, I mentioned that scientists often adopt a disparaging attitude towards applied research. While this can be seen as a consequence of their interests in theory development, I have already hinted that those interests are themselves shaped by the academic culture in which they are trained.

Likewise, perhaps because of their heavy focus on technology, defence and security stakeholders often view behavioural science disparagingly as "soft science." Behavioural scientists will seldom describe themselves or their enterprise in such terms and are likely to be offended by the connotation.

Such offense can easily diminish a scientist's motivation to offer genuine assistance. Scientists derive a great deal of their self-worth from their career, and even an inadvertent insult can have negative consequences for planning success. At minimum, a poor choice of words is likely to suggest that they stakeholder "just doesn't get it."

The defence and security community can mitigate these effects simply by using descriptively accurate and non-offensive terms. I have tried to explain to some stakeholders that most of the so-called soft sciences deal with discovering causal or predictive relationships between types (as opposed to tokens) that are probabilistic rather than deterministic. That makes them probabilistic sciences, not soft sciences. Most often, they get it. However, once again, these perceptions are often deeply entrenched. I suspect most go back to using the same terms as before.

Another cultural difference that can impede the effectiveness of defence and security science concerns the manner in which the practitioner and scientific communities tend to work. Academic scientists tend not to enjoy working under rigid constraints. They see the scientific process more as a journey of discovery, full of unpredictable twists and turns, than as a schedule of activities. Practitioners, in contrast, want to have more certainty, if not on the outcome then at least on the nature and schedule of activities.

Defence scientists, like myself, are nested between these two worlds. In my own case, I have seen how this sort of cultural difference can undermine trust in a partnership. Scientists resent being pressured to stay on schedule or even to stick to their original research proposal, which they usually regard as no more than a rough guide.

This is hardly surprising, given that most academics that have research funding are supported through grants, not contracts. Grant renewal depends on productivity and peer recognition of quality of work, but it does not generally depend on adherence to a project plan.

Practitioners, on the other hand, are very much concerned about the specific plan they agreed to being realized. They may resent being put off schedule and not being able to have confidence in the timing of plans or the outcome of the work.

Oftentimes, both the scientists and practitioners tend to feel that it shouldn't be so difficult for the other side to "get it," and yet perennially both sides continue not to.

Structuring Opportunities For Robust Partnerships

I have found that the deleterious effects I have just described and others can be often be mitigated by investing more time into face-to-face discussions between the prospective partners. Interactions of this sort go a long way towards building a genuine sense of partnership.

Apart from any progress made on the substantive issues, such meetings serve a vital diplomatic function that is all too often ignored. Face-to-face meetings provide opportunities to overcome misperceptions or misunderstandings that might otherwise go unnoticed until they affect the success of the partners' plans.

They allow scientists to better understand the practical problems that stakeholders face and how their research might benefit the stakeholders. And such meetings allow the stakeholders to better understand the scientists' perspective on the problem and to calibrate their expectations.

The importance of sustained and open discussion between the two (or more) communities for the success of robust partnerships that have a good chance of successfully realizing their plans is often underestimated. Such meetings allow hard boundaries between the interacting cultures to become increasingly "infused."

Thus, scientists begin to develop an appreciation of the formidable challenges faced by the practitioner community. Practitioners begin to understand better what scientists can and cannot offer and how they approach research. Both side, importantly, begin to develop familiarity with the other's cultural norms.

Yet, the importance of structuring opportunities for ongoing practitioner-scientist interactions is often not adequately built into the planning process. Workshops that bring together members of both communities are useful opportunities to spark interest, exchange information, and facilitate networking. But workshops are typically insufficient to provide a basis for robust science-practitioner partnership.

I was struck by that fact several years ago, when I served as a panellist for an Office of the Director of National Intelligence (ODNI) workshop on improving intelligence analysis through behavioural science. That meeting brought together a stellar panel of scientists and a wide range of defence and security stakeholders. The meeting was endorsed at the highest level, with John Negroponte, the Director of National Intelligence at the time, speaking to the audience about the importance of such partnerships. The two-day meeting was structured into plenary and parallel sessions and the talks were invariably informative and of high quality.

Nevertheless, a number of the scientists commented that they lacked an adequate understanding of what intelligence analysts were required to do and what behavioural challenges they faced. They wished they had known more because, in the absence of such knowledge, they could only offer fairly academic overviews of behavioural science research and theory that they suspected might be relevant. With rare exception, however, they could not link those ideas to specific intelligence challenges or current intelligence practices.

The practitioners that I spoke to, on the other hand, tended to be left with a wide array of ideas and facts. However, how those ideas could be translated into tangible improvements to analytic processes was much less clear. In other words, many found what they heard interesting, but had little idea how it could be applied.

In February 2009, I co-organized a follow-up meeting in Canada on the same topic, under the Global Futures Forum's Community of Interest for the Organization and Practice of Intelligence workshop program. (That, in itself, was a formidable challenge since, in the year of planning, GFF funding and oversight passed from CIA to ODNI to the State Department) Like the ODNI meeting, the aim of the "Ottawa Roundtable," as it was called, was to bring together behavioural scientists and members of the intelligence community to explore how behavioural science might improve the practice and organization of intelligence analysis (Campbell & Mandel, 2010).

A key difference from the earlier meeting, however, was that a considerable portion of the schedule was assigned to break-out sessions, where small groups each comprised of scientists and practitioners would meet to discuss pertinent issues. The groups would report the results of their discussion back to the entire group in brief presentations, followed by discussion among all the workshop delegates.

This approach went some way towards "bridging the gaps" between the two communities and charting a collaborative agenda for the future. However, even interactive meetings such as the Ottawa Roundtable can only accomplish so much. The enthusiasm conjured up at a meeting can quickly dissipate once delegates get back to their normal work routines.

For robust, productive partnerships to develop in the behavioural sciences, sustained and open (and preferably face-to-face) discussion between the scientists and practitioners ought to be built into the planning process. Since the ultimate purpose of such engagement is to serve the defence and security community's goals, the onus should be on that community to take steps towards establishing such conditions.

Summary

The key points I have tried to communicate in this paper can be summarized as follows.

1. Science-practitioner partnerships, like those being investigated in the current workshop, are goal directed.

2. For such goals to be realized, plans must be formulated and implemented.

3. The success of plans requires that all necessary and at least one sufficient condition for their effective realization be met.

4. As plans become more complex, meeting the aforementioned requirements becomes increasingly difficult.

5. Awareness of this requirement and of the difficulty of meeting it is important to avoid failure.

6. To increase the chances of planning success and goal attainment, several considerations must be triangulated.

7. Such efforts require many things including conceptual clarity, coordinated action and clear intent, organizational vision to implement practices that support effective partnerships, and an awareness of how motivational and cultural differences between the scientific and practitioner communities can undermine effective partnerships, to name a few.

8. Although such partnerships face many challenges, there are also many opportunities for improvement.

9. Some of those opportunities include shifting the relationship between scientists and practitioners from a client-centric to a partner-based model, shifting from a technological focus to a focus on impact (namely, achieving desired effects), and cultivating an awareness of how cultural and motivational differences between scientists and practitioners can impact plan success and goal attainment.

10. A particularly important condition for developing robust and effective scientist-practitioner partnerships involves creates sustained opportunities for dialogue on the key issues, preferably in face-to-face meetings at least from time to time.

As noted earlier, the challenges and opportunities discussed here are certainly not exhaustive, but they do constitute a set of factors that I have seen first-hand can impact the quality of scientist-practitioner partnerships. I suspect that if these issues were effectively tackled, the positive impact of scientist-practitioner partnerships would be greatly increased.

References

[1] Adams, G. (February, 2010). The Quadrennial Diplomacy and Development Review: Separating the U.S. civilian and defense missions. *Bulletin of the Atomic Scientists*. Retrieved October 30, 2010 from http://thebulletin.org/web-edition/columnists/gordon-adams/the-quadrennial-diplomacy-and-development-review-separating-the-.

[2] Campbell, A., & Mandel, D.R. (2010). *Summary record of the GFF Community of Interest on the Practice and Organization of Intelligence Ottawa Roundtable: What can the cognitive and behavioural sciences contribute to intelligence analysis? Towards a collaborative agenda for the future.* DRDC Toronto contractor report CR-2010-012.

[3] Department of Defense, (July 2009), *Technology Readiness Assessment (TRA) Deskbook*. Retrieved October 30, 2010 from http://www.dod.mil/ddre/doc/DoD_TRA_July_2009_Read_Version.pdf.

[4] General Intelligence and Security Service (AIVD) (2007). *The radical dawa in transition: The rise of Islamic neoradicalism in the Netherlands*. The Hague: AIVD.

[5] Lewin, K. (1951). *Field theory in social science.* New York: Harper and Row.

[6] MacEoin, D. (2006). Why do Muslims execute innocent people? *Middle East Quarterly*, *13*(4), 15-25.

[7] Mandel, D. R. (2009). *Applied behavioural science in support of intelligence: Experiences in building a Canadian capability*. Commissioned report to the Committee on Field Evaluation of Behavioral and Cognitive Sciences-Based Methods and Tools for Intelligence and Counter-intelligence, Division of Behavioral and Social Sciences and Education. Washington, D.C.: The National Academies.

[8] Mandel, D. R. (2010). Radicalization: What does it mean? In T. M. Pick, A. Speckhard, & B. Jacuch (Eds.), *Home-grown terrorism: Understanding and addressing the root causes of radicalisation among groups with an immigrant heritage in* Europe (pp. 101-113; Vol. 60 of NATO Science for Peace and Security Series E: Human and Social Dynamics). Amsterdam, Netherlands: IOS Press.

[10] Ministry of Foreign Affairs of Denmark (2007). *Countering radicalisation through development assistance – A country assessment tool*. Copenhagen: Ministry of Foreign Affairs of Denmark.

[11] Sloman, S. A. (1996). The empirical case for two systems of reasoning. *Psychological Bulletin, 119,* 3–22.

[12] Stanovich, K. E., & West, R. F. (2000). Individual differences in reasoning: Implications for the rationality debate. *Behavioral and Brain Sciences, 23,* 645–726.

[13] Vartanian, O., & Mandel, D. R. (2012a). Neural bases of judgment and decision making. In M. K. Dhami, A. Schlottmann, & M. R. Waldmann (Eds.), *Judgment and decision making as a skill: Learning, development and evolution* (pp. 29-52). Cambridge, UK: Cambridge University Press.

[14] Vartanian, O., & Mandel, D. R. (2012b). Reflections on the neuroscience of decision making. *Mathware & Soft Computing Magazine, 19*(1), 20-24.

DOCUMENT CONTROL DATA

(Security classification of title, body of abstract and indexing annotation must be entered when the overall document is classified)

1. ORIGINATOR (The name and address of the organization preparing the document. Organizations for whom the document was prepared, e.g. Centre sponsoring a contractor's report, or tasking agency, are entered in section 8.)

Defence R&D Canada – Toronto
1133 Sheppard Avenue West
P.O. Box 2000
Toronto, Ontario M3M 3B9

2. SECURITY CLASSIFICATION (Overall security classification of the document including special warning terms if applicable.)

UNCLASSIFIED
(NON-CONTROLLED GOODS)
DMC A
REVIEW: GCEC JUNE 2010

3. TITLE (The complete document title as indicated on the title page. Its classification should be indicated by the appropriate abbreviation (S, C or U) in parentheses after the title.)

Challenges and Opportunities for Defence and Security Science in the Human Domain:

4. AUTHORS (last name, followed by initials – ranks, titles, etc. not to be used)

David R. Mandel

5. DATE OF PUBLICATION (Month and year of publication of document.)	6a. NO. OF PAGES (Total containing information, including Annexes, Appendices, etc.)	6b. NO. OF REFS (Total cited in document.)
July 2013	28	14

7. DESCRIPTIVE NOTES (The category of the document, e.g. technical report, technical note or memorandum. If appropriate, enter the type of report, e.g. interim, progress, summary, annual or final. Give the inclusive dates when a specific reporting period is covered.)

Technical Report

8. SPONSORING ACTIVITY (The name of the department project office or laboratory sponsoring the research and development – include address.)

Defence R&D Canada – Toronto
1133 Sheppard Avenue West
P.O. Box 2000
Toronto, Ontario M3M 3B9

9a. PROJECT OR GRANT NO. (If appropriate, the applicable research and development project or grant number under which the document was written. Please specify whether project or grant.)	9b. CONTRACT NO. (If appropriate, the applicable number under which the document was written.)
15dm	

10a. ORIGINATOR'S DOCUMENT NUMBER (The official document number by which the document is identified by the originating activity. This number must be unique to this document.)	10b. OTHER DOCUMENT NO(s). (Any other numbers which may be assigned this document either by the originator or by the sponsor.)
DRDC Toronto TR 2012-124	

11. DOCUMENT AVAILABILITY (Any limitations on further dissemination of the document, other than those imposed by security classification.)

Unlimited

12. DOCUMENT ANNOUNCEMENT (Any limitation to the bibliographic announcement of this document. This will normally correspond to the Document Availability (11). However, where further distribution (beyond the audience specified in (11) is possible, a wider announcement audience may be selected.))

Unlimited

13. ABSTRACT (A brief and factual summary of the document. It may also appear elsewhere in the body of the document itself. It is highly desirable that the abstract of classified documents be unclassified. Each paragraph of the abstract shall begin with an indication of the security classification of the information in the paragraph (unless the document itself is unclassified) represented as (S), (C), (R), or (U). It is not necessary to include here abstracts in both official languages unless the text is bilingual.)

The present document constitutes a White Paper submitted in advance of an inter-governmental US defence and security workshop entitled The Neurobiology of Political Violence: New Tools, New Insights. The author outlines some of the challenges and opportunities faced by the scientific and practitioner communities in attempting to forge robust, productive partnerships. The paper begins with a discussion of the basic requirements for success in plan execution. The author then discusses the importance of triangulating multiple considerations to ensure the integrity of plan success. Several challenges to and opportunities for scientist-practitioner partnerships in the human domain are then discussed.

Le présent document **constitue un** Livre blanc déposé avant l'atelier intergouvernemental américain en matière de défense et de sécurité intitulé « La neurobiologie de la violence politique : nouveaux outils, nouveaux regards ». L'auteur souligne quelques-unes des difficultés et des possibilités auxquelles sont confrontées les collectivités de scientifiques et de praticiens en essayant d'établir des partenariats robustes et productifs. Le document commence avec une discussion sur les exigences de base visant la réussite de l'exécution des plans. L'auteur discute ensuite de l'importance de la triangulation de considérations multiples afin d'assurer l'intégrité de la réussite des plans. Ont ensuite été discutées nombre de difficultés et possibilités relatives aux partenariats entre les scientifiques et les praticiens dans le domaine humain.

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.)

scientist-practitioner partnership, plan success, interoperability, challenges, opportunities

Defence R&D Canada

Canada's Leader in Defence
and National Security
Science and Technology

R & D pour la défense Canada

Chef de file au Canada en matière
de science et de technologie pour
la défense et la sécurité nationale

DEFENCE R&D DÉFENSE

www.drdc-rddc.gc.ca