

Evaluation of the Security and Disruptive Technologies Research Centre

December 20, 2023

●●● NRC-Evaluation

About the research centre

The Security and Disruptive Technologies Research Centre (SDT) specializes in quantum science and technology and advanced materials science. SDT works with collaborators to build new technology platforms for a range of industries. The research center hosts the Quantum Sensors Challenge program (QSP) and is a key collaborator in the NRC-University of Ottawa Joint Centre for Extreme Photonics.

SDT research areas



Quantum science and technology: quantum photonics, quantum electronics, quantum sensing, quantum information.



Advanced materials: nanocomposite, additive materials and nanomaterials.

Key findings

Scientific excellence

The extent to which SDT is leading in scientific excellence varies across the research centre. Some activities, particularly in quantum science and technology, were world-leading; while others, in advanced materials, played a supportive role.

- SDT has been recognized for scientific leadership and has advanced scientific knowledge, **exceeding publication targets** and publishing in prestigious journals (e.g., Nature Index journals).
- SDT's field-weighted citation impact (FWCI) was positive (at 1.17) but **lagged behind those of the NRC overall** (1.26) and Canada (1.45).
- SDT **exceeded intellectual property (IP) targets**, particularly in the advanced materials area. The count of patent applications filed, over the 5-year evaluation period, was 215, far exceeding SDT's strategic plan 2019-24 target of 10 to 14, annually.

Economic and social impacts

SDT expanded connections with industry and moved products up the Technology Readiness Level (TRL) ladder to commercialize them. These efforts had cascading impacts on businesses as they hired new staff and increased revenue; but the scale of these impacts was not quantifiable.

SDT made a significant contribution to the development of the National Quantum Strategy (NQS) and supported government priorities. SDT's impact on the policy landscape beyond this is not well quantified. Connections to Government of Canada themes such as sustainable development and Indigenous engagement are not evident in SDT's work.



Budget (2017-18 to 2022-23)

Expenses (average annual): \$13.3 million
Revenues (average annual): \$3.4 million



Resources (March 31, 2023)

Research centre staff: 109
Students: 26

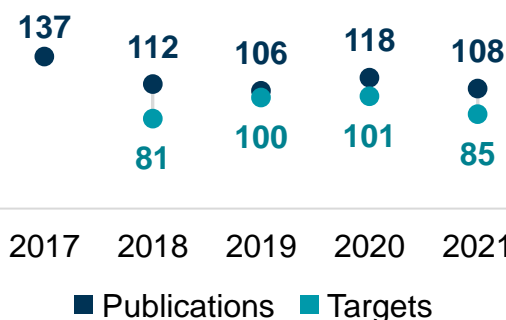


Equity, diversity and inclusion (EDI)

Improved representation of women and racialized person but has not met full labour market availability.

In November 2022, SDT, parts of the Advanced Electronics and Photonics Research Centre, and the Nanotechnology Research Centre began to be reorganized. The research centres will be combined into the new **Quantum and Nanotechnologies Research Centre** on April 1, 2024.

SDT publications decreased over the evaluation period, however it consistently exceeded its targets



Research focus

An updated overarching vision is required (in alignment with strategic planning that was underway during the evaluation), that would help prioritize research, provide future direction, and define SDT's role in the Canadian ecosystem.

- **Quantum science and technology** research focus aligned with the NQS, the needs of clients, and was on trend with some market predictions.
- **Advanced materials activities** aligned with needs of clients and other Challenge programs, with less focus on an overall strategic orientation.
- SDT is **positioned to move forward in its niche research areas**, addressing gaps and acting as a connector for other organizations.

Capabilities

SDT has the financial capacity and human resource competencies to meet its objectives. To supplement its budget, SDT leadership leveraged \$15.9 million for 2019-20 to 2027-28 from several sources.

SDT has excellent quantum facilities, but needs to prepare now for the future. Quantum photonics equipment procurement is part of the first wave of the NRC facilities renewal project.

SDT's advanced materials facilities need substantial improvement. The Peer Review Committee (PRC) noted that the poor physical condition of the labs could damage morale and inhibit the ability to attract and retain highly-qualified personnel.

Recommendations

The evaluation put forward 3 recommendations:

1. set out strategic direction for advanced materials so that leadership can prioritize areas of impact
2. identify priorities, develop strategies and implement actions to address physical condition issues identified by the PRC and ensure advanced materials facilities support attraction and retention of HQP
3. generate a concrete plan to support new directions in quantum science and technology

About the evaluation

The evaluation covered 2017-2018 to 2022-23. The NRC's evaluation team conducted the evaluation in accordance with the NRC's approved evaluation plan and Treasury Board's Policy on Results. The evaluation examined scientific excellence, business innovation and government policy solutions, research focus, engagement and capabilities. It used a mixed-methods approach including document and data review, bibliometric analysis, internal and external interviews and an expert peer review.

The full evaluation report, including recommendations and the management response and action plan, is available on the [NRC website](#).

Engagement

SDT engaged with academia, industry and other government departments (OGD), and its reputation and expertise proved to be attractive. SDT significantly increased the number of clients and collaborators since the previous evaluation (156 vs. 96). The QSP and other new grant and contribution funding has fostered engagement.



Academia

40 clients
(previously 19)



Foreign governments

6 governments
(previously 7)



OGDs

8 departments
(previously 3)



Industry

76 clients
(previously 65)



Other new collaborations

26 collaborators through NRC research centres, Challenge programs, Ideation fund and other (other was previously 2)

Engagement was effective to some degree, but SDT lacks a well-articulated engagement strategy and could improve its mix of clients and collaborators. QSP is the exception to this and has made SDT a major integrator and quantum player in Canada.

Advanced materials does not have an articulated engagement strategy, but engages externally through other Challenge programs (e.g., Aging in Place, Artificial Intelligence for Design, and Materials for Clean Fuels).