EVALUATION OF THE NANOTECHNOLOGY RESEARCH CENTRE

NRC-EVALUATION

About the research centre

The Nanotechnology Research Centre (NANO) aims to lead NRC-wide nanotechnology and nanoscience activities. NANO works with other government departments (OGDs); other NRC Research Centers (RCs); academia; and industry to develop nano-enabled solutions to Canada's pressing health, environmental, and technology challenges.

NANO draws upon expertise across science disciplines in pursuit of innovation by conducting collaborative research projects, and offering technical services and access to its facilities.

NANO has three main **nanoscience research platforms**:

- developmental and analytical microscopy
- biomedical nanotechnologies
- detection and automation

Supporting capabilities include nanomaterial deposition and characterization, and theory and modelling.

Budget (2017-18 to 2021-22)
Expenses (annual/total): $10.6M/$53.1M
Revenues (annual/total): $754K/$3.8M

Resources (March 31, 2022)
Research centre staff: 56
Students/Research Associates: 23

Equity, Diversity and Inclusion:
Good representation for visible minorities; low representation of women, particularly in leadership roles.

Key findings

Transition

Despite significant leadership and change management challenges at its inception, transitioning from the National Institute for Nanotechnology (NINT) collaborative model to an NRC RC has been generally positive:

- NANO's organizational structure, governance, and processes are now consistent with other RCs, and most staff consider the transition as positive, feeling connected to NRC and taking pride in their work.
- The transition empowered NANO with greater control over its research strategy, operations and scientific leadership, but with diminished ability to leverage resources from the University of Alberta (U of A).
- The longstanding relationship with the U of A has been maintained and is evolving through the Nanotechnology Initiative (NI), although there have been some challenges. For example, the first round of NI projects were not well aligned with strategic objectives.

53% of staff felt their **pride in R&D projects** was positively impacted by the transition

63% of staff indicated more opportunities **to collaborate within NRC** (other RCs)

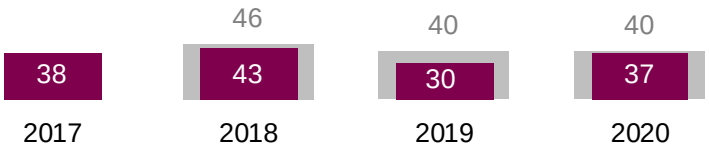
53% of staff indicated more opportunities **to collaborate nationally (outside Alberta)**

Scientific excellence

NANO is somewhat positioned to be a leader of scientific excellence:

- NANO is mainly known and recognized as a leader in developmental and analytical microscopy.
- NANO has continued to generate intellectual property and is looking for new opportunities.

NANO has averaged 37 publications per year, below annual targets, mainly due to a reduction in staff



- NANO has lost scientific influence. Citation scores are relatively low and below Canadian averages for its areas of focus. Co-authorship is concentrated with the U of A (84%).
- Ten new agreements with other universities (e.g. Waterloo Institute for Nanotechnology) may help to reverse this trend.
- NANO does not currently have performance measures sufficient to monitor achievements against its mission.

Impact

NANO has made contributions to NRC's goals of business innovation and government policy solutions in environmental and health fields:

- NANO is enabling long-term impacts for Canadian businesses by accelerating Research and Development (R&D), mainly in Alberta.
- NANO has the potential to further contribute to Challenge Programs and Supercluster Support Programs.
- A high number health projects, especially related to COVID-19, should continue to yield enhancements.

Examples of NANO contributions to scientific and technological advancements:

- tested and advanced a new approach to targeted cell delivery with potential for broad application
- prototyped microfluidics for engines that sort fine particles suspended in oil to reduce wear
- advanced nanostructured energy storage, bridging the gap between academic and industrial applications

National Research Council Canada | Conseil national de recherches Canada

NR16-403/2-2022E-PDF
978-0-660-45452-8

Canada

EVALUATION OF THE NANOTECHNOLOGY RESEARCH CENTRE

NRC-EVALUATION

Research focus

NANO has defined its strategy and mission, responding to national priorities and stakeholders, but work remains to align its research focus and teams to its mission.

- NANO aligned its research to federal priorities and NRC's strategic objectives.
- Other RCs rely on NANO for innovative contributions to their fields. NANO contributes to NRC Challenge Programs and federal Supercluster Support Programs aligned with its mission.
- NANO identified areas where it may complement other Canadian organizations rather than compete.

NANO's project portfolio was unbalanced, with a lower percentage of applied projects with external partners and clients (2018-19 to 2020-21)

Engagement

NANO has expanded its partnerships and increased collaboration with other RCs

Academia
10 new agreements

Industry
Multi-year agreements with Hitachi and Japan Electron Optics Lab

NRC RCs
Working directly with 5 RCs, Microscopy network with 13 RCs

OGDs
Defence Research and Development Canada (DRDC), new collaborations with Agriculture and Agri-Food Canada (AAFC) and Natural Resources Canada (NRCan)

NANO engaged with new clients, but engagement efforts could be more strategic. There is a need to engage further with:

- SMEs, to achieve the right mix (recommended by the peer review committee)
- With a broader range of clients outside of Alberta, as 63% of the client base remains in Alberta

In terms of visibility, NANO has been inconsistent in its communications: 63% of clients and collaborators were only somewhat aware of the range of its expertise and capabilities.

Capabilities

NANO has capacity, competencies, and facilities to achieve current objectives, but could be challenged moving forward due to:

- Salary growth increasing total expenditures (without new hiring) resulting into a decreasing operations budget.
- Limited revenues – opportunities exist to secure additional large revenue-generating projects.
- Need for investment in some facilities – strategies for co-investment, divestment or reorientation are needed.

NANO is challenged in achieving the right mix of staff:

- It has leveraged capacity from universities supplementing staff with short-term, co-op students and research associates.
- More cross-team collaboration is needed to strengthen capabilities and provide greater value to clients and collaborators.

Recommendations

1. NANO should further align its activities to its mission by a) narrowing the focus of its research platforms, services, and facility offerings, and b) providing each research team/platform with a central focus and specific priorities, while promoting cross-team collaboration.
2. NANO should develop a balanced project portfolio management approach to ensure that projects are aligned to its mission and strategic objectives.
3. NANO should further leverage resources through partnerships, and secure revenues from external collaborative research projects.
4. NANO should improve its outreach by engaging with external clients outside Alberta, to achieve a higher proportion of collaborative research projects with industry.
5. NANO should increase the visibility and awareness of its research foci, capabilities and platforms.
6. NANO should develop performance indicators to monitor achievement of its mission and strategic objectives, including the balance of its project portfolio.

About the evaluation

The evaluation covered the years 2017-2018 to 2021-22. It was conducted by the NRC's evaluation team in accordance with the NRC's approved evaluation plan and Treasury Board's Policy on Results. The evaluation examined NANO's transition to an NRC RC; scientific excellence; impact; research focus; engagement; and capabilities. It used a mixed-methods approach including document and data review; bibliometric analysis; interviews; staff and client surveys; project case studies; and a peer review with national and international experts.

The evaluation report, including recommendations and the management response and action plan, is available here: https://nrc.canada.ca/en/corporate/planning-reporting/evaluation

National Research Council Canada | Conseil national de recherches Canada

NR16-403/2-2022E-PDF
978-0-660-45452-8

Canada