



National Occupational Standard for
Research Project Manager in Agri-Bio

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2 A COMPETENCY FRAMEWORK FOR INDIVIDUALS WORKING IN THE BIO-ECONOMY

2.1 What is a National Occupational Standard?

In Canada, National Occupational Standards are industry-developed and validated documents that identify and group tasks/competencies associated with a particular occupation. They also describe the knowledge and skills that a worker must demonstrate to be considered competent.

The former Alliance of Sector Councils (TASC) outlined 11 guiding principles for creating National Occupational Standards (NOS). NOS for the Canadian bio-economy meet all 11 principles and are developed to meet the current and future human capital management needs of the Canadian bio-economy.

2.2 How are we defining a competency?

We define a competency as *a set of related behaviors that describe successful performance in a designated area. It is a behavioural expression of how people integrate knowledge, skills, attributes, and attitudes to produce a value-adding result in a defined situation.*

The competency statement includes a description that integrates skills, knowledge, and actions into a sequence of activities that deliver a value-added product or service.

Performance Indicators is the term we use for the behaviours grouped under each competency that describe the level of mastery the incumbent role must demonstrate when executing a task.

For this project, we have organized the competencies into four categories.

Core Competencies are those competencies that describe the "essence of the role" — that is, they are the one to three most critical competencies that may be applicable across multiple roles in a function or job family. All levels of personnel in this function would typically share them. These competencies may also act as qualifiers that differentiate the function from other functions.

Technical Competencies are those competencies related to specific roles or professions that enable an individual to work, function, and succeed in that role. They address the various responsibilities that job incumbents encounter in a role. For example, a surgeon's technical competencies would encompass multiple surgical tools, techniques, and conditions that could be part of the position. Similarly, technical competencies for a lawyer would contain various legal situations that they encounter in the context of a particular field of practice.


Regulatory Competencies are those competencies that describe compliance with prescribed practices and mandated obligations under applicable laws, regulations, and industry standards. They ensure that critical work processes are implemented and integrated into all work activities. They are of absolute importance where economic behaviours can impact human conditions.

Personal/professional Competencies are those competencies that enable an individual to be successful working with others and fulfilling their responsibilities in a work context. Personal and professional competencies are not necessarily role specific.

2.3 Levels of complexity of work

It is important to recognize how the complexity of work varies along an organizational continuum. At one end of this continuum is low-complexity, clearly-defined, task-driven work. At the other end of the continuum is work that is higher in complexity, not as well-defined, and requires higher-level thinking and decision-making skills and a greater degree of autonomy. Results are recognised over a longer period of time and are more difficult to assess.

Figure 1: Demonstrates how the level of complexity changes with the role responsibilities

Complexity Level	Examples of Work at Different Complexity Levels	Typical Roles/Titles
Most Complex	Construct and pursue worldwide strategic plans in large corporations.	CEOs of the largest trans-global corporations
	Construct and pursue worldwide strategic plans.	C-suite executives at multi-national organizations
	Lead the accumulated impact of multiple business units.	C-suite executive at large, multi-location organizations
	Optimize the function of a single business unit or corporate support staff.	General manager; plant manager
	Manage multiple, interdependent projects; balance resources among departments.	Engineering manager
	Plan and carry out sequential projects while considering contingencies and alternatives.	Maintenance manager
	Accumulate information to diagnose and anticipate problems; proactive; notice trends.	Maintenance technician
Least Complex	Follow predefined procedures; seek help when encountering an obstacle. The ability to anticipate problems is not expected.	Maintenance labourer

We define the complexity levels within the profiles at four levels:

Foundational — performance focus is on the execution of procedures and tasks involving own job role.

Operational — performance focus includes some discretion in the planning and executing of work. The work typically includes assessing the quality of the work outcomes and taking corrective action to ensure quality.

Specialist — performance focus is on translating goals and standards to team members and ensuring that work done under the person's responsibility area complies with all corporate standards.

Strategic — performance focus is on leading work and the accumulated impact of work in an independent business unit or across a whole organization. The impact of work at this level is often not visible until the medium to longer term.

The following example illustrates the different complexity levels within a profile.

<p>Competency Name: Research Ethics</p> <p>Competency Definition: Exercises integrity and professionalism to ensure all research is performed responsibly in keeping with the ethical principles of beneficence and nonmaleficence.</p> <p>Competence at this level is demonstrated when the Research Manager:</p>			
Performance Indicators			
Foundational	Operational	Specialized	Strategic
Diligently follows research procedures and protocols mandated by legitimate authorities and professional organizations.	Regularly monitors own actions and decisions to ensure they align with professional and organizational values.	Holds self and staff accountable to the organization's values, ensuring compliance with the policies and procedures related to scientific ethics and rules of conduct.	Fosters an organizational culture of integrity and ethical business practices by unwavering personal example.

2.4 Overview methodology for the development of national occupational standards

National occupational standards were developed using a multi-step process.

Step	Description	Result/Output
1	Identify critical roles in the bio-economy through primary and secondary research.	List of 50 key roles
2	Create draft profiles with critical competencies for the roles, performance, and knowledge indicators.	Draft profiles
3	Review the draft profiles with industry subject matter experts to refine the competencies, performance, and knowledge indicators.	Reviewed profile with design inputs from industry experts
4	Further validation and review by industry via online focus group.	Validated profiles by industry experts
5	Broader validation of the draft profiles via national online surveys.	Occupational Standards validated on a national level by experts from the different sectors
6	Addition of the Essential Skills and Canadian Language Benchmark (ES/CLB) ratings.	Nationally validated NOS profiles with ES/CLB profile for each NOS

3 RESEARCH PROJECT MANAGER IN AGRI-BIOTECH COMPETENCY FRAMEWORK

3.1 Competency diagram for Research Project Manager in Agri-Biotech

Competencies		Complexity Level				Complexity Level Legend
		1	2	3	4	
Core Competency						1. Foundational
1	Research Ethics					2. Operational
Technical Competencies						3. Specialist/Manager
2	Budget Management					4. Expert/Executive
3	Developing &/or Overseeing an R&D Program					
4	Designing an R&D Project					
5	Planning & Implementing R&D Projects					
6	Commercialization of Research Results					
7	Recruiting & Managing the R&D Team					
8	Applying Model Experimental Practices					
9	Managing Quality in R&D					
10	Digital Skills for R&D					
11	Liaising with Key Stakeholders and Influencers					
Industry Regulatory Competencies						
12	Legal/Regulatory Compliance in R&D					
13	Occupational Health & Safety in R&D					
Personal and Professional Competencies						
14	Collaboration					
15	Continuous Learning					
16	Creative Leadership					

Competencies		Complexity Level			
		1	2	3	4
Personal and Professional Competencies					
17	Critical Thinking/Decision-Making in R&D				
18	Effective Interpersonal Communication				
19	Professionalism/Emotional & Cultural Intelligence				

3.2 Definition of occupation

The Research Project Manager in Agri-biotech supports research teams by facilitating all administrative aspects of research projects. This involves the development and communication of timelines and budgets, tracking timelines and budgets against performance measures, securing the application for research ethics, liaising with external contractors on technical matters, communicating and reporting project performance results to the director, overseeing contractor performance to milestones and contract objectives, connecting the teams with the right human resources for the project, and ensuring compliance with standard operating procedures (SOPs) and regulatory and legal requirements. Although not necessarily involved in the day-to-day research activities, this position is generally held by a senior research scientist managing multiple research projects.

The Research Project Manager develops and maintains a full overview of the project, including technical, financial, and business aspects, and therefore interfaces with many parts of the organization. The individual in this role assists in the preparation and management of strategic and operating plans, budgets, and forecasts, as well as general departmental logistics and administration.

Another key responsibility for this position is to identify problems in programs using tools like critical path analysis, working with key staff to identify remedies. Depending on the size of the organization, the Research Project Manager may be responsible for the management of the research team involved in the research and field trials.

The role works in the following subsectors:

Applicable To	Bio-Health	Agri-Bio	Bio-Industrial	Bio-Energy

The level of complexity of the role is:

Span of Complexity Levels	Foundational	Operational	Specialist/Management	Expert/Executive

3.3 Level of education, training, or designations requirements

Typical Education Required	Secondary	College	Bachelor	Master	PhD
Typical Starting Experience	0–5 yrs.	5–10 yrs.	10–15 yrs.	15–20 yrs.	20+ yrs.

- Minimum bachelor’s degree in agriculture, biology, or a related field is recommended
- Certificate in project management or equivalent experience is an asset
- Three to five years of experience in a relevant field is recommended
- Experience in managing others is recommended

- Leadership experience is an asset

3.4 Core competencies list for Research Project Manager in Agri-Biotech

3.4.1 Research Ethics

Exercises integrity and professionalism in order to ensure all research and development (R&D) is performed in a responsible manner in keeping with the ethical principles of beneficence and nonmaleficence.

Competency in this role is demonstrated when the individual:

- Models integrity and respect in all related actions and decisions, ensuring own actions and decisions follow the letter and spirit of the professional code of conduct for R&D.
- Ensures staff are sufficiently trained in policies/procedures related to ethics and conduct.
- Holds self and staff accountable to the organization's values, ensuring compliance with the policies and procedures related to scientific ethics and rules of conduct.
- Includes all study demographics and data necessary to present a complete and accurate picture of study results.
- Ensures that the required ethics approval certificate is secured from the Research Ethics Board (REB) before undertaking a research project.
- Ensures that the use of public funds and resources meet the policies of good stewardship.
- Ensures best statistical practices are applied to data analysis in order to produce the most accurate outcomes.
- Applies scientific principles to ensure that experiments minimize risk to self, colleagues, animals, the environment, and/or the broader public.
- Respects intellectual property rights and the principles of the Nagoya Protocols on Biodiversity.
- Considers the principles of the '3Rs' (Replacement, Reduction and Refinement) when planning or conducting research using animals.

Knowledge required for competency at this level:

- Hold good standing with necessary professional certification for conduct of company activities (e.g., plant breeder certification, Professional Agronomist, Experimental Animal Ethics courses, etc.)
- Working knowledge of the organization's code of conduct

- Working knowledge of relevant scientific ethical issues (e.g., use of animals in research, use and storage of data, potential harmful environmental impacts, etc.)
- Working knowledge of the ethical codes and requirements of the organization, partnered organizations, and funding bodies
- Working knowledge of the implications of the general data protection regulation (GDPR) for Canadian businesses

3.5 Technical competencies list for Research Project Manager in Agri-biotech

3.5.1 Budget Management

Establishes, tracks, and manages budgets for the team/project, laboratory/department, and/or organization in order to ensure sound fiscal responsibility with designated funds.

Competency in this role is demonstrated when the individual:

- Prepares the laboratory/department's annual operating budget, including a projection for the next two to five years, using spreadsheets and other financial software.
- Projects the laboratory/department's capital budgetary needs over the next two to five years as necessary, considering projects identified in the laboratory/department's R&D plan.
- Utilizes financial systems to track the laboratory/department's R&D budget and operational spending and make decisions necessary to ensure the laboratory/department operates within budget.
- Develops a proposal to justify the laboratory/department's annual R&D budget request and/or supplementary operational funds, if required.
- Manages the project budget by negotiating with the R&D team(s) regarding aspects such as quantity of items actually required, most economical supplier, etc.
- Tracks expenditures eligible for tax incentives under the federal Scientific Research and Experimental Development (SR&ED) Program, if applicable.

Knowledge required for competency at this level:

- Working knowledge of the type of project, contracting, and funding models used by the organization

- Working knowledge of cost-related factors such as depreciation models, procurement of quotes for research/development requirements, invoice schedules, resource and activity estimations, industry rates for contracted services, labour costs, collective agreements, etc.
- Working knowledge of the available suppliers for purchasing research consumables and equipment
- Working knowledge of the relative cost of purchasing equipment to complete tests onsite vs. outsourcing the testing
- Basic accounting skills and tools such as Microsoft Excel and Quick Books
- Working knowledge of the organization's financial runway for the next three to five years
- Working understanding of the federal SR&ED Program, if applicable

3.5.2 Developing &/or Overseeing an R&D Program

Defines the focus and strategy of the laboratory/organization's R&D program, determines which projects will be included in the program, generates funding to support the program, and oversees the program from inception to commercial development, if applicable.

Competency in this role is demonstrated when the individual:

- Participates in the creation of a strategic vision for the organization's R&D program.
- Rigorously tests hypotheses using a series of minimum viable products and technologies in order to validate the organization's R&D objectives and agenda.
- Identifies which projects align with the organization's strategic R&D objectives and agenda and merit inclusion in the R&D program based on a SWOT analysis, key risks and proposed mitigation strategies, and a high-level cost/benefit analysis.
- Identifies which projects, or components of projects, can/should be conducted by external agencies.
- Develops funding proposals for the R&D program, including consideration of tax incentive programs such as SR&ED.
- Drives the development of new products and technologies from validation and design control to final launch, ensuring they meet all critical technical and marketing specifications.
- Leads/participates in the evaluation of the R&D program.
- Represents the department around intellectual property (IP) discussions and IP lifecycle management.

Knowledge required for competency at this level:

- Working understanding of the operational and functional needs of the industry
- In-depth understanding of the company's strategic direction, roadmaps, and milestones
- Working understanding of IP development and protection
- Working knowledge of recent developments, products, and research outputs from similar disciplines and/or competitors
- Working understanding of the process for translating R&D to commercial products and technologies
- Working knowledge of the best practices and products in the target markets

3.5.3 Designing an R&D Project

Defines the parameters and specifications of a research/development project, including the project scope, objectives, goals, resource requirements, project timeline, and budget. Also designs the experiments, identifies the testing and validation methodologies that can be employed to create a manageable research/development project, and, if applicable, takes the application, translation, and scale-up of research discoveries/results into consideration during the design phase.

Competency in this role is demonstrated when the individual:

- Writes proposals to secure project funding from internal or external sources, including application for tax incentive programs.
- Defines the project scope, including the inquiries to be addressed by the project, the major objectives, critical success factors for performance measurement and project evaluation, deliverables, assumptions, and constraints, including commercialization and scale-up considerations, if applicable.
- Verifies that all governance procedures and regulatory requirements are defined and communicated to stakeholders.
- Determines go/no-go decisions, key milestones, high-level budgets, timelines, and resource requirements.
- Ensures that the project design incorporates the ethical parameters required to secure a certificate of ethical approval from the Research Ethics Board (REB) or other equivalent approval body, if required.
- Contributes scientifically viable considerations for application, translation, and scale-up of research results as they apply to the organization's strategic R&D plan.
- Participates in the evaluation of the R&D project.
- Generates the overall experimental strategy and hypotheses for the research/development project.
- Ensures the experimental strategy is of optimum quality to deliver meaningful research/development results.

- Identifies the potential testing and validation methodologies that are compliant with regulatory requirements for this type of project.
- Prepares a project initiation document to facilitate a smooth hand-off from project design to project planning and implementation.

Knowledge required for competency at this level:

- Working knowledge of project management principles and techniques
- Working understanding of the project stages and the transition management process at the end of each stage
- In-depth knowledge of the regulatory requirements related to the project
- In-depth knowledge of the project context and requirements, and other standards
- In-depth understanding of the stages of a research process
- In-depth knowledge of the analytical and statistical design of research experiments, including relevant GLP, DOE, and International Council for Harmonisation (ICH) guidelines
- In-depth knowledge of relevant literature and technical tools available to the field of R&D
- In-depth knowledge of the company's on-site measurement/testing capabilities, and what testing would need to be outsourced to an offsite lab
- In-depth understanding of the company's strategic direction, roadmaps, and milestones
- Working knowledge and understanding of the process for translating R&D to commercial products
- Working understanding of the design and manufacturing processes

3.5.4 Planning & Implementing R&D Projects

Prepares a deliverable-oriented work breakdown structure that details milestones, resources, schedules, and budget for the planned project outcomes. Also develops a risk management plan, manages activities, provides project updates, and oversees project closeout in order to ensure project outcomes are delivered on time and in budget.

Competency in this role is demonstrated when the individual:

- Collaborates with stakeholders to clearly articulate project deliverables, create a shared understanding of the full scope of the project (what is and is not included), and establish communication frequency and methods.
- Breaks the deliverables down into major milestones with input from subject matter experts in each work stream.
- Establishes a milestone schedule, identifying the planned start and finish dates of each milestone.
- Determines staffing and physical resource requirements for each milestone, scheduling them as required.
- Identifies risks that may be encountered throughout the project, developing a risk elimination or mitigation strategy for each one.
- Designs and implements quality control criteria for the project.
- Develops a detailed project budget, identifying when funds will be required throughout the project.
- Manages the project schedule and budget and any associated contracts in order to ensure the project is delivered within the defined scope, budget, and schedule.
- Provides regular project updates to management and other stakeholders.
- Leads the evaluation of the R&D project.
- Closes out the project by confirming completion of deliverables and payments, preparing a final report on budget, methodology, results, and recommendations, and transferring all files to the project file storage system.

Knowledge required for competency at this level:

- Detailed knowledge of a project management system and tools, such as Primavera, Microsoft Project, Microsoft Excel, etc.
- Working understanding of both waterfall and agile project management processes, including project stages and the transition management process at the end of each stage, as would be gained in PMP, CPM, or PRINCE2 programs
- In-depth knowledge of the regulatory requirements related to the project
- Comprehensive knowledge of schedule management techniques such as critical path management, Program Evaluation & Review Technique (PERT) analysis, GANTT charts, and decision trees

3.5.5 Commercialization of Research Results

Works within an interdisciplinary team to assist with, manage, and oversee the research adaptation and scale-up process from inception to sustainable and profitable high-volume production in order to ensure the science developed in the lab can be translated into practical, commercially viable products/processes.

Competency in this role is demonstrated when the individual:

- Conducts/directs a feasibility study on commercialization of the proposed research venture, including market demand research, literature review, economic analysis, life cycle assessment, cost to production ratio, anticipated turnover numbers, etc.
- Weighs scientifically viable considerations and alternatives for the translation, application, and scale-up of approved research ventures in light of the organization's strategic R&D plan.
- Develops protocols for a scale-up study describing the objectives, methodology, and overall organization of the scale-up activities, including creating a guide to the scale-up process as a whole and laying the groundwork for QA/QC.
- Conducts an environmental assessment of the scale-up process to identify byproducts and adverse impacts, as well as determining effective means of handling and disposal of byproducts and mitigation of adverse environmental impacts.
- Conducts an initial and ongoing risk assessment, identifying potential problems and generating viable solutions, in order to minimize the likelihood of error, manage costs, and evaluate the potential success of commercialization.
- Participates in the hazard analysis and critical control point process required when scaling up, identifying regulatory approvals required from FDA/HC or CFIA.
- Reports on the projected feasibility of commercialization of the research venture based on a comprehensive analysis and synthesis of the feasibility study.
- Investigates the tolerable limits of the laboratory specimen/science to field factors such as weather, moisture, nutrients, etc., using computer-aided design (CAD) software to optimize the scale-up process.
- Implements viable solutions to barriers as they arise in the scale-up process, returning to the underpinning science as required.
- Writes a white paper for internal distribution in order to demonstrate that the process works.
- Participates in the ongoing and final evaluation of the scale-up project.
- Provides technical support to sales and marketing staff on an ongoing basis to increase commercial success.

Knowledge required for competency at this level:

- Comprehensive understanding of the commercial applications and goals of the laboratory/organization's R&D program
- Working understanding of the process for translating R&D to commercial products
- Working knowledge of Hazard Analysis and Critical Control Point (HACCP) processes or similar assessment strategy to aid in assessing potential issues with scale-up, application, or commercialization of research results
- Working understanding of interdisciplinary sciences

- Comprehensive understanding of analytical tools such as R, Six Sigma, Aspen, etc.
- Comprehensive knowledge of instrumentation and computer-aided design (CAD) programs
- Working understanding of the principles and factors of LCA

3.5.6 Recruiting & Managing the R&D Team

Recruits and manages a qualified workforce in order to ensure the organization's R&D program and projects are properly staffed and that the team is managed in a way that fosters not only compliance to requirements and protocols, but also high performance, strong morale, and a high retention rate.

Competency in this role is demonstrated when the individual:

- With HR support, ensures all relevant employment standards are adhered to in the recruitment, hiring, and management of team members.
- Provides an effective orientation and onboarding process to ensure new team members are well initiated.
- Aligns team goals with project and organizational goals in order to ensure the team achieves the project goals and adds value to the organization.
- Assesses team members' performance, strengths, and development needs in a timely manner in order to provide the direction and support needed to keep the work on track.
- Holds individuals accountable for their performance by providing feedback in a balanced, constructive, and encouraging manner, acknowledging what is working and identifying the changes needed to address what is not working.
- Works with individuals to create a development plan that addresses identified performance gaps and career development priorities, e.g. further training, job shadowing, mentoring, etc., or reallocates them to a position that matches their strengths.
- As team lead, accepts accountability for the team's performance.
- Conducts formal supervision activities as applicable, e.g., performance reviews, objective setting, and recommendations regarding raises/promotions.
- Displays appropriate coaching skills to deal with ad hoc personnel issues.

Knowledge required for competency at this level:

- Working knowledge of relevant labour laws

- Working knowledge of the organization's HR policies, hiring practices, and requirements
- Comprehensive knowledge of the management of multidisciplinary teams of experts
- Working knowledge of relationship building and management techniques, e.g., French and Raven's power model
- Working understanding of motivational techniques

3.5.7 Applying Model Experimental Practices

Applies knowledge, skills, and model experimental practices related to the scientific and technical components of laboratory and field testing; the use, collection and storage of samples and reagents; the proper handling and disposal of waste products generated during research activities; and the use, maintenance, and calibration of instruments and equipment in order to produce optimal research results in a safe, effective, and efficient manner.

Competency in this role is demonstrated when the individual:

- Ensures that staff are professionally trained in and comply with current model experimental techniques and practices.
- Ensures that currently accepted scientific and experimental concepts and theories are integrated and applied to laboratory and field operations.
- Ensures staff compliance with policies, processes, and procedures for safe handling of reagents, samples, supplies, and waste products.
- Oversees the policies, processes, and procedures for the maintenance, calibration, repair, and replacement of experimental instruments and equipment.
- Develops new SOPs, as needed.
- Implements procedures for processing and storing sensitive/hazardous materials, e.g., seed/cell banks for biological materials used in the laboratory.

Knowledge required for competency at this level:

- Comprehensive understanding of and certification in WHMIS
- Comprehensive understanding of Good Laboratory Practices (GLP) and the scientific method
- Comprehensive understanding of relevant organizational policies and procedures
- Comprehensive understanding of animal welfare and compliance practices as part of the experimental process

3.5.8 Managing Quality in R&D

Implements and monitors the standard quality management processes to ensure that all R&D activities are conducted according to required standards and create reproducible results in the tests performed, the data generated, the results reported, and the products and technologies created.

Competency in this role is demonstrated when the individual:

- Implements a quality control plan and SOPs, following best practices for all R&D processes and activities.
- Keeps adequately detailed records of all experimental procedures, data, and data analysis.
- Ensures staff compliance with record-keeping procedures.
- Ensures that appropriate and timely corrective action is taken when made aware of noncompliant R&D practices.
- Ensures that any deviance or proposed changes to R&D procedures comply with required quality control standards.
- Ensures R&D procedures are developed with operational/practical constraints in mind.
- Ensures staff adhere to the guidelines of the organization's quality management system (QMS) and regulated quality standards.
- Develops formal training and SOPs for the handling of all tools, materials, and resources used and waste products generated during R&D activities.

Knowledge required for competency at this level:

- Comprehensive knowledge of relevant quality standards
- Comprehensive knowledge of QMSs and best practices in continuous quality improvement.
- Comprehensive knowledge of quality assurance tools such as flowcharts, check sheets, deviation reports, root cause analysis, Pareto diagrams, cause and effect diagrams, histograms, scatter diagrams, and control charts
- Working knowledge of organizational data integrity processes, e.g., lab notebooking, data storage formats, and locations, etc.

3.5.9 Digital Skills for R&D

Makes effective use of the Internet and computer software in order to identify existing scientific activity relevant to the area of study, investigate the depth and breadth of that research, record and maintain data, and develop and disseminate reports and presentations, etc.

Competency in this role is demonstrated when the individual:

- Develops strategies to manipulate web databases in order to gather information in the most effective way and identify data gaps.
- Uses Microsoft Excel or an equivalent spreadsheet/database software to organize and analyze data for inclusion in records, reports, and filings.
- Uses Microsoft Office or an equivalent organizational software to keep experiments/data trackable and accessible for all users.
- Uses specialized data analysis software as appropriate to project needs, e.g., Design of Experiments (DOE), Spotfire, GraphPad Prism, R Statistical Software, etc.
- Successfully navigates existing and emerging technologies and electronic tools required for tracking and reporting R&D projects and budgets such as SAP for budget and Microsoft Excel, Provantis, and SigmaPlot for reporting.
- Uses the Internet to file complex technical documents and reports such as electronic documents to government regulators.

Knowledge required for competency at this level:

- Comprehensive knowledge and skill in the application of the Microsoft Office Suite and Google Analytics
- Comprehensive knowledge and skill in the use of the Internet and scientific data bases for targeted research
- Working knowledge of software applications used within the organization (such as ERP, eQMS and CRM) and their compliance requirements
- Working knowledge of project management tools

3.5.10 Liaising with Key Stakeholders and Influencers

Liaises with investors, government, regulatory authorities, and other influential organizations in order to build positive relationships and support for the laboratory/organization's R&D program.

Competency in this role is demonstrated when the individual:

- Participates in R&D association meetings to gain insights into the role and perspective of key players in the industry.
- Cultivates ongoing relationships with influential individuals who deal in areas related to the biotechnology industry.
- Continuously seeks to recruit talent in order to build staff quality within the organization.

Knowledge required for competency at this level:

- Working knowledge of the principles of positive influence and persuasion
- Working knowledge of the principles of effective communication

3.6 Industry regulatory competencies list for Research Project Manager in Agri-biotech

3.6.1 Legal/Regulatory Compliance in R&D

Manages R&D documents, data, tools, resources, waste products, processes, and procedures in accordance with relevant safety, security, environmental, and ethical protocols—including intellectual property protection—in order to ensure legal protection and compliance with regulatory and funding requirements.

Competency in this role is demonstrated when the individual:

- Audits all aspects of R&D projects to ensure compliance with applicable policies and regulatory and funding requirements.
- Ensures staff compliance with regulatory requirements and guidelines in R&D activities.
- Ensures processes are in place to protect the safety and security of informatics as per general data protection regulation (GDPR) standards.
- Manages contractual instruments in order to ensure compliance by contract staff and R&D partners.
- Identifies critical R&D processes and product attributes to be included in intellectual property protection applications.
- In cooperation with Legal, determines which legal documentation is required such as consent forms and NDAs.
- Continually monitors current regulatory guidance to facilitate compliance.

Knowledge required for competency at this level:

- Comprehensive knowledge of the organization's regulatory framework
- Thorough knowledge of all legal and regulatory requirements relative to the organization's operations from sources such as the EPA, OECD, FDA, Health Canada (CFIA), Environment Canada, Province, etc.
- Working understanding of IP development and protection
- Working knowledge of ISO and other relevant world standards and the guiding principles behind them
- Working knowledge of corporate HR policies

- Working knowledge of how Health Canada and its branches are structured

3.6.2 Occupational Health & Safety in R&D

Actively participates in/manages the health and safety program for R&D staff and their workplace in order to ensure the health and safety of staff. Also ensures the organization's compliance with legislation and regulations related to safe work practices and procedures, corporate procedures, and facility health, safety, and environmental rules.

Competency in this role is demonstrated when the individual:

- Audits all aspects of R&D projects to ensure compliance with applicable health and safety requirements.
- Ensures health and safety standards and practices are up to date.
- Enforces staff compliance with safety requirements and guidelines in R&D activities.
- Ensures all staff, students, and volunteers have received all required course-based and on-the-job health and safety training in order to work safely in the laboratory and/or field environment prior to starting their work.
- Identifies additional/ongoing health and safety training and equipment requirements.
- Ensures that hazards are evaluated and mitigated in a timely manner where required.
- Leads/participates in safety audits and incident investigations as required.
- Continually monitors corporate policy and current safety guidance to facilitate compliance.
- Ensures all adverse safety incidents and accidents occurring during the project are documented and that the team learns from them.

Knowledge required for competency at this level:

- Comprehensive understanding of WHMIS and Workplace Health & Safety, as applicable
- Comprehensive understanding of the organization's Occupational Health & Safety (OHS) framework and corporate HR policies
- Comprehensive knowledge of required and available Health and Safety professional development courses

3.7 Personal and professional competencies list for Research Project Manager - Agri-biotech

3.7.1 Collaboration

Works effectively with others in order to foster trust and cooperation in the achievement of R&D goals and project objectives.

Competency in this role is demonstrated when the individual:

- Identifies the personal interests of clients and other key stakeholders in the success of the R&D program or project in order to better engage them in achieving program/project goals.
- Creates an environment of trust and mutual respect with relevant colleagues and stakeholders, regardless of their relative position in the organization, by consulting them in key decisions and taking their views, expectations, and priorities into account.
- Solicits feedback throughout the project from project staff and stakeholders in order to proactively identify potential issues.
- Seeks to understand difficult situations and issues from the others' perspectives, providing support where necessary to move things forward.
- Continuously coordinates with internal colleagues, clients, suppliers, investors, regulators, etc. to effectively achieve goals and responsibilities.
- Liaises between key project groups such as laboratory staff, informatics researchers, sales and marketing, manufacturing, and collaborators to enable and facilitate the efficient flow of data and resources.

Knowledge required for competency at this level:

- Working understanding of effective team facilitation skills
- Working knowledge of effective collaboration models and techniques
- Working knowledge of change management resources to affect staff culture, e.g., Kotter's 8-Step Change Model

3.7.2 Continuous Learning

Continuously undertakes introspection in order to understand current knowledge and skills in a changing environment, recognizes personal knowledge gaps, undertakes independent action to actively seek targeted opportunities to acquire new knowledge, and reflects on how new knowledge can be integrated and applied.

Competency in this role is demonstrated when the individual:

- Seeks out new role-related information to expand knowledge and understanding of the field.
- Actively pursues training to advance role-related skills and knowledge or to develop new skills and knowledge.
- Applies prior skills and knowledge to address new situations and challenges.
- Discusses scientific and technical advances relevant to own work to increase personal understanding.
- Continuously expands knowledge of the organization's field of research and of best research, laboratory, and data gathering practices.

Knowledge required for competency at this level:

- Basic knowledge of latest adult learning principles as related to learning processes and techniques
- Basic knowledge of training resources that can be utilized for personal and professional development
- Working understanding of personal learning style

3.7.3 Creative Leadership

Creates clarity of purpose for colleagues, teams, staff, and the organization, inspires them to transform an idea or vision into reality, cultivates innovative solutions even in the face of complex and challenging circumstances, and effectively manages change.

Competency in this role is demonstrated when the individual:

- Demonstrates genuine care and concern for the well-being of others.
- Continuously focuses the team on solving the problem and achieving the objective rather than rushing into unsustainable solutions.
- Encourages diversity and inclusivity in both the makeup of the workforce and receptivity to new perspectives.

Knowledge required for competency at this level:

- Working knowledge of influencing and motivational techniques
- Working understanding of strategic leadership principles and techniques
- Formal leadership training

3.7.4 Critical Thinking/Decision-Making in R&D

Analyzes, synthesizes, and evaluates arguments, information, and data and exercises sound judgement in order to solve problems and make decisions that strategically benefit the laboratory/organization's R&D activities and strategy.

Competency in this role is demonstrated when the individual:

- Engages in scientific discussions with peers through journal clubs, online forums, conference meetings, debates, etc. in order to hone critical thinking skills and evaluate scientific developments.
- Seeks opinions from scientists with different areas of expertise in order to explore other perspectives on new scientific concepts.
- Seeks opinions and validation of the practicality of the research/development solution in light of the organization's objectives.
- Uses experience and logic to evaluate and refine creative options and solutions.
- Explores new scientific technologies and approaches to determine their applicability considering competitive products and technological advances.
- Recommends a course of action based on an analysis of preliminary and incomplete information when action must be taken immediately.
- Uses creative processes such as mind mapping, brainstorming, and visualization to generate options.
- Uses creativity and imagination to view issues from a new perspective and create revolutionary breakthroughs.
- Contributes to the synthesis of information from multiple sources to formulate entirely new ideas and products.
- Utilizes the power of chance happenings to create new products such as the development of penicillin from mold and the invention of Post-it Notes.

Knowledge required for competency at this level:

- Working understanding of problem-solving frameworks and techniques
- Working understanding of root cause analysis tools such as the Ishikawa diagram or the 5 Whys method
- Working understanding of systems thinking approaches
- Working understanding of the organization and its relationship to the larger economic and political environment

3.7.5 Effective Interpersonal Communication

Communicates in ways that create shared understanding, generate support for the achievement of goals and objectives, and facilitate conflict resolution and problem-solving.

Competency in this role is demonstrated when the individual:

- Delivers multi-mode communications that convey a clear understanding appropriate to the target audience and context, e.g., using plain language to communicate technical research details to a non-technical audience.
- Uses persuasive language to ethically advocate for R&D program/project goals and objectives while allowing others room to share their opinions.
- Invites participative decision-making where appropriate, encouraging input from staff.
- Uses discretion and integrity in order to resolve conflict with a resistant audience in a manner that maintains a positive working relationship.
- Provides regular project updates in meetings with funders or other stakeholders.
- Makes scientific presentations at advisory boards, key scientific meetings, and external committee meetings.
- Develops strategies to appropriately communicate non-confidential and confidential information.

Knowledge required for competency at this level:

- Working knowledge of communication and conflict management models (e.g., DISC)
- Working knowledge of change management resources to affect staff culture (e.g., Kotter's 8-Step Change Model)
- Working understanding of how to communicate complex scientific ideas and results together with their impact on the project/organization in clear, plain language

3.7.6 Professionalism/Emotional & Cultural Intelligence

Applies emotional and professional sensitivity to become aware of own emotions and those of others they interact with in such a way that they can manage personal and professional decorum and maintain productive relationships.

Competency in this role is demonstrated when the individual:

- Consistently models ethical conduct such as discretion, personal integrity, and respect for diversity in order to foster cooperation and collaboration in the achievement of organizational objectives (self awareness).

- Exercises initiative to proactively address emerging organizational, regulatory, and technological concerns (self management/regulation).
- Implements positive personal stress management techniques to effectively deal with stress (self management/regulation).
- Works cooperatively with multiple stakeholders, demonstrating tact, diplomacy, and a willingness to consider alternative approaches or ideas that achieve results within ethical guidelines (relationship management).
- Navigates effectively through personal and political agendas to avoid or overcome barriers to the organization's progress (social awareness).

Knowledge required for competency at this level:

- Working understanding of the principles of emotional intelligence (see the work of authors like Daniel Goleman and Travis Bradberry)
- Working understanding of motivational theories

3.8 Essential Skills for Research Project Manager in Agri-biotech

Essential Skills (ES) are foundational skills required for all types of work. They are not technical skills, but the core skills people need to acquire knowledge and complete workplace tasks and daily activities.

Understanding the ES requirements for a role can allow individuals to compare their skills to those required, assist training/learning providers in developing appropriate supports to ensure ES levels are developed during training, and provide employers with an additional tool for determining who/how to place in particular roles.

Human Resources and Skills Development Canada has defined Essential Skills as follows:

- Reading
- Document Use
- Numeracy, which is further divided into:
 - Money math; Scheduling, budgeting, and accounting math; Measurement and calculation math; Data analysis math.
 - Several different factors related to estimations, including the presence of a set procedure, the number of items being estimated, the consequences of errors in estimation, the amount of information missing, and the accuracy required.
- Writing

- Oral Communication
- Thinking Skills, which are further divided into:
 - Problem Solving
 - Decision Making
 - Critical Thinking
 - Job Task Planning and Organizing
 - Finding Information
 - Significant Use of Memory
- Digital Skills
- Working with Others
- Continuous Learning

Most of the ES have levels based on complexity, and a role can be analyzed to determine the appropriate levels of ES. The exceptions are noted below:

- "Working with Others" does not have a complexity rating: it simply describes the ways in which the role would be required to interact with other people, either internally within the organization or externally (i.e., with clients, customers, or the public).
- "Continuous Learning" does not have a complexity rating: it describes the types of learning expected in the context of the role (e.g., on the job, being mentored by others, formal training as part of the job, etc.).

NOTE: as of January 2020, ESDC was undertaking a comprehensive review of ES with the intent of adding additional skills, refining existing ones (particularly digital skills) and better aligning ES with similar approaches used in other countries. However the detail was not finalized in time to be used, therefore the profiles developed for this project follow existing standards as of December 2019.

3.9 Canadian Language Benchmark for Research Project Manager - Agri-biotech

Canadian Language Benchmarks (CLB) are a 12-point scale for task-based language proficiency descriptors which were originally developed as a guide for measuring the teaching and assessment of English as a Second Language (ESL) learners in Canada. Since they

were originally developed, the Canadian Centre for Language Benchmarks (CCLB) has continued to refine CLB, and it now includes scales for both English and French language proficiency.¹

The CLB has been validated against both the Common European Framework for Language (CEFL) and the American Council for the Teaching of Foreign Languages (ACTFL) benchmarks and is considered accurate for high-stakes evaluation².

The ES levels for Oral Communication were developed with reference to the Canadian Language Benchmarks³. Comparative work to determine the alignment between the CLB and other Essential Skills has been ongoing, with recent work providing additional alignment with the ES for Oral Communication in both spoken and listening domains, Reading, Writing, and Document Use.⁴

CCLB has developed a set of crossover tables that align CLB ratings with ES ratings for reading, writing oral communication and document use.

Research Project Manager (Agri-biotech) ES/CLB Profile

Essential Skills	Equivalent CLB Level	ES Level				
		1	2	3	4	5
Reading	Reading: 10–11	1	2	3	4	5
Document Use	Reading: 7–8 Writing: 7–8	1	2	3	4	5
Writing	Writing: 9–10	1	2	3	4	5
Oral Expression	Speaking: 11–12 Listening: 11–12	1	2	3	4	
Numeracy	n/a	1	2	3	4	5
Thinking Skills – Problem Solving	n/a	1	2	3	4	

¹ Centre for Canadian Language Benchmarks. Theoretical Framework for The Canadian Language Benchmarks And *Niveaux De Compétence Linguistique Canadiens*. CCLB. Ottawa 2015. p8

² Centre for Canadian Language Benchmarks. Canadian Language Benchmarks: English as a Second Language for Adults, CCLB. Ottawa 2012 p.II

³ Essential Skills Research Group. Readers Guide to the Essential Skills. ESDC. Ottawa ND. p57

⁴ Canadian Centre for Language Benchmarks. Relating Canadian Language Benchmarks to Essential Skills: A Comparative Framework. 2015, p3

Essential Skills	Equivalent CLB Level	ES Level				
		1	2	3	4	5
Thinking Skills – Decision Making	n/a	1	2	3	4	
Thinking Skills – Job/Task Planning and Organizing	n/a	1	2	3	4	
Thinking Skills – Significant Use of Memory	n/a	Types 1,2,3				
Thinking Skills – Finding Information	n/a	1	2	3	4	
Digital Skills	n/a	1	2	3	4	5
Working with Others	n/a	See Below				
Continuous Learning	n/a	See Below				

Explanation of the Essential Skills and the Canadian Language Benchmark for Research Project Manager (Agri-biotech)

Reading: ES 4 CLB: 10–11

Research Project Managers read and interpret a variety of technical documents such as project plans, contracts, non-disclosures and confidentiality agreements, company policies and procedures, and professional standards (PMI, etc.). They read to gather information from multiple sources to solve problems, inform decisions, and manage their work.

Document Use: ES 3 CLB: Reading: 7–8, Writing: 7–8

Research Project Managers access and interpret a wide variety of technical documentation and information in both printed and electronic form. Information can be textual, graphical, and/or numerical in nature. Locating specific information requires them to recognize and use particular sources, but these sources are generally known and provided as part of their job.

Writing: ES 4 CLB: 9–10

Research Project Managers write reports to management to detail the progress of projects, and communicate with team members and support staff through a variety of written methods, including email, text or other IM communication vehicles, memos, and written SOPs and directives. They produce written plans and budgets to secure and/or justify support (funding, resources) for specific projects.

Oral Expression: ES 4 CLB: Speaking: 11–12, Listening: 11–12

Research Project Managers communicate with stakeholders at all levels of the organization, as well as with external suppliers/vendors, in the course of their duties. They work within an interdisciplinary team and must be adept at communicating complex technical information to a wide variety of audiences. They contribute to peer forums, provide information to inform the decisions of senior managers and other stakeholders, instruct junior personnel in techniques and technologies, and solicit feedback from project staff and other stakeholders. Additionally, they make presentations to senior management, negotiate with external vendors, providers, and/or clients, and may be called upon to communicate and explain the technical details of projects to non-technical audiences.

Numeracy: ES 4 (Money Math: n/a, Scheduling, Budgeting and Accounting: 4, Measurements: n/a, Data Analysis: 3)

Research Project Managers are directly involved in the budgeting process for projects, as well as accounting for expenditures during project execution, conducting earned-value analysis on projects to facilitate billing and invoicing activities, and managing the costs associated with external vendors and suppliers. On sophisticated projects, they analyze data to determine critical paths, allocate and balance personnel and resources, calculate and mitigate variances from project plans, and determine alternate approaches to project execution to ensure variances are minimized.

Thinking Skills:

Thinking skills are subdivided into five domains:

- Thinking Skills — Problem Solving
- Thinking Skills — Decision Making
- Thinking Skills — Job/Task Planning and Organizing

- Thinking Skills — Finding Information
- Thinking Skills — Significant Use of Memory
- **Thinking Skills — Problem Solving: ES 3**

Research Project Managers solve problems related to project execution. These problems have a limited number of variables, and the relationships between these variables is known. There are established processes for solving most problems, but it is up to the Project Manager to determine which process to follow. Solutions can be evaluated, and once effects are known they must determine what, if any, additional changes need to be made in order to minimize variances and bring projects back under control.

- **Thinking Skills — Decision Making: ES 3**

Research Project Managers make decisions that can have significant financial repercussions for their organization such as re-scoping and re-scheduling work, issuing change orders, requesting engineering changes, etc. These decisions require them to exercise judgement, and complete and unambiguous information is not always available to support the decision-making process. Reversing these decisions comes at significant cost.

- **Thinking Skills — Job/Task Planning and Organizing: ES 3**

Research Project Managers' primary function involves the detailed planning and monitoring of the work of many different individuals involved in a project. They have significant discretion over how they spend their own time, and they manage their own work within the constraints of the particular project as well as the established processes and standards of their profession. Resource management and allocation across multiple departments or projects is common, as is rebalancing work when individuals are committed to multiple projects and delays and rescheduling occur.

- **Thinking Skills — Finding Information: ES 3**

Research Project Managers access a number of information sources in their work. These sources include project reports, progress metrics, costing information, and project plans and budgets. The type of information sought and the usual source of that information is generally well known. Information collected is often repurposed or input into other systems in order to support decision-making and ongoing project management activities.

- **Thinking Skills — Significant Use of Memory: Types 1, 2, 3**

Research Project Managers must memorize, retain, and use information through one or all of the following methods:

- Purposeful memorization of procedures, codes, parts numbers, memorization through repetition (Type 1)
- Remembering information for brief periods, e.g., minutes or hours (Type 2)
- Unique events in which learning occurs from exposure (Type 3)

Digital Skills: ES 3

Research Project Managers utilize standard office productivity software tools (Word processing, spreadsheets, presentations, etc.), electronic communication tools (email, text, instant messaging, video conferencing, etc.), and set up and use specialized project management tools and software in the performance of their duties.

Working with Others: Work Contexts 2, 3 & 4

The following work contexts and functions are relevant to the Research Project Manager role:

- Works independently (Work Context 2)
- Works jointly with a partner or helper (Work Context 3)
- Works as a member of a team (Work Context 4)

They are also involved in supervisory or leadership activities, as follows: Functions 1–5 & 8–12

- Participate in formal discussions about work processes or product improvement (S/L Function 1)
- Have opportunities to make suggestions on improving work processes (S/L Function 2)
- Monitor the work performance of others (S/L Function 3)
- Inform other workers or demonstrate to them how tasks are to be performed (S/L Function 4)
- Orient new employees (S/L Function 5)
- Select contractors and suppliers (S/L Function 8)
- Assign routine tasks to other workers (S/L Function 9)
- Assign new or unusual tasks to other workers (S/L Function 10)
- Identify training that is required by or would be useful for other workers (S/L Function 11)
- Deal with other workers' grievances or complaints (S/L Function 12)

Continuous Learning: Type of Learning 1, 2, 3 How Learning Occurs: 1, 2, 3, 4, 5, 6

Type of learning may include:

- Training in job-related health and safety (Type 1)
- Obtaining and updating credentials (Type 2)
- Learning about new equipment, procedures, products, and services (Type 3)

The learning may occur:

- As part of regular work activity (Context 1)
- From coworkers (Context 2)
- Through training offered in the workplace (Context 3)
- Through other forms of self-study (Context 4):
 - At work
 - On worker's own time
 - Using materials available through work
 - Using materials obtained through a professional association or union
 - Using materials obtained through worker's own initiative
- Through offsite training (Context 5):
 - During working hours at no cost to the workers
 - Partially subsidized
- With costs paid by the worker (Context 6)

4 REFERENCES

Gathering the data

The development of the National Occupational Standards started with a review of existing information for the role. This review process included: referencing books, job postings, websites, articles, and BioTalent Canada's existing skills profiles to create the first draft. After several iterations via written feedback, focus groups and a national survey with subject matter experts, the National Standards were developed. The following are sources consulted during the creation of the **Research Project Manager – Agri-Biotech** profile:

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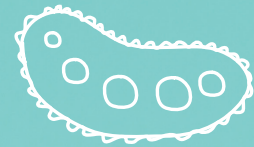
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During the research period, several job posting boards were reviewed for this profile.

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