Project Manager
Profile Outline

About the Electricity Sector Council
Approximately 100,000 Canadians are involved in the generation, transmission and distribution of one of our country's essential utilities: electricity. Their work powers homes and businesses across the country, fuelling everything from light bulbs, cell phones and refrigerators to water treatment plants and road vehicle assembly lines.

The Electricity Sector Council provides support to this dedicated team by working with industry employers and other stakeholders to research and resolve human resource and workplace development issues.

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Disclaimer: Please note that some of the tasks detailed in this document will require the services of a registered tradesperson depending upon the province of work. Provincial regulations change from time to time, employers and employees should consult your provincial appropriate licensing authority for clarification regarding which tasks may be affected. It is the responsibility of the individual employer/employee to ensure they act within the regulation for their jurisdiction.

Introduction

Project Managers working in the electricity sector plan, organize, direct, control and evaluate projects in the generation, transmission, distribution and renewable energy sectors. They are employed by electrical utilities and private companies that build power infrastructure for utilities and municipalities.

The most important Essential Skills for Project Managers are:

• Document Use

• Thinking Skills – Critical Thinking

• Working With Others

A. Reading Text

Reading Text refers to reading material that is in the form of sentences or paragraphs. *Reading Text* generally involves reading notes, letters, memos, manuals, specifications, regulations, books, reports or journals. *Reading Text* includes:

- forms and labels if they contain at least one paragraph;
- print and non-print media such as computer screen and microfiche text; and
- paragraph-length text within charts, tables and graphs.

The Reading Text Complexity Rating Scale ranges from Level 1 (least complex) to Level 5 (most complex). The typical text reading tasks of Project Managers are at Complexity Levels 2 to 4. Their most complex text reading tasks are at Complexity Level 4.

Examples

Project Managers:

- read e-mail messages from project staff. For example, they may read e-mail messages from project forepersons which describe schedule delays. They may read e-mail messages from suppliers which outline material specifications and delivery arrangements. (2)

- read magazines and other periodicals. For example, they may read articles in *Electricity Today* magazine which describe new technological developments and trends in renewable energy. (2)

- read paragraphs of text on work orders, contracts and other forms. For example, they may read incident forms which briefly describe unsafe conditions leading up to incidents and accidents and detail injuries sustained by staff and damage to equipment. They may read entries in daily logs and reports written by site forepersons that give details about project progress and provide sign-off for submission to project stakeholders. (2)

- read letters and memos from project contractors, sub-contractors and utility staff which detail project responsibilities. For example, they may read memos from utility managers which describe changes to project team personnel and revisions to project policies that Project Managers must administer and oversee. (2)

- may read reports written by private utilities and electricity grid operators. For example, they may read interconnection evaluation reports completed by Independent Electricity System Operators which describe various electricity system impacts of new generating facility projects. Project Managers must be able to understand how their projects will affect the bulk electrical system and how new infrastructure is integrated with existing networks and grids. (3)

- may read manuals and regulations. For example, they may read regulations from the Canadian Standards Association to learn about recommended practices for installations of electricity generating systems such as wind turbines. They may read sections of the *Canadian Electrical Code* to determine applicable standards for installing high voltage equipment such as switchgear assemblies, isolating switches and interrupter switches. (3)

- read technical specifications for project equipment and components prior to their installation, testing and commissioning. For example, they may read detailed specifications for wind turbines and associated generating equipment to learn about their individual components, compositions and operating norms. They must interpret complex and industry-specific terminology to fully understand equipment and component specifications of major infrastructure projects. (4)

Reading Text Summary

Type of Text	Purpose for Reading			
	To scan for specific information/ To locate information	To skim for overall meaning, to get the 'gist'.	To read the full text to understand or to learn.	To read the full text to critique or to evaluate.
Forms	✓	✓		
Notes, Letters, Memos	✓	✓	✓	
Manuals, Specifications, Regulations	✓	✓	✓	✓
Reports, Books, Journals	✓	✓	✓	

B. Document Use

> **Document Use** refers to tasks that involve a variety of information displays in which words, numbers, icons and other visual characteristics (e.g., line, colour, shape) are given meaning by their spatial arrangement. Workplace examples of documents include graphs, lists, tables, blueprints, schematics, drawings, signs and labels.
>
> If a document includes a paragraph of text, as may be the case on a label or a completed form, it is also included in **Reading Text**. Documents requiring the entry of words, phrases, sentences and paragraphs are also included in **Writing**.

The Document Use Complexity Rating Scale ranges from Level 1 (least complex) to Level 5 (most complex). The typical document reading tasks of Project Managers are at Complexity Levels 1 to 3. Their most complex document reading tasks are at Complexity Level 3.

Examples

Project Managers:

- locate data in completed forms. For example, they may read sections of contracts completed by project contractors and sub-contractors which detail proposed construction or consulting tasks and general information about contractors' and sub-contractors' capabilities and responsibilities. (1)

- locate data in lists and tables. For example, they may scan tables in electrical product specifications and check lists of technical specifications to find prices of electrical power from different sources. (2)

- enter data into forms. For example, they may fill out federal, provincial and municipal forms to apply for work permits. They may complete work orders and change orders which indicate project work tasks to be completed and revised before forwarding the forms to administrative staff and project sponsors. (2)

- locate data in schedules. For example, they may refer to schedules and complex Gantt charts to find specific information about project phases, tasks, resources, milestones and deadlines for their projects. (2)

- locate data in assembly drawings. For example, they may scan assembly drawings of wind turbines to familiarize themselves with the size and number of components. (2)

- may interpret scale drawings. For example, they may review construction drawings depicting several different views of buildings to obtain data such as the dimensions of floor areas, walls, windows and ceilings. (3)

- may take measurements from scale drawings. For example, they may measure distances between utilities and other structures on scale drawings when managing infrastructure projects to confirm proximities. (3)

- interpret data in schematics and flowcharts. For example, they may interpret technical data in electrical schematics which describe connections between electrical components. They may study flowcharts to determine electricity flows and control points between new generating plants and existing transmission infrastructure. (3)

- locate data and interpret trends in graphs. For example, they may refer to graphs which display contractors' adherence to project milestones and deliverables to identify performance patterns. They may refer to graphs of testing results with engineers and other project staff to determine if equipment and machinery are functioning according to specifications. (3)

Examples of Creating Documents

Project Managers:

- create schedules. For example, they create project schedules that detail project design and construction phases, tasks and resources. They may create material schedules that list the construction materials and equipment required to complete their projects.

- may create sketches and diagrams. For example, they may sketch rough layouts of new electrical substations that depict required components and forward their sketches to engineers, designers and drafters to complete formal drawings.

- may create tables and charts to gather, organize and analyze contractor and sub-contractor data such as human resource complements, key contacts and contract stipulations.

Document Use Summary

Project Managers:

- Read signs, labels or lists.

- Complete forms by marking check boxes, recording numerical information or entering words, phrases, sentences or texts of a paragraph or more.

- Read completed forms containing check boxes, numerical entries, phrases, addresses, sentences or texts of a paragraph or more.

- Read tables, schedules or other table-like text.

- Create tables, schedules or other table-like text.

- Enter information on tables, schedules or other table-like text.

- Plot information on graphs (e.g., line, pie, and bar).

- Obtain specific information from graphs or charts.

- Interpret information on graphs or charts.

- Construct or draw graphs or charts.

- Recognize common angles such as 15º, 30º, 45º, and 90º.

- Draw, sketch or form common shapes such as circles, triangles, spheres, rectangles, squares, etc.

- Interpret scale drawings (e.g., blueprints or maps).

- Take measurements from scale drawings.

- Read assembly drawings (e.g., those found in service and parts manuals).

- Read schematic drawings (e.g., electrical schematics).

- Make sketches.

- Obtain information from sketches, pictures or icons.

C. Writing

> ***Writing*** includes:
>
> - ***text writing and writing in documents such as filling in forms; and***
> - ***non-**paper-based writing such as typing on a computer.*

The Writing Complexity Rating Scale ranges from Level 1 (least complex) to Level 5 (most complex). The typical writing tasks of Project Managers are at Complexity Level 1 to 3. Their most complex writing tasks are at Complexity Level 3.

Examples

Project Managers:

- write brief reminders and notes to co-workers. For example, they may write lists of activities associated with daily project tasks and provide the lists to forepersons and team leaders. They may write reminders to administrative staff about completing daily reports and telephone logs. (1)

- write e-mail messages to project contractors, co-workers, colleagues and stakeholders. For example, they may write e-mail messages to contractors requesting clarification on project milestones and completion of tasks. (2)

- write memos and letters. For example, they may write memoranda which provide technical details about project component design to all project staff. They compile information from engineers and technical experts to draft memoranda and obtain sign-off from project contractors, department leads and forepersons. (2)

- may write explanations and descriptions on work orders and change order forms. For example, they may write explanations for contractors' equipment problems which lead to project delays and provide descriptions of measures taken to alleviate the problems. (2)

- may write briefing notes. For example, they may write briefing notes for management to summarize the activities performed to mitigate issues or complaints raised by project stakeholders. (2)

- write reports to provide timely information to contractors, sub-contractors, co-workers and project sponsors. For example, they may write project status reports describing progress made, difficulties encountered and potential solutions being explored. They may write brief analysis reports for utilities which analyze and describe electrical and mechanical failures encountered during installation and commissioning. (3)

- may write business cases to justify projects. For example, they may write formal business cases that outline the background of the project, the expected benefits of the project, financial requirements, and risks of the project. Once completed, the business cases are often forwarded to project sponsors and are reviewed for accuracy throughout the project life cycle. (3)

Writing Summary

Length	Purpose for Writing						
	To organize/to remember	To keep a record/to document	To inform/to request information	To persuade/to justify a request	To present an analysis or comparison	To present an evaluation or critique	To entertain
Texts requiring less than one paragraph of new text.	✓	✓	✓				
Texts rarely requiring more than one paragraph	✓	✓	✓				
Longer texts		✓	✓	✓	✓		

D. Numeracy Task

> *Numeracy* refers to the use of numbers by workers and their requirement to think in quantitative terms in order to complete tasks. Two aspects of *Numeracy* have complexity ratings: *Numerical Calculation;* and, *Numerical Estimation*.
>
> *Numerical Calculation* is rated within four different application settings as specific knowledge of concepts or procedures are exclusive to each setting:
>
> - *Money Math* - financial transactions, such as handling cash, preparing bills or making payments;
> - *Scheduling or Budgeting and Accounting Math* - managing time and money as resources, planning and monitoring their use, assessing best value, reducing waste;
> - *Measurement and Calculation Math* - measuring and describing the physical world; and,
> - *Data Analysis Math* - analysis of numerical data such as extrapolation of information and determination of trends or statistically significant effects.
>
> *Numerical Estimation* refers to tasks involving any estimation (i.e., an approximation based on judgement) that results in a number.

Numerical Calculation

The Numerical Calculation Rating Scale ranges from Level 1 (least complex) to Level 5 (most complex). The numerical calculation tasks of Project Managers involve:

- Money Math at Complexity Level 2.

- Scheduling or Budgeting and Accounting Math at Complexity Levels 2 to 4.

- Measurement & Calculation Math at Complexity Level 2.

- Data Analysis at Complexity Levels 2 to 3.

Examples

Project Managers:

- may total amounts for project supplies, tools and parts on purchase orders and requisition forms. For example, they may purchase office supplies and record the associated costs for project accounting personnel. (Money Math) (2)

- may calculate amounts for personal travel expenses. They calculate amounts for travel in personal vehicles using per kilometre rates. They may add amounts for per diem allowances and meals. (Money Math) (2)

- prepare draft project budgets. For example, they may prepare baseline budgets for construction project phases using contractor and sub-contractor estimates. They use these budgets to determine potential cost ranges and expenditures per project phase. (Scheduling or Budgeting and Accounting Math) (2)

- may monitor and adjust project budgets. For example, they may review weekly, bi-weekly and monthly project expenditure reports and balance sheets, monitor project labour, materials and consultancy costs and adjust expenditures to meet project budget constraints. They compare budgeted amounts to actual costs and may use cost-projecting calculations to see if projects will be over or under budget, identify trends and prevent cash flow problems. (Scheduling or Budgeting and Accounting Math) (3)

- monitor and adjust project schedules. For example, they may scrutinize project schedules and associated milestones and deliverables to confirm that project tasks are being completed on time. They may calculate the time and resources required to complete various project tasks as scheduled, forecast potential project lag and downtime and adjust schedules to ensure projects and individual project phases stay on time. They must ensure that all project staff members are notified in advance of these schedule adjustments and that contractors, sub-contractors and co-workers know how their deadlines and milestones may have changed. (Scheduling or Budgeting and Accounting Math) (4)

- may calculate the dimensions of project buildings, equipment, components and structures from scale drawings. For example, they may check construction drawings to make sure rooms are large enough to accommodate electrical and electronic equipment and components. (Measurement and Calculation Math) (2)

- calculate costs associated with contractor and sub-contractor hiring, materials procurement and project administration. For example, they may calculate hourly labour costs using contractors' invoices and timesheets and may calculate office expenditures by adding and subtracting capital costs such as business machines, cellular telephones and project vehicles. They may insert values in digital worksheets to calculate costs. (Measurement and Calculation Math) (2)

- analyze cost, schedule and scope data from past projects to adequately plan current projects. For example, they may review costing data associated with hiring contactors and sub-contractors in past projects and compare those costs with estimates received from current contractors to determine potential labour expenditures. They may compare past projects' schedules and work breakdown structures to identify common leads, lags and floats when assigning durations to work packages. (Data Analysis Math) (2)

- may record and monitor productivity data of project human resources. For example, they may track work productivity by monitoring the number of contractors' change orders, project phase budgets, inventory and lost-days reports, contract waivers and work instructions and assign numerical values that represent the relative difficulties of project tasks to develop performance benchmarks. These analyses may form bases of contractor and co-worker incentives, rewards and motivations. (Data Analysis Math) (3)

Numerical Estimation

The Numerical Estimation Rating Scale ranges from Level 1 (least complex) to Level 4. The numerical estimation tasks of Project Managers are at Complexity Level 2.

- may estimate labour hours required to complete project tasks. For example, they consider their previous experience in similar projects and the number and qualifications of their current project contractors, sub-contractors and staff to estimate how long various project tasks may take. They must estimate accurately to effectively plan and manage project timelines and budgets. (Numerical Estimation) (2)

Math Skills Summary

a)   Mathematical Foundations Used

Number Concepts	
Whole Numbers	Read and write; count; round off; add or subtract; multiply or divide whole numbers. For example, counting days in project phases; reading and writing dates in schedules; adding the number of days required to complete project tasks.
Integers	Read and write; add or subtract; multiply or divide integers. For example, recognizing elevations, calculating budgetary values in journal entries
Rational Numbers – Fractions	Read and write; add or subtract fractions; multiply or divide by a fraction; multiply or divide fractions. For example, writing human resources requests expressed as fractions of days; adding and subtracting fractions of hours, days and months to determine project planning tasks.

Rational Numbers - Decimals	Use decimals mainly to refer to dollars and cents. For example, calculating labour costs using hourly rates; calculating budget overspending and current allocations; interpreting measurements expressed as decimals.
Rational Numbers - Percent	Read and write percents; calculate the percent one number is of another; calculate a percent of a number. For example, reading percents in Gantt charts that describe task completion; calculating deviation of actual costs from projected costs as a percentage total project budgets.
Equivalent Rational Numbers	Convert between decimals and percentages. For example, tracking project work time by converting decimals to fractions; converting labour rates expressed as percents to decimals.
Other Real Numbers	Use powers and roots; scientific notation; significant digits. For example, inserting variables into equations to calculate areas; inserting budget amounts in a compound interest formula; using Ohm's Law.

Patterns and Relations	
Equations and Formulae	Solve problems by constructing and solving equations with one unknown. Use formulae by inserting quantities for variables and solving. For example, inserting variables into equations to calculate areas; inserting budget amounts in a compound interest formula; using Ohm's Law.
Use of Rate, Ratio and Proportion	Use a rate showing comparison between two quantities with different units. Use a ratio showing comparison between two quantities with the same units. Use a proportion showing comparison between two ratios or rates in order to solve problems. For example, calculating cost of power consumption in cents per kilowatt hour; comparing productivity and use of materials across months; using proportions to note scales on construction drawings.
See Document Use for information on using scale drawings.	

Shape and Spatial Sense	
Measurement Conversions	Perform measurement conversions. For example, converting measurements in construction drawings between Imperial and System International units.
Areas, Perimeters, Volumes	Calculate areas. Calculate perimeters. Calculate volumes. For example, calculating the areas and perimeters of project buildings and sites; calculating volumes of materials (e.g., oil, concrete, water, fill).
Geometry	Use geometry. For example, using geometric principles to understand and interpret scale drawings and schematics.
See Document Use for information on recognizing common angles and drawing, sketching and forming common forms and figures	

Statistics and Probability	
Summary Calculations	Calculate averages. Calculate rates other than percentages. Calculate proportions or ratios. For example, calculating average production costs; calculating interest rates associated with late invoices; calculating profit ratios in project budgets.
Statistics and Probabilities	Use descriptive statistics (e.g., collecting, classifying, analyzing and interpreting data). Use inferential statistics (e.g. using mathematical theories of probability, making conclusions about a population or about how likely it is that some event will happen). For example, collecting and developing statistical profiles of past projects; conducting project risk analyses to determine the probabilities of risks to project budgets, project schedules and project scopes.
See Document Use for information on using tables, schedules or other table-like text and using graphical presentations	

b)   How Calculations Are Performed

- In their heads

- Using a pen and paper

- Using a calculator

- Using a computer

c) Measurement Instruments Used

- **Time** – For example, using clocks and watches.

- **Distance or dimension** – For example, using scale drawings.

- **Temperature** – For example, using thermometers.

They use the:

- System International (Metric) measuring system, and

- Imperial measuring system

E. Oral Communication

> ***Oral Communication*** pertains primarily to the use of speech to give and exchange thoughts and information.

The Oral Communication Complexity Rating Scale ranges from Level 1 (least complex) to Level 4 (most complex). The typical oral communication tasks of Project Managers are at Complexity Levels 2 to 4. Their most complex oral communication tasks are at Complexity Level 4.

Examples

Project Managers:

- discuss ongoing work with co-workers. For example, they may talk to administrative assistants to obtain telephone messages and gather information about contractor invoices. They may speak to forepersons and contractors about project status and task progress. (2)

- participate in group discussions. For example, they attend periodic project meetings with project stakeholders, project department heads, forepersons and contractors to discuss project tasks and obtain current information. They may take part in project completion meetings with sponsors and other stakeholders to share insights about their experiences, successes and areas for improvement. (2)

- may speak to project staff and other co-workers to diffuse disagreements, confrontations and personality conflicts which negatively affect project work. For example, they may ask forepersons to intervene in personality conflicts between workers to maintain safe and effective work habits. They may meet with discontented contractors and sub-contractors to discover the reasons for their displeasure and tactfully suggest potential solutions. Project managers must ensure they listen effectively to all parties involved to seek resolutions to conflicts. (3)

- may speak to the public to provide project information. For example, they may speak to landowners, farmers and community residents of nearby utility infrastructure and construction projects to provide information. They provide reassure to public citizens by answering their questions carefully and work to gain public trust by speaking honestly and sincerely. (3)

- may negotiate with project stakeholders, project sponsors and contractors. For example, they may meet with utility managers and financial staff to discuss re-financing possibilities for project cost overruns and may speak to contractors to offer incentives for the safe and efficient completion of work tasks. (3)

- may discuss products, prices and deliveries with suppliers and contractors. For example, Project Managers overseeing small infrastructure projects may ask suppliers of materials for prices and lead times. (3)

- consult with colleagues to obtain their input on technical topics and challenging project problems. For example, they may talk to electrical engineers and utility workers with specific technical knowledge to troubleshoot equipment and component installations that are not working properly. They ask questions to ensure they understand complex technical theory related to electricity generation, transmission and distribution and obtain colleagues' opinions and perspectives regarding the causes and solutions to project challenges. (3)

- present information and progress updates to large groups of corporate clients, project sponsors, utility executives and engineering colleagues on project topics such as task analysis reports, budget estimates, project scope descriptions and responsibilities of their contractors and sub-contractors. Project Managers field questions and offer professional opinions. (4)

Modes of Communication Used

- **In person** – For example, talking to project workers during site visits.

- **Using a telephone** – For example, speaking with suppliers and servicers to ask about equipment delivery dates and times.

- **Using a two-way radio** – For example, speaking with project forepersons to obtain progress updates.

- **Others not elsewhere classified (nec) e.g. video conferencing, use a public address system** – For example, using video conferencing to communicate between site and corporate facilities; using PA systems to facilitate large meetings; using smart boards.

Environmental Factors Affecting Communication

Project Managers may work on-site in the field where construction noise may impede communication

Oral Communication Summary

Type	Purposes of Oral Communication (Part 1)					
	To greet	To take messages	To provide/ receive information, explanation, direction	To seek, obtain information	To co-ordinate work with that of others	To reassure, comfort
Interact with co-workers			✓	✓	✓	
Interact with those you supervise or direct			✓	✓	✓	
Interact with peers and colleagues from other organizations			✓	✓	✓	
Interact with customers/clients /public			✓	✓	✓	
Interact with suppliers, servicers			✓	✓	✓	
Participate in group discussion			✓	✓	✓	
Present information to a small group			✓		✓	
Present information to a large group			✓		✓	

Type	Purposes of Oral Communication (Part 2)					
	To discuss (exchange information, opinions)	To persuade	To facilitate, animate	To instruct, instil under-standing, knowledge	To negotiate, resolve conflict	To entertain
Interact with co-workers	✓	✓	✓		✓	
Interact with those you supervise or direct					✓	
Interact with peers and colleagues from other organizations	✓					
Interact with customers/clients/public	✓	✓		✓	✓	
Interact with suppliers, servicers	✓	✓				
Participate in group discussion	✓		✓			
Present information to a small group	✓		✓	✓	✓	
Present information to a large group	✓			✓	✓	

F. Thinking Skills

Thinking Skills differentiate among five different types of cognitive functions. However, these functions are interconnected and include:

1. *Problem Solving*
2. *Decision Making*
3. *Critical Thinking*
4. *Job Task Planning and Organizing*
5. *Significant Use of Memory*
6. *Finding Information*

1. Problem Solving

> **Problem solving** involves problems that require solutions. For example, a mechanic solves problems, e.g., the car shakes when driven over 80 km./hr., by eliminating probable causes until the correct one is identified and remedied. Most problems concern mechanical challenges, people or situations.

The Problem Solving Complexity Rating Scale ranges from Level 1 (least complex) to Level 4 (most complex). The typical problem solving tasks of Project Managers are at Complexity Levels 2 to 4. Their most complex problem solving tasks are at Complexity Level 4.

Examples

Project Managers:

- may discover during site visits and conversations with technical staff that project work has not been completed to specifications. For example, they may talk to electrical engineers who notice installation and interconnection deficiencies between generators and transmission lines. They consult with installation contractors and review project drawings and specifications to identify the deficiencies, review safety risks and tolerances and ask technical experts for opinions about solutions. (2)

- discover that contractors and sub-contractors are struggling to meet deadlines and may be delaying project completion. They meet with contractors and staff to determine the causes of the delays and refer to contracted obligations to encourage contractors' compliance to project schedules and deliverables. They use tact and collaboration to ensure that contractors and sub-contractors stay on task and on target. (3)

- encounter construction delays and project complications caused by inadequate resources and insufficient planning. For example, they may find that estimated project tasks are taking longer than originally scheduled because of inclement weather. They consult with contractors, sub-contractors, utility staff and other colleagues to re-examine project phases and discuss their options. They may expand the durations and budgets of projects and renegotiate revised deadlines and deliverables to ensure all project activities can be completed. (4)

2. Decision Making

> ***Decision making*** refers to making a choice among options.
>
> ***Decision making*** occurs during problem solving, but not all decision making is part of problem solving. It is, therefore, presented as a separate thinking skill. For example, buyers for retail outlets regularly make decisions about which suppliers to buy from, i.e., they select from the options for particular types of merchandise. This is not problem solving.

The Decision Making Complexity Rating Scale ranges from Level 1 (least complex) to Level 4 (most complex). The typical decision making tasks of Project Manager, are at Complexity Levels 2 to 3. Their most complex decision making tasks are at Complexity Level 3.

Examples

Project Managers:

- may choose project staff to lead various project departments. For example, they review personnel qualifications and related past work experience to select directors and managers for project areas such as procurement, finance, human resources and others. (2)

- may choose equipment and supply contractors. For example, they check contractors' product information, speak with contractors to determine product availability and delivery terms and may gauge other Project Managers' opinions to select appropriate suppliers. (2)

- decide when to seek technical assistance or technical expert consultation during their projects. For example, they may approach electrical engineers and utility workers to gather technical data and obtain explanations when project tasks fall outside their specific technical expertise. (2)

- may decide to reprimand and dismiss project contractors and sub-contractors for inadequate work, missed deadlines and unsafe performance. They review the specifics of organizations' contracts, discuss any events directly with contractors and point out stipulations, consequences and penalties for non-compliance. They make these decisions carefully to maintain original project schedules and budgets. (3)

3. Critical Thinking

Critical Thinking is the process of evaluating ideas or information, using a rational, logical thought process, and referring to objective criteria, to reach a rational judgement about value, or to identify strengths and weaknesses.

Critical Thinking may be an element in other thinking skills. For example, judgement is sometimes required to evaluate the choices offered during the course of *Decision Making* and to evaluate solutions proposed as a result of *Problem Solving*. In other cases, Critical Thinking is an independent job task.

The Critical Complexity Rating Scale ranges from Level 1 (least complex) to Level 4 (most complex). The typical critical thinking tasks of Project Managers are at Complexity Levels 2 to 4. Their most complex critical thinking tasks are at Complexity Level 4.

Examples

Project Managers:

- judge the accuracy and validity of contractors' and sub-contractors' invoices. They ensure that all invoice items are complete and justified by reviewing contract terms, work agreements and project schedules for work completion before issuing payments. (2)

- may assess the completeness and quality of project tasks completed by contractors, sub-contractors and utility workers. For example, they may review procurement documents, delivery schedules and work orders to confirm that appropriate tasks have been performed. They may call in technical experts to test equipment after installations to determine if equipment is functioning correctly and visually inspect work areas to ensure commissioning is complete. (3)

- evaluate new and innovative construction methods and processes to use in their projects. For example, they may examine associated costs, sources of qualified and experienced contractors and other workers and any safety concerns related to construction advancements. They review these criteria to determine the feasibility of integrating new methods and processes into their personal project management styles. (3)

- may evaluate their personal performance in leading projects. For example, they may review expected and unexpected project alterations and assess the positive and negative effects of their responses and reactions to project changes. They may review project deadlines, milestones and budgets after project completion to determine their ability to meet contracted expectations and to identify personal areas of management strengths and limitations. (4)

- evaluate the rationality of change requests made by contractors, sub-contractors and project sponsors. They consider the need for the changes, the feasibility of performing tasks associated with project changes in terms of time and budget and the degree to which they think the changes will satisfy terms of contracts. They gather information by discussing changes with contractors, sub-contractors and project sponsors and reviewing past related project data. (4)

4.   Job Task Planning and Organizing

There are two aspects to **Planning and Organizing: Job Task Planning and Organizing** and **Organizational Planning**.

Job Task Planning and Organizing refers to the extent to which the workers plan and organize their own tasks.

Organizational Planning refers to the job incumbent's involvement in the organization's broader planning and organizing tasks (i.e., planning and organizing the work of others, operational planning, strategic planning).

The Job Task Planning and Organizing Rating Scale ranges from Level 1 (least complex) to Level 4 (most complex). Project Managers plan and organize their job tasks at Complexity Level 3.

Own Job Planning and Organizing

Project Managers working in the electricity sector set their own work priorities and plan their daily activities within the framework of project schedules and deadlines. They must manage their time effectively to produce high quality work on time and within approved budgets. Their work is often interrupted by unpredictable issues such as project design changes, contract change requests, equipment breakdowns and work delays caused by underestimation of project complexity, communication errors and many other factors that may interfere with expected results. Project Managers must be proficient at revising their priorities and adapting project schedules to achieve required results. (3)

Planning and Organizing for Others

Project Managers are responsible for planning and co-ordinating the human resources, job tasks, schedules and budgets for projects that vary in length from several months to several years. Some Project Managers may also be involved in strategic planning for their sponsor organizations and utilities.

5. Significant Use of Memory

> ***Significant Use of Memory*** includes any significant or unusual use of memory for workers in the occupational group. It does not include normal memory use that is a requirement for every occupation.

Examples

Project Managers:

• remember names and areas of expertise for project contractors, sub-contractors, suppliers and co-workers to facilitate communication and professional rapport.

• remember anecdotal and historical information. For example, Project Managers may remember how certain equipment and components were installed and aligned in past projects to apply the knowledge to their current work.

• remember dates of significant contract milestones and contract amendments resulting from change orders.

• remember the scope of their projects to determine if additional demands or requirements require change requests or changes in scope.

6. Finding Information

> ***Finding Information*** involves using any of a variety of sources including text, people, computerized databases or information systems.
>
> ***Finding Information*** is highlighted in this section as an essential job skill. However, workers' use of various information sources may be referred to in other sections such as *A. Reading Text, B. Use of Documents, E. Oral Communication* and *H. Computer Use*.

The Finding Information Complexity Rating Scale ranges from Level 1 (least complex) to Level 4 (most complex). Project Managers, tasks that involve finding information are at Complexity Levels 2 to 3.

Examples

Project Managers:

- locate information about contractors and equipment suppliers. For example, they may locate equipment descriptions, shipping and installation terms, specifications, costs and availabilities by speaking with contractors and suppliers and by reviewing catalogues, brochures, price lists and information posted on manufacturers' websites. (2)

- find information about electricity industry standards and utility company requirements in policy, procedure and standards manuals. (2)

- locate information about past projects in binders, reports and documents and other digital files. For example, they may find information about past turbine installation schedules to compare the data to current projects. (2)

- consult with colleagues and experienced project team members to seek advice and information about project scheduling, material procurement and unusual problems to identify options and strategies. (3)

G. Working with Others

The Essential Skill of **Working with Others** examines the extent to which employees work with others to carry out their tasks. Do they have to work co-operatively with others? Do they have to have the self-discipline to meet work targets while working alone?

The Working with Others Complexity Rating Scale ranges from Level 1 (least complex) to Level 4 (most complex). Project Managers, work with others at Complexity Level 4.

Description

Project Managers coordinate and integrate their work tasks with contractors, sub-contractors, suppliers and utility workers to complete projects in electricity generation, transmission and distribution. They direct the work of project staff and may oversee the work of various project teams. Project Managers adjust their direct involvement with other workers to address issues such as quality of work concerns and missed project deadlines.

Project Managers may be responsible for assigning work tasks to team members and spend many hours per day communicating with project teams and seeking others' input. They are responsible for evaluating contractors, sub-contractors, suppliers and employees' work performance. (4)

Participation in Supervisory or Leadership Activities

Project Managers:

- participate in formal discussions about work processes or product improvement.

- have opportunities to make suggestions on improving work processes.

- monitor the work performance of others.

- inform other workers or demonstrate to them how tasks are to be performed.

- orient new employees.

- make hiring recommendations.

- make hiring decisions.

- select contractors and suppliers.

- assign routine tasks to other workers.

- assign new or unusual tasks to other workers.

- identify training that is required by, or would be useful for, other workers.

- deal with other workers' grievances or complaints.

H. Computer Use

> **Computer Use** indicates the variety and complexity of computer use within the occupational group

The Computer Use Rating Scale ranges from Level 1 (least complex) to Level 5 (most complex). The Computer Use tasks of Project Managers, are at Complexity Levels 2 to 4.

Examples

Project Managers:

- use word processing software. For example, they may use features of Word to write, edit and format change orders, contracts, progress reports and other documents. (2)

- may use graphics software. For example, they may use graphics software to create slide presentations and other promotional materials for their projects and to present these materials to project stakeholders during meetings and consultations. They may also use graphics software to develop organizational charts. (2)

- may use database software. For example, they may use database software to view and retrieve data which describes the procurement, delivery and installation of suppliers' equipment on project sites. They may enter data to record project contractor and sub-contractor names, addresses, equipment lists and staff complement. (2)

- may use spreadsheet software. For example, they may enter quantitative data into spreadsheets and apply formulas within the spreadsheet to track sections of project budgets and calculate resource scheduling for specific project phases. (3)

- may use financial software. For example, they may use accounting functions to consolidate project spending and monitor project finances related to labour, consulting, inventory and equipment. They may use advanced functions to forecast project costs and create accurate cost estimates. (3)

- may use computer-assisted design software. For example, they may use AutoCAD and associated viewing software to review prints and make field marks for revisions to be completed by the engineering and drafting departments. (3)

- use communication software. For example, they may use communication software to create and maintain project contact lists, send and receive e-mail and text messages and retrieve attachments from contractors, suppliers and site workers. They may relay information to field crews via their personal digital assistants or cellular telephones. (3)

- use the Internet. For example, they may access suppliers' websites to research products, download specifications, retrieve assembly and application instructions and obtain corporate information. They may download electronic copies of policies and guidelines published by regulatory bodies and electricity industry associations. (2)
- use other computer and software applications. For example, they may use advanced

functions of project management software to create detailed project schedules, assign task interdependencies and human resources and predict completion of project milestones and deliverables. They may use the software to administer project contracts and subcontracts and to view updated plans, drawings, change orders, purchase orders, meeting minutes, requests for information (RFIs) and other project-related documents. (4)

I. Continuous Learning

Continuous Learning examines the requirement for workers in an occupational group to participate in an ongoing process of acquiring skills and knowledge.

Continuous Learning tests the hypothesis that more and more jobs require continuous upgrading, and that all workers must continue learning in order to keep or to grow with their jobs. If this is true then the following will become Essential Skills:

- knowing how to learn;
- understanding one's own learning style; and
- knowing how to gain access to a variety of materials, resources and learning opportunities.

The Continuous Learning Complexity Rating Scale ranges from Level 1 (least complex) to Level 4 (most complex). Project Managers perform Continuous Learning tasks at Complexity Level 4.

Description

Project Managers must continually update their skills to succeed in their work. They must be able to process and integrate information related to advancements in project management processes into their skill sets and keep up to date with standards and regulations. They may be responsible for maintaining personal learning plans for review by their direct supervisors and personally identify beneficial areas of training and learning in both project management and technical areas to better understand the needs of project stakeholders such as individual contractors, utility workers and the general public. Much of their learning is self-directed as they may read professional project management journals, books and periodicals. They may also expand their continuous learning initiatives to encompass other areas of expertise relating to their projects and to broaden their knowledge base. They learn informally by examining their performances managing past projects. Project Managers may hold professional designations from national and international organizations and may be required to maintain project management credentials by demonstrating their skills during projects and writing periodic examinations. Health and safety training and technical training related to infrastructure projects including safe work site training, WHMIS and first aid may be offered by their employers. (4)

How Learning Occurs

- as part of regular work activity.

- from co-workers.

- through training offered in the workplace.

- through reading or other forms of self-study:
  o at work,
  o on worker's own time,
  o using materials available through work
  o using materials obtained through a professional association or union,
  o using materials obtained on worker's own initiative,

- through off-site training:
  o during working hours at no cost to the worker,
  o partially subsidized,
  o with costs paid by the worker

J. Other Information

> ***Other Information*** summarizes additional information collected during interviews with job incumbents and focus groups with occupational experts.

In addition to collecting information for this Essential Skills Profile, our interviews with job incumbents also asked about the following topics.

1. Physical Aspects

Project Managers may sit at computer workstations and walk around project sites. They use upper limb and hand-eye coordination to manipulate computer hardware. Project managers are required to exert very limited strength to lift and carry small objects related to their work.

2. Attitudes

Project Managers must maintain a confident, positive attitude and outwardly present this positive attitude to project staff. They must be able to adapt to stressful situations and possess the ability to think quickly and rationally while representing all project stakeholders affirmatively.

3. Future Trends Affecting Essential Skills

In the future, Project Managers will need strong critical thinking, problem solving and computer skills to effectively integrate project tracking and project management technologies. They must employ specialized critical thinking and problem solving skills to identify and use suitable project management technology in their projects. They will require advanced computer use skills to track and analyze project progress using automated software. As global procurement practices increase, the need to work with diverse working groups will become increasingly important.