Implementations of ISO/IEC 29110 in Canada

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Content

- Introduction
- Implementations in Canada
  - A Start-up Company of 2 People Involved in the Development of Web Services For Travelers
  - An ISO/IEC 29110 in an IT Start-up of Canada and Tunisia
  - A Division of a Large Engineering Firm
  - A large Canadian Financial Institution
  - A Canadian Enterprise in the Automotive Field
  - A Young Transportation Enterprise
  - A Large Federal Department
- Next Steps

VSEs = Very Small Entities are enterprises, organizations, projects or departments having up to 25 people.

A Start-up Company of 2 People Involved in the Development of Web Services For Travelers

An IT Start-Up

- **Start-up Company of 2 People**
  - Involved in the development of web services for travelers
    - To help travelers throughout the life cycle of a trip from its initial planning to sharing the experience of the traveler with friends.

http://swicetrip.com/

Adapted from (Laporte et al 2014)

An IT Start-Up

- Allocation of ISO/IEC 29110 documents the two-people VSE,
- As the VSE grows, the set of roles will be attributed amongst all people of the VSE.

Role	Identification of team member
Analyst	A
Designer	B
Programmer	A/B
Project Manager	B
Technical Leader	A
Work Team	A/B

Name of document	Main author	Reviewer (if applicable)
Change Request	A	B
Correction Register	B	A
Maintenance Documentation	B	A
Meeting Record	A	
Product Operation Guide	B	B
Progress Status Record	B	
Project Plan	B	A
Project Repository	B	
Project Repository Backup	B	
Requirements Specification	A	B
Software	A/B	
Software Components	A/B	
Software Configuration	A/B	
Software Design	B	A
Software User Documentation	A	B
Statement of Work	A	B
Test Cases and Test Procedures	A	B
Test Report	A	
Traceability Record	B	A
Verification Results	A/B	
Validation Results	A/B	

A

Adapted from (Laporte et al 2014)

An IT Start-Up

- **Total Effort of 990.5 Hours**

Phase of development cycle	Prevention (Hours)	Execution (Hours)	Evaluation (Hours)	Rework (Hours)
Installation of the work environment	89			
Project management and Project progress		47		
Deployment		8,5		
Development of Project Plan		35	3	4
Software Specification and Prototyping		199,5	7	18
Development of the Architecture		42.5	1.5	3,5
Construction (Prototype and code)		361	47	96,5
Development of Test Plan		12.5	1	2
Development of product and User guide		8	1	1
Project closure		2		
TOTAL	**89**	**716**	**60.5**	**125**

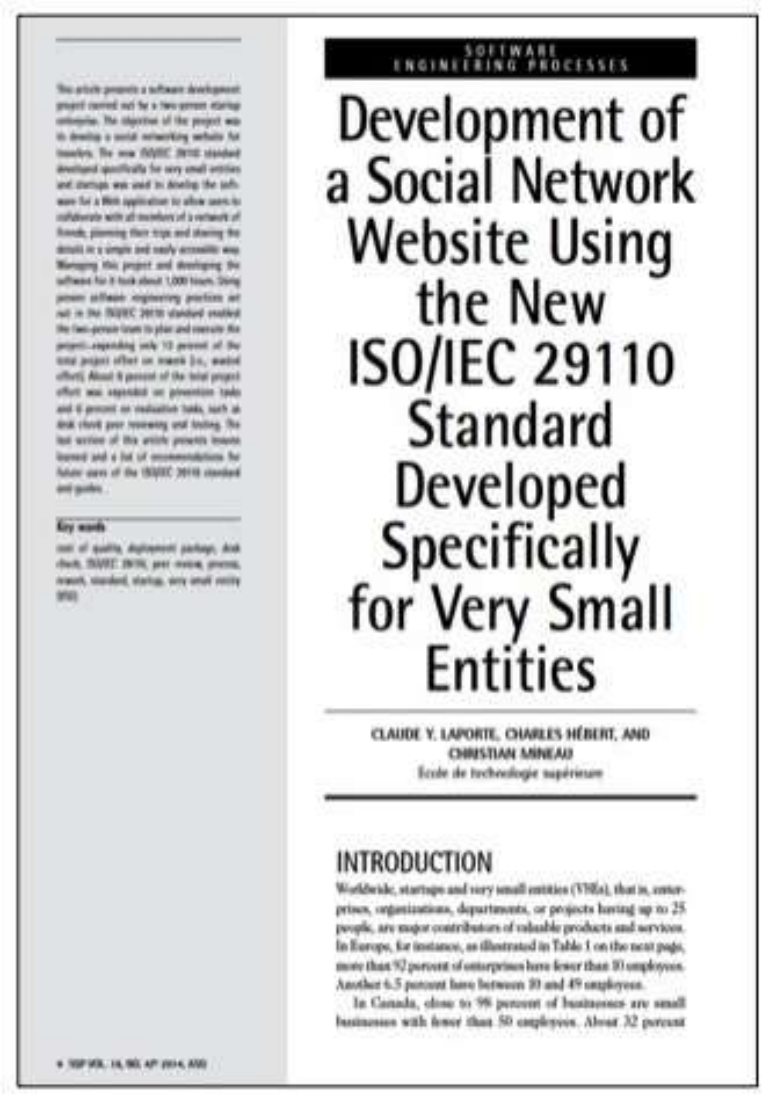
- Percentage of rework of 12.6% (i.e. 125 hours/990.5) hours

Adapted from (Laporte et al 2014)

An IT Start-Up

- Development of a Social Network Website Using the New ISO/IEC 29110 Standard Developed Specifically for Very Small Entities
- Software Quality Professional – September 2014

http://www.iso.org/iso/home/standards/standards-in-education/education_materials-higher-edu/educational_materials-detail-em.htm?emid=1421



SOFTWARE ENGINEERING PROCESSES

Development of a Social Network Website Using the New ISO/IEC 29110 Standard Developed Specifically for Very Small Entities

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INTRODUCTION

Worldwide, startups and very small entities (VSEs), that is, enterprises, organizations, departments, or projects having up to 25 people, are major contributors of valuable products and services. In Europe, for instance, as illustrated in Table 1 on the next page, more than 92 percent of enterprises have fewer than 10 employees. Another 6.5 percent have between 10 and 49 employees.

In Canada, close to 98 percent of businesses are small businesses with fewer than 50 employees. About 32 percent

(Laporte et al. 2014)

An ISO/IEC 29110 in an IT Start-up of Canada and Tunisia

An IT Start-Up

- Company founded en 2013 by a software engineering graduate of ÉTS
  - One site in Canada with 5 employees
  - One site in Tunisia with 2 employees
- Business domains
  - Software development services, Web solutions, mobile applications
  - Consulting services to implement ERP solutions
- ISO/IEC 29110 is also used a foundation to implement CMMI® DEV level 2 practices
  - Requested by some military contracts

Adapted from (Houcine 2015)

A Canadian Division of a Large Engineering Firm

Pilot Project in a Large Engineering Firm

- Offers a range of services in the production of hydro-electric, wind, geothermal, solar or biomass-related energy.
- Company established 10 years ago,
- Over 500 employees spread over 10 offices in Canada,

Business Objectives Targeted for the Improvement Project	
Identification n Number	Description
O-1	Facilitate the integration of new project managers.
O-2	Reach an overall customer satisfaction level 80%.
O-3	On average projects should reach cost and schedule targets within 5% within 5%
O-4	Reduce overload of staff by 10%
O-5	Reduce schedule slippage to less than one week and 5% of initial cost for initial cost for mismanaged risks of projects
O-6	Reduce rework by 10 %
O-7	Reduce non billable hours by 10%

Adapted from (Laporte et col. 2013)

Pilot Project in a Large Engineering Firm

- Classified their projects in 3 categories and developed 3 project management processes, checklists and templates

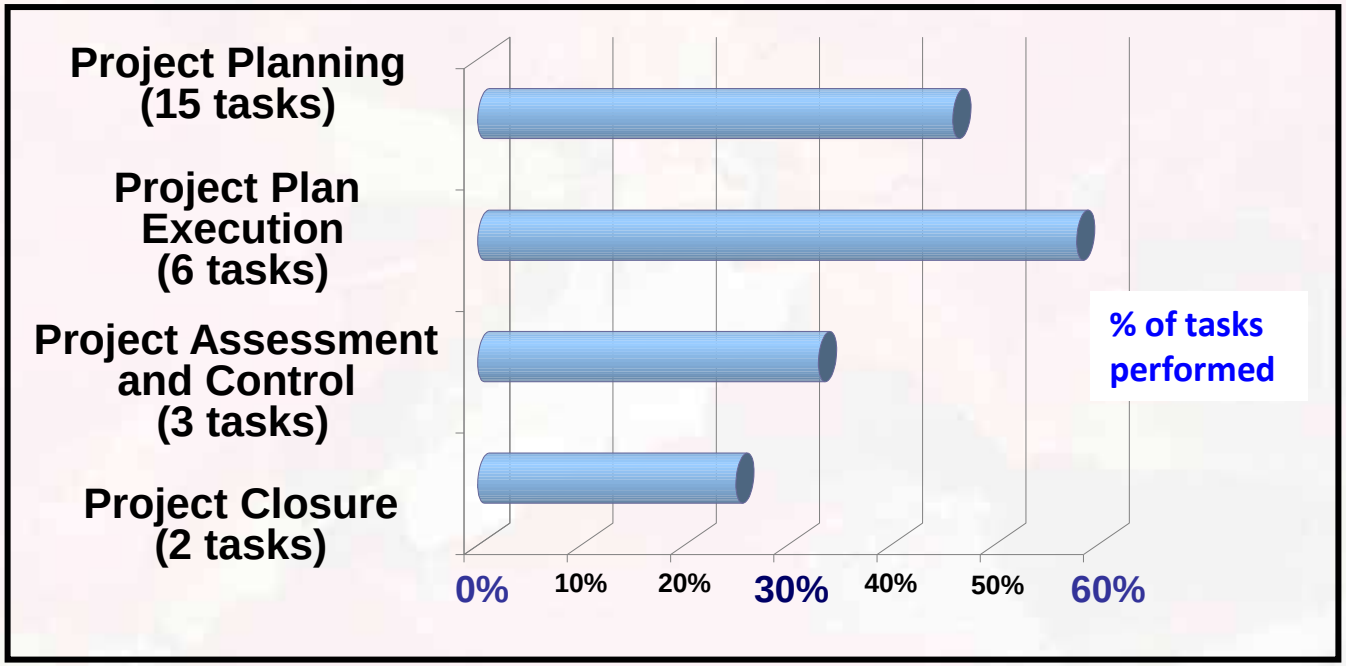
	Small Project	Medium project	Large project
Duration of project	Less than 2 months	Between 2 and 8 months	More than 8 months
Size of team	Equal or less than 4 people	Between 4 and 8 people	More than 8 people
Number of engineering specialties involved	One specialty	More than one specialty	Many specialties
Engineering fees	Between 5,000$ and 70,000$	Between 50,000$ and 350,000$	Over 350,000$
Percentage of projects	**70%**	**25%**	5%

- Small projects used ISO/IEC 29110 Entry Profile
- Medium projects used ISO/IEC 29110 Basic Profile
- Large projects used the Guide to the project management body of knowledge (PMBOK® Guide) of PMI

Adapted from (Laporte et al. 2013)

Pilot Project in a Large Engineering Firm

- Project Management process for medium projects was evaluated against the 26 tasks of ISO 29110 Basic Profile

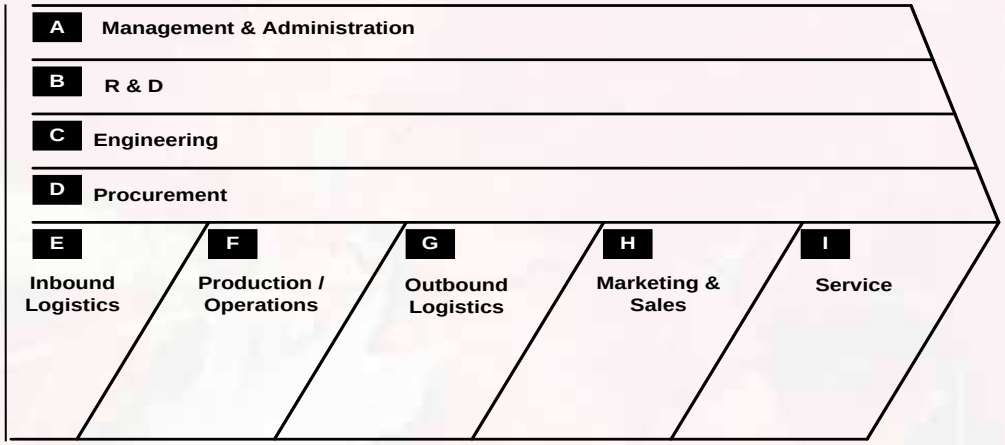


- PM tasks were not performed systematically.
- PM practices varied from project manager to project manager

Adapted from (Laporte et col. 2013)

Pilot Project in a Large Engineering Firm

- Cost analysis using the ISO method to evaluate the *Economic Benefits of Standards*
  - Value chain



  - Costs and Benefits

	Year 1	Year 2	Year 3	Total
Cost to implement and maintain	59 600$	50 100$	50 100$	159 800$
Net Benefits	255 500$	265 000$	265 000$	785 500$

Adapted from (Laporte et col. 2013)

Pilot Project in a Large Engineering Firm

- INCOSE International Symposium,
- Seattle, July 2015
- 20-page article

http://profs.etsmtl.ca/claporte/Publications/Publications/INCOSE%202015_Tetra_Tech.pdf

An Innovative Approach to the Development of Project Management Processes for Small–Scale Projects in a Large Engineering Company

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ABSTRACT

A 400-employee Canadian division of a large American engineering company has developed and implemented project management processes for their small-scale and medium-scale projects. The company was already using a robust project management process for their large-scale projects. The objectives of this project were to reduce cost overruns and project delays, standardize practices to facilitate the integration of new managers, increase the level of customer satisfaction and to reduce risk-related planning deviations. For this project, the engineering organization used the ISO/IEC 29110 standards developed specifically for very small entities, i.e. organizations, having up to 25 people. An analysis of the cost and the benefits of the implementation of small and medium scale project management processes was performed using the ISO economic benefits of standard methodology. The engineering enterprise estimated that, over a three-year timeframe, savings of about 780,000$ would be realized due to the implementation of project management processes using the ISO/IEC 29110 standard.

Keywords: Project Management, Very Small Entity, Small-Scale Project, Medium-Scale Project, Process, ISO/IEC 29110, Standards, Economic Benefits.

INTRODUCTION

Standards are sources of codified knowledge and studies have demonstrated the benefits of standards, such as product interoperability, increased productivity, market share gains, and improved interaction with stakeholders such as enterprises, government organizations and the public. Standards and associated technical documents could be considered as a form of technology transfer and, if the right standards are selected and used correctly they should have an economical impact in an organization.

Many advantages or benefits as well as disadvantages or costs have been reported regarding the use of voluntary standards. Table 1 lists a few of the advantages and disadvantages reported.

A large Canadian Financial Institution

Implementation in a Large Canadian Financial Institution

- The Cash Management IT department, of a large Canadian financial institution, is responsible for the development and maintenance of software tools used by traders.
- The software team is composed of 6 people. Each year, the division is faced with an increase in the numbers of requests to add, correct or modify features related to supported applications.
- Before the implementation of the ISO 29110-agile process, customers had the following complaints:
  - Very difficult to know the status of specific requests
  - Very often, there is an incident when a change is put in production.
  - There is a large number of faults detected by the quality assurance department
  - The development process is painful and the documentation produced is not very useful.

A Canadian Enterprise in the Automotive Field

An Enterprise in the Automotive Field

- A company of more than 140 people (14 software developers), designs and sells electric powertrain systems in the automotive field.
- The company plans to increase its production systems in the coming years.
- A compliance study was conducted to establish the difference between the processes in place and those proposed by ISO 29110.
- An action plan has been developed to organise the software process improvement activities
- An analysis of differences between ISO 29110 and ISO 26262, a standard for the automotive industry, was conducted
- An economic impact assessment was conducted using the methodology developed by ISO
- An ISO 29110 pilot project has been successfully completed in May 2015.
- ISO 29110 will be used in future projects.

A Young Transportation Enterprise

Overview

- Public transportation customers often require a CMMI® maturity level for system and sub-system suppliers.
- In 2012, **CSiT** was composed of 4 people (7 presently).
  - Implementing the CMMI® Level 2 Process Areas was too demanding at that time.
- **Strategy**
  - Implement the draft version of Systems Engineering ISO/IEC 29110 Basic profile as a foundation
    - Used other frameworks to complete process descriptions
      - e.g. INCOSE Handbook, PMBOK Guide of PMI and CMMI®
  - Perform a gap analysis between CMMI® level 2 and the SE Basic Profile
  - Implement the practices needed for a CMMI® level 2 assessment.

Classification of CSiT processes

	Light Process	Standard Process	Full Process
Type of Project	Proof of Concept, Prototype Concept validation or Product Deployment at Customer Site Small Project	Typical Project Product intended to be installed at Customer Site Medium Project	Project when CMMI level 2 is required by a Customer Product Testing or Product Deployment at Customer Site Large Project
Framework to be used	ISO/IEC TR 29110-5-6-1 Entry Profile + CMMI - Supplier Agreement Management	ISO/IEC TR 29110-5-6-2 Basic Profile + CMMI - Supplier Agreement Management	CMMI (Level 2)

ISO 29110 in Academia

- École de technologie supérieure (ÉTS)
  - An 8,000-students engineering school
    - ÉTS won the ISO Award for Higher Education in Standardization
  - Software Quality Assurance Courses
    - Two textbooks covering ISO 29110
    - Team-project where students must develop a software using ISO 29110
  - Projects done by graduate students of ETS:

A Large Federal Department of Canada

The Organisation Context

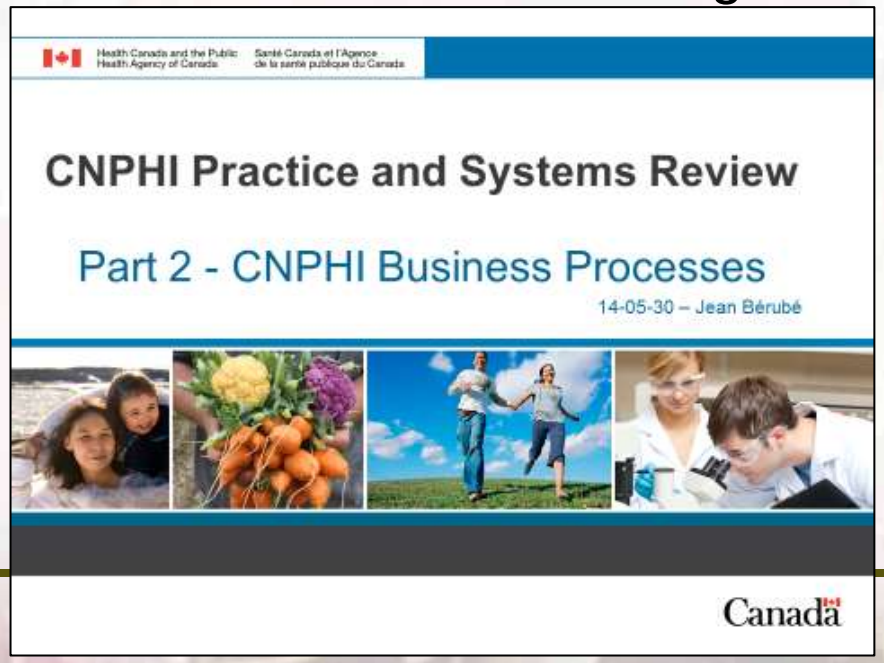
- Health Canada is the Federal department responsible for helping Canadians maintain and improve their health, while respecting individual choices and circumstances.
- Health Canada is not a VSE (12,000 employees), but some of its units are.
- The CIO (Chief Information Officer) and the Director General for Software Development hired an external consultant to prepare recommendations on specific situations.
- The Basic Profile of ISO 29110 was used as the reference for evaluations and recommendations.

Situation 1

- After an internal audit, Health Canada wanted to know if its response to an internal audit that rated low its process maturity in the area of Software Development.
- The ISO 29110 Basic Profile was used as a neutral reference (checklist) to validate the proposed Software Development Life Cycle (SDLC) documents, and as the source of some process improvements.

Situation 2

- A small IT unit (really a VSE) responsible for a well defined mandate (Health Information Dissemination) was about to participate in a major project as a key player.
- The CIO wanted to know how this unit was operating, and if its practices were good enough to participate in a larger project.
- ISO 29110 was used as the reference for software development processes, and ISO 20000 was used for service management and CoBit for governance.



Situation 2 - Example

CNPHI Practice and Systems Review - CNPHI Business Processes

CNPHI Initiatives Related Processes

29110-5-1-2 Tasks

	Starting an initiative		
Ref. Id	**Ref. Process**	**CNPHI Impl.**	**Notes**
PM.01.01	Service Request	Request comes at service desk, and identified as such Initial gathering of needs and objectives	
PM.01.02	Service/Application Requirements	Review step at CNPHI -map with PHAC Mandate -map with existing CNPHI service Reply with a proposal Call for an initial meeting	
PM.01.13 & 14	Mandate Formalization	Agreement reached on proposal MOU for partnership (affiliated projects) if needed	
PM.01.04-11	Activity Planning, Budgeting, etc.	Use template project plans	
PM.01.12	Product/Deliverables Planning	Re-use of previous products as examples	
PM.01.10 & 15	Set up infrastructure, document library, methods and tools, etc.	Same environment for all initiative (including tools) Wiki, collaboration center, common drive for documentation	

14-05-30 (v2.0) Final

19

Conclusion

- ISO 29110 has been specifically developed for VSEs (enterprise, organization, project, department) having up to 25 people that develop systems and/or software,

- A wide range of Canadian organizations have implemented successfully ISO 29110,

- Canadian public and private organizations as well as academia still have a long way to go for Canadian VSEs to fully benefit from ISO 29110.

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Grazie Danke Ευχαριστίες Dalu Obrigado

Thank You Köszönöm

Tack

Спасибо Dank Gracias

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