Norm and Standards in Quality

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Context of this lecture

As soon as an IT company wants to reach international markets, having a certification becomes necessary

Reaching European markets is best done via an ISO certification

The North-American market is usually tackled from a process point of view (CMMI)

Goal of this lecture

It is not about making you a CMMI certifier

It will probably not help you in getting to the next CMMI phase

The goal of this lecture is

- to know what a quality standard and norm is about
- to provide a starting point in case you need to work on a certification

Outline

1. Product and Process Standards
2. International Organization for Standardization
3. Capability Maturity Model Integration
4. The Chilean case

Product and Process Standards

Product and Process Standards

Product standards define characteristics that all components should exhibit

Process standards define how the software process should be enacted

Product and Process Standards

Product standard

Design review form
Document naming standards
Procedure header format
Java conventions
Project plan format
Change request form

Process standards

Design review conduct
Submission of documents
Version release process
Project plan approval process
Change control process
Test recording process

Sample Java Code Conventions

4.2 Wrapping Lines

When an expression will not fit on a single line, break it according to these general principles:

Break after a comma.

Break before an operator.

Prefer higher-level breaks to lower-level breaks.

Align the new line with the beginning of the expression at the same level on the previous line.

If the above rules lead to confusing code or to code that's squished up against the right margin, just indent 8 spaces instead.

Sample Java Code Conventions ...

10.3 Constants

Numerical constants (literals) should not be coded directly, except for -1, 0, and 1, which can appear in a for loop as counter values.

Source: http://java.sun.com/docs/codeconv/CodeConventions.pdf

Potential Problems with Standards

Not always seen as relevant and up-to-date by software engineers

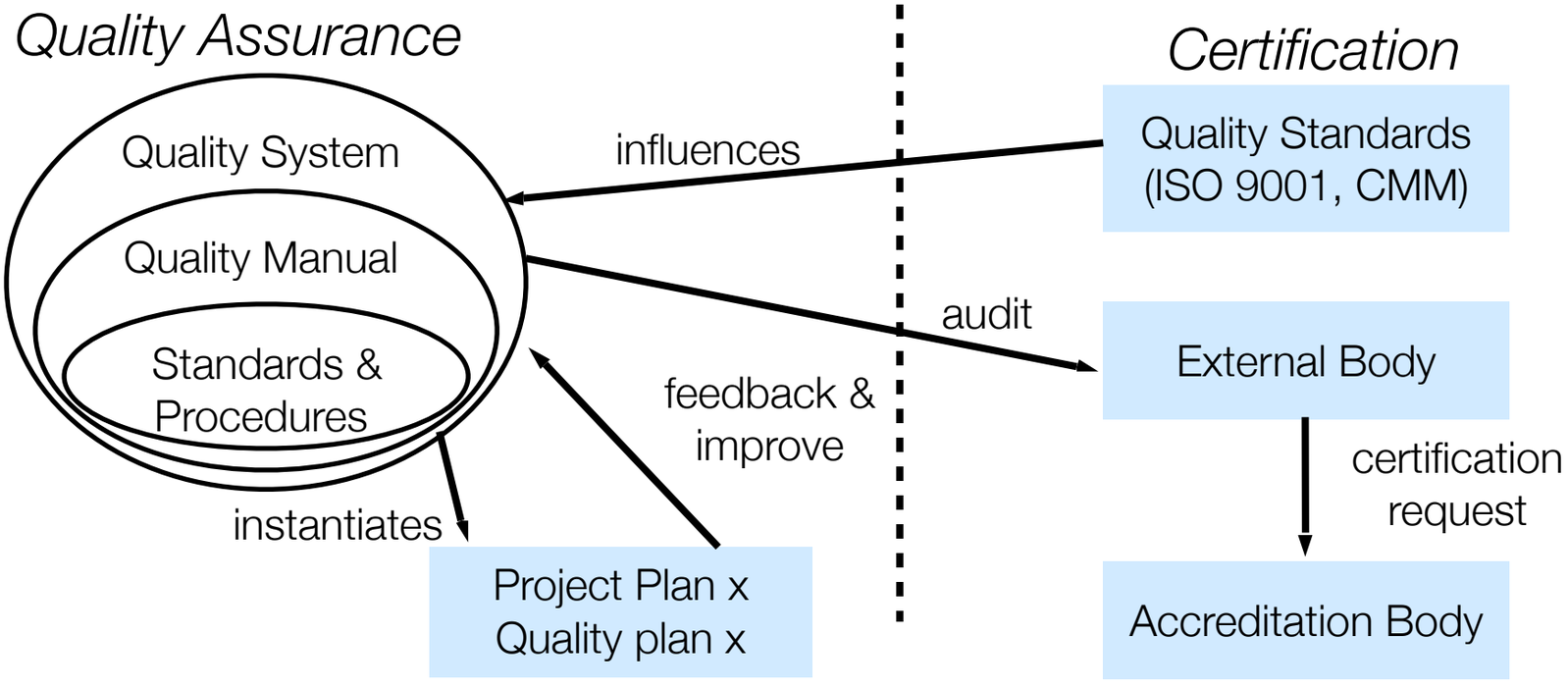
May involve too many bureaucratic form filling

May require tedious manual work if unsupported by software tools

Limit overhead to effectively apply standards

Quality System

A Quality Plan should be an instance of an organization's Quality System



Customers may require an externally reviewed quality system

ISO

International Organization for Standardization

ISO 9000

ISO 9000 is an international set of standards for quality management applicable to a range of organizations from manufacturing to service industries

ISO main site: http://www.iso.ch

ISO 9000 main site: http://www.tc176.org

ISO 9001

ISO 9001 is a generic model of the quality process, applicable to organizations whose business processes range all the way from design and development, to production, installation and servicing

- ISO 9001 must be instantiated for each organization
- ISO 9000-3 interprets ISO 9001 for the software developer

In Europe, it is almost necessary to be certified 9001 in order to submit to open call

ISO 9126

ISO 9126 is an international standard for the evaluation of software quality

This is the standard related to software quality you heard about in France

The objective is to address some of the well-known human biases

ISO 9126...

The standard is divided into 4 parts

- quality model
- external metrics
- internal metrics
- quality in use metrics

ISO 9126: quality model

- Functionality
  - Suitability, Accuracy, Interoperability, Compliance, Security
- Reliability
  - Maturity, Recoverability, Fault Tolerance
- Usability
  - Learnability, Understandability, Operability
- Efficiency
  - Time Behavior, Resource Behavior
- Maintainability
  - Stability, analyzability, changeability, testability
- Portability
  - Installability, replaceability, adaptability, conformance

This ISO Standard provides a framework for organizations to define a quality model for a software product. On doing so, however, it leaves up to each organization the task of specifying precisely its own model. This may be done, for example, by specifying target values for quality metrics which evaluates the degree of presence of quality attributes.

ISO 9126: quality model

Functionality

Suitability, Accuracy, Interoperability, Compliance, Security

Reliability

Maturity, [illegible] Tolerance

Usability

Learnabili[illegible] Operability

Efficiency

Time Behavior, Resource Behavior

Maintainability

Stability, analyzability, changeability, testability

Portability

Installability, replaceability, adaptability, conformance

attribute 1
attributes 2
...

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Each quality sub-characteristic (e.g., adaptability) is further divided intro attributes. An attribute is an entity which can be verified or measured in the software product. The value assigned to an attribute may be automatically or manually obtained.
Attributes are not defined in the standard, as they vary between different software products.

Software product is defined in a broad sense: it encompasses executables, source code, architecture descriptions, and so on. As a result, the notion of user extends to operators as well as to programmers, which are users to components as software libraries.

ISO 9126: metrics

Internal metrics

static measures, do not rely on the program executions

External metrics

applicable to running software

Quality in use metrics

available only when the product in used in real conditions

ISO 9126: metrics

Ideally:

Internal metrics

static measures, do not rely on the program executions

determine

External metrics

applicable to running software

determine

Quality in use metrics

available only when the product in used in real conditions

McCall quality model (1977)

Organized around 3 types of quality characteristics

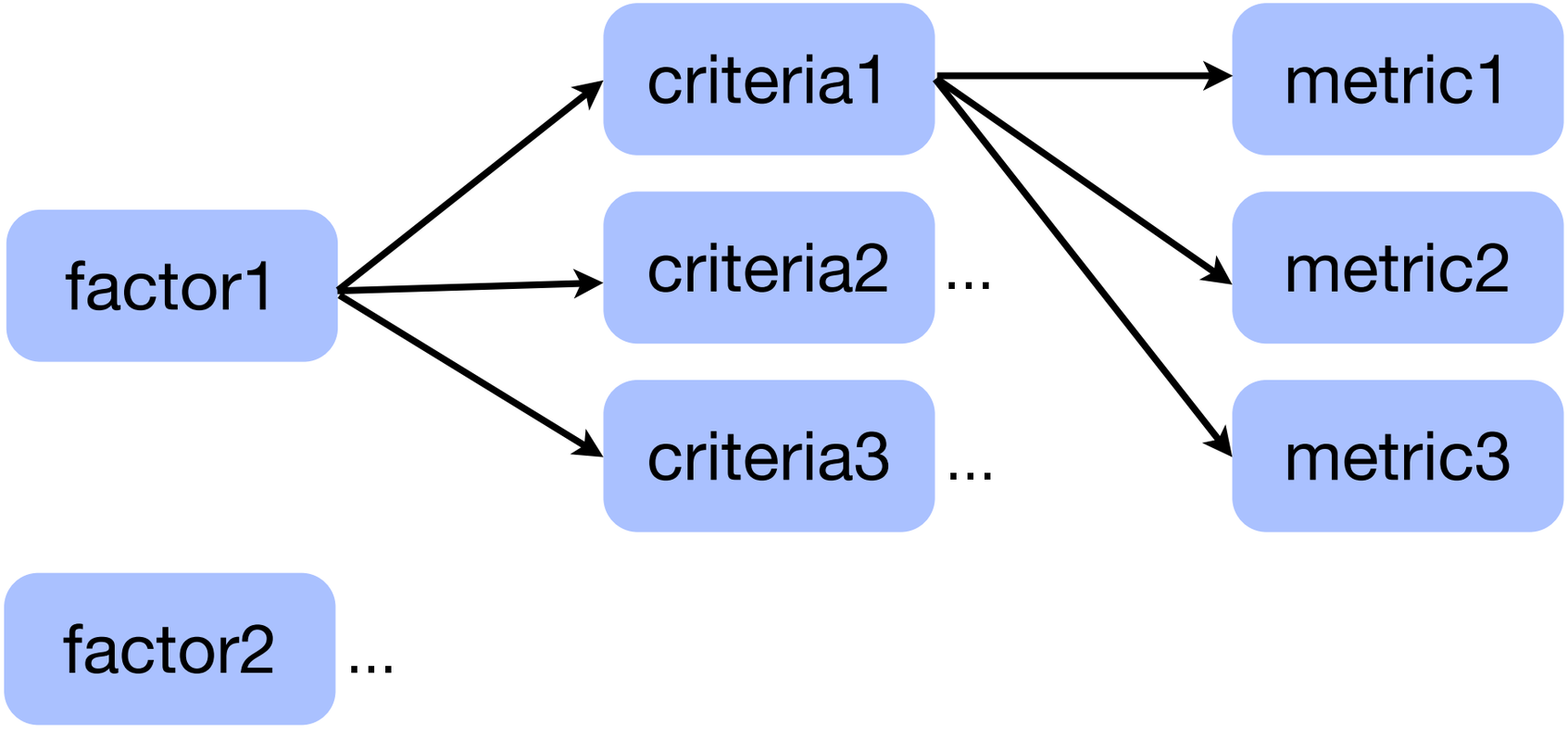
Factors (to specify): they describes the external view of the software, as viewed by the users

Criteria (to build): they describe the internal view of the software, as seen by the developer

Metrics (to control): they are defined and used to provide a scale and method for measurement

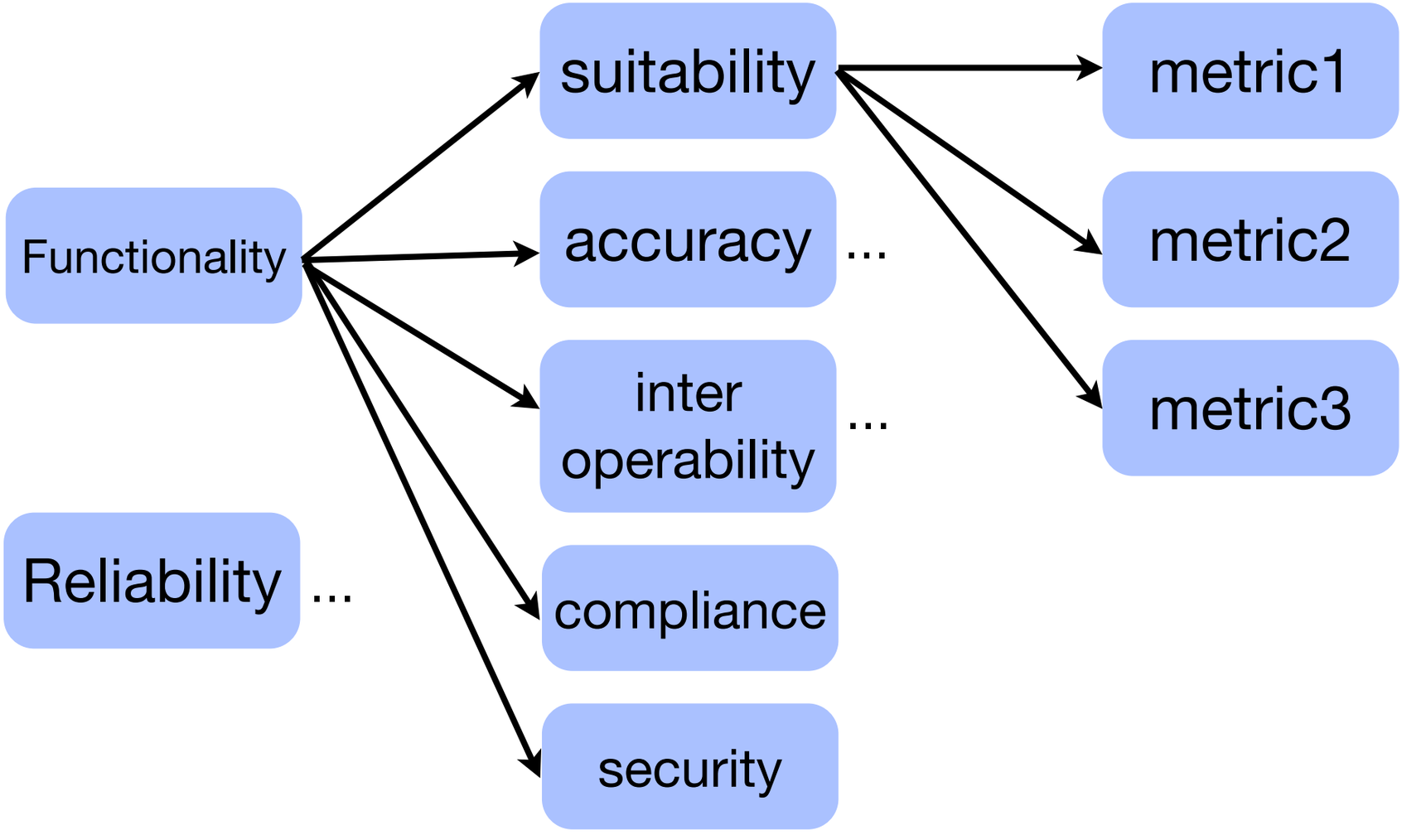
http://satc.gsfc.nasa.gov/support/STC_APR96/qualtiy/stc_qual.html

McCall quality model (1977)



http://satc.gsfc.nasa.gov/support/STC_APR96/qualtiy/stc_qual.html

When instantiated...



Users of ISO 9126

SQuaRE

"ISO/IEC SQuaRE. The second generation of standards for software product quality"

Squale

http://www.squale.org/

Capability Maturity Model Integration

Introduction

CMMI = Capability Maturity Model Integration

CMMI is a process improvement approach

The claimed goal is to improve performances

In reality, it is necessary for competing at international level

CMMI can be used to guide process improvement across a project, a division, or an entire organization

http://www.sei.cmu.edu/cmmi

When to adopt CMMI?

- Missed commitment
  - spiraling costs
  - late delivery to the market
  - last-minute crunches
- Inadequate management visibility
  - too many surprises
- Quality problems
  - customer complaints
  - too much rework
  - functions not working correctly
- Poor morale
  - burned-out people
  - inadequate control of project results

CMMI implementation steps

1. Secure sponsorship and funding

    essentially talk to executives

2. Take core training

3. Prepare your organization for change

    process improvement must be taken as a project

    establish the business reasons and business goals

4. Form a process group

    this group coordinates software process improvement activities across the enterprise

"Defining processes is a key step to achieving maturity level 2 in CMMI as well as to becoming certified for ISO 9000 and 9001." - www.sei.cmu.edu

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Iterative process, Extreme Programming, Waterfall process are example of software development processes

CMMI implementation steps...

5.Know where you are

map CMMI best practices to your organization's processes and do an informal gap analysis

6.Know where you are going

get a balanced view from management, project leaders and staff

prioritize the process areas to address and build your improvement plan

7.Communicate and coordinate

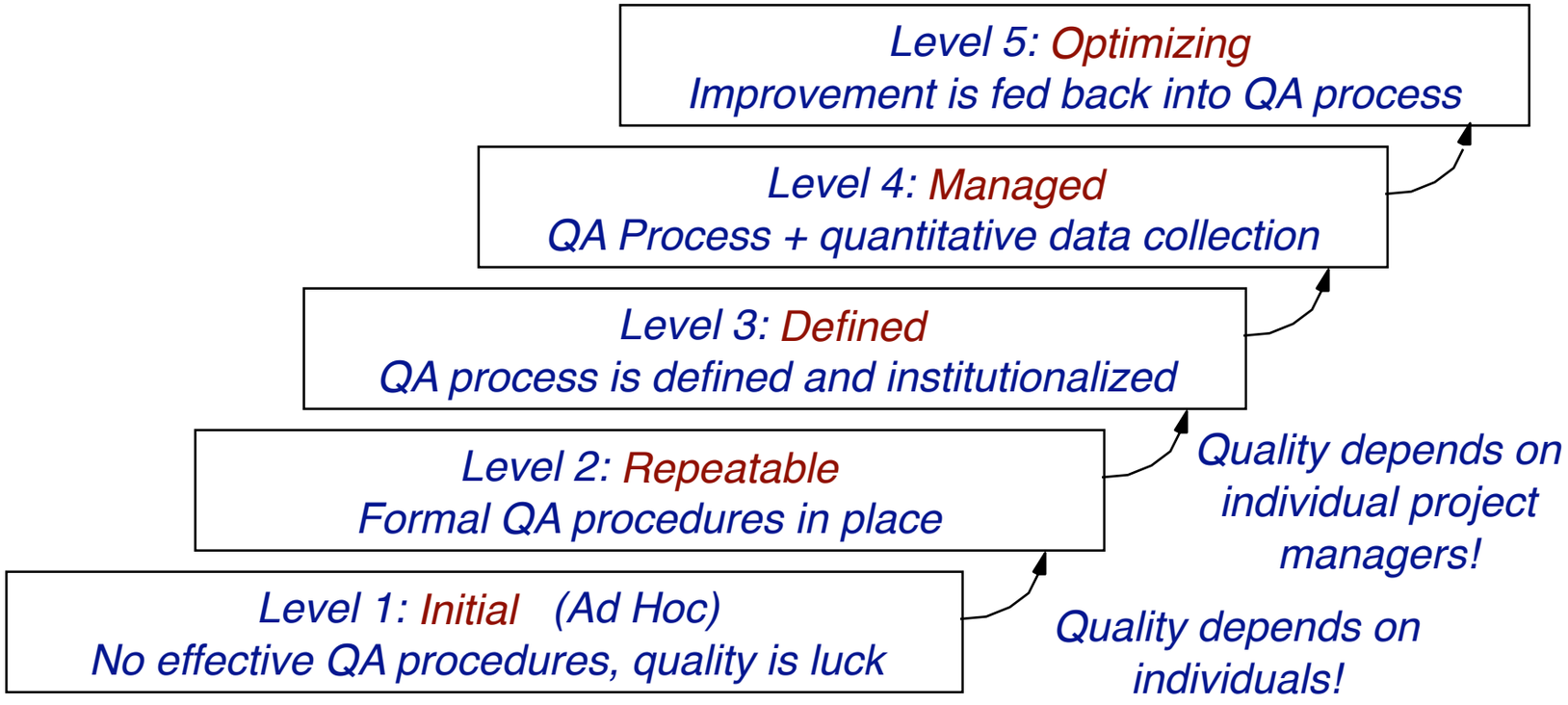
must have honest and open communication

share the plan with everyone who will be affected and listen to their comments

8.Track your progress

Capability Maturity Model (CMM)

The SEI process maturity model classifies how well contractors manage software processes



The Chilean case

Situation in Chile

CORFO expects Chile to become a country of outsourcing and offshoring

> "Outsourcing is subcontracting a service, such as product design or manufacturing, to a third-party company" - ventureoutsource.com

> "Offshoring describes the relocation by a company of a business process from one country to another" - Wikipedia

SEI partners in Chile

America XXI Limitada

- Only pure chilean company

European Software Institute (Madrid)

It Era S.A. de C.V. (Mexico)

Pragmatica Technologies S.A. (Argentina)

Procesix Colombia Ltda. (Colombia)

Procesix Inc. (Canada)

Complete list available on http://www.sei.cmu.edu/partners/

ISO 9001 in SMEs (PYMEs)

SME = Small and medium enterprise

PYME = Pequeña Y Mediana Empresa

There is more than 100.000 SMEs in Chile

Only 1% is certified ISO 9001

http://www.lapyme.cl

Norma Chilena de Gestión PYME

NCh 2909

- Gestión administrativa eficaz
- Gestión eficiente de los recursos
- Mayor posicionamiento nacional
- Mayor respaldo antes instituciones financieras
- Aporte de CORFO: hasta 70%

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Again, Proquality argues that 5 month to implement NCh 2909:2004 is enough. This is clearly suspicious. The document from the Chilean Instituto Nacional de Normalizacion mentions 12 as a short implementation time.

Other important norm...

"ITIL® is the only consistent and comprehensive documentation of best practice for IT Service Management."

Overview and benefits

- reduced costs
- improvement IT services through the use of practice processes
- improved customer satisfaction
- improved delivery of third party services (ISO 20000)

http://www.itil-officialsite.com