

Continuous Quality Improvement:

More Than Just an Idea for
Geomatics

New Jersey Society of
Professional Land Surveyors

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Presented by

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Continuous Quality Improvement in Surveying

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Quality-why do we need it?

- Everyone likes it
 - Customers
 - Company providing services
 - Employees
 - Stakeholders (who?)
- So why is it not always there consistently?
- Is it important to have it? Why?
- What can we do to make it more consistent?

Overview

- Introduction of topic
- What is it?
- Typical issues and sources
- Developing CQI process - changing company culture
- Benefits and risks
- Implementation ideas

If we desire quality...

- not delivering it is a failure

Why failures occur (usually)

- Ignorance
- Ineptitude

Ignorance

- Partial understanding
- Partial knowledge
- Input about how things are going comes from a set of sources that are not complete...
- Or information from the reliable sources you do have is not complete enough

Ineptitude

- The knowledge exists; we fail to apply correct solutions even when we want success...
- Or we are unwilling

QA/QC/CQI

- QA: Quality Assurance
- QC: Quality Control
- CQI: Continuous Quality Improvement

Quality Control

- The processes that test your products and services to ensure they comply with stated quality goals (may not always be called “quality”)
- In other words, quality control’s purpose is to uncover defects or measure compliance (with something)
- Observation - monitoring - watchfulness are the activities in the processes

Quality Assurance

- The process of designing the appropriate system to assure that quality is always delivered by your processes
- ...systematic monitoring and evaluation of various aspects of business, project or process to maximize probability that minimum standards will be attained
- It includes the concept of the result being “fit for purpose”
- Also, to get it “Right the first time”

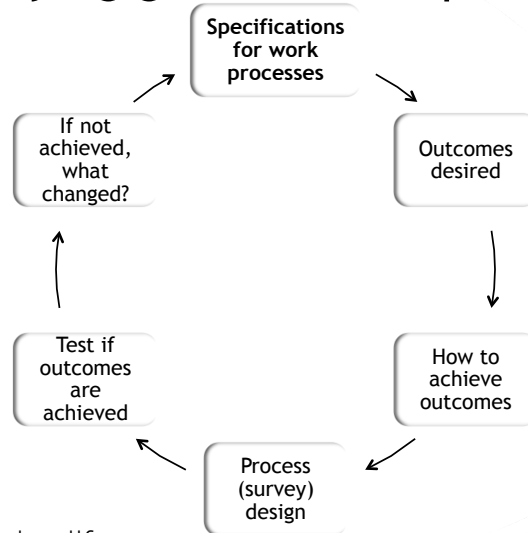
Some QA examples

- Tests of quality (Inspection)
- Standards against which to test the product or service
- Feedback from tests to impact design and execution of processes
- Evaluation of processes to ensure they achieve the intended changes

Continuous Quality Improvement

- The process that ensures that the quality improvement cycle is being executed
- It is an ongoing effort to continuously improve the output
- Some call it THE META PROCESS for most management systems
- Involves improvements, feedback, efficiency improvement through reduction or elimination of sub-optimal processes, and (usually) evolutionary or incremental improvements

Surveying generic example



Quality Control

- Process to get quality of a certain (specified) level
 - Calculate/evaluate: survey closure and/or precision
 - Standard procedures (For which procedures? do they have to be written?)
 - Compliance with contract documents
 - Compliance with Minimum Standards
 - Compliance with legislation or regulations or advisory standards for ensuring quality
 - What else?

Quality Assurance

- Systematic monitoring and evaluation to get it done once, and properly
 - Verifying that survey closure, positional accuracy or other standards or specifications that have been set out as standards for the survey have been met
 - Checking that two or more measurements do not vary from each other or the average by more than a QA value
 - Processes to ensure plumbing, leveling, sighting are within the organizations standard procedure
 - What else?

CQI

- Insurance that the quality improvement cycle is being carried out
- [What is the quality improvement cycle in a typical surveying business?]
- What processes insure the cycle is being carried out?
- Usually this is a manual or handbook describing the processes that should be carried out (QA and QC) from start to finish.
- Can even include initial client contact and product delivery meeting

CQI ideas for surveying

- Everyone is responsible for quality
 - This means nobody is penalized for pointing out issues or potential trouble, in fact they should be appreciated
 - Management commitment by ensuring something like “quality circles”
 - Have a regular program for evaluating quality of performance of
 - Surveying sensors
 - Peripheral devices
 - Field systems
 - People
 - Computing systems

Quality circles

- Quality circle is a volunteer group under leadership of team leader (or elected from the group)
- Trained to identify, analyze and solve work-related problems and present solutions to management
- Improves company performance
- Enriches work lives of employees
- When matured, quality circles become self-managing; this requires management confidence and support

QC, QA, CQI examples?

Examples?

Trouble spots

- Survey in wrong place
- Used incorrect control
- Measurements were not verified
- Monuments were not verified
- Improperly trained personnel
- Incorrect understanding of evidence
- Equipment failures

Trouble spots

- Survey not really designed
- Equipment not selected properly
- Personnel not informed of survey objectives
- Required to re-do survey? (or parts of it?)
- Lacking calibration procedures
- Lacking procedures to check on instrumentation
- No “test-fields”

Trouble spots

- No contract
- No performance specifications
- Specifications for deliverables (quality, form, schedule, etc.)
- Client late-payment or non-payment
- Correction surveys or other documents
- Failures in governmental processes
- Communications failures

Trouble indicators

- Business failures
- Survey over budget?
- Survey over schedule?
- How many re-dos? (Any re-dos?)
- Client complaints
- Adjoiner complaints
- Stakeholder complaints

Trouble indicators

- Lawsuit (or threat)
- Loss of reputation
- Unhappy employees
- Loss of key personnel
- Eroding operating profits
- Formal licensing board complaints

Developing the CQI Process



A process manual for CQI

- Not different from other manuals or handbooks
- Employee handbook
- State code of regulations, rules and laws pertaining to the practice of surveying
- Look in your organization—ask the people doing the work
- Very often bits and pieces of your QA, QC and CQI processes exist

Company meeting

- Discuss why you are doing it (it is good for everyone)
- Management must make clear that no slackers are allowed (including management)
- An individual must be tasked with overall responsibility AND AUTHORITY
- Develop drafts and revisit periodically with the people who will have to refer to them, use them and rely on them
- Invite contributions from all

What is measurable or observable?

- Are they being measured?
- How could they be measured?
- Does measurement process yield quality information
- How is the measurement done?
- Who does it?
- Who makes sure it is done?
- What if the measurements indicate low quality

Examples

- When using total station, instrument person must check optical plummet and plate bubble every time instrument is set up
- Instrument person must check that all angles and distances are measured at least twice and maximum variation of the individual angles cannot exceed a pre-set value for a particular survey or sub-activity of the survey

We are experts at measurement (of the land)

- Develop analogous procedures for measuring your organization's quality in every aspect of the business

Deciding if it is quality

- Written standards - quantitative or qualitative
- If qualitative, must be as objective as possible
- The more subjective, the more a panel needs to review
- If low quality is it part of a pattern?
- Mandatory review over time periods to observe trends
- Communication about level of quality to company regardless of whether it is at a low, OK or high level

Scorecard

- Have a public scorecard (at least public company-wide)
- Build pride in the organization
- Encourage cross-level communication
- Don't get distracted
- Be to the point
- Don't belabor

Response to the score

- Does it need to be fixed? (also is the spec correct?)
- If “no,” then set a time for the next review
- [Also there should be periodic review to see if the spec needs to be reviewed]
- If “yes,” who determines fixes? Involve those executing them
- Then monitor the changes to see if the desired result is obtained

Summarizing

Core Concepts of CQI

- Quality is meeting or exceeding customer expectations
- Success is achieved through meeting needs of the served
- Most problems are found in processes, not in people. CQI does not seek to blame, but rather to improve processes

Core concepts (continued)

- Variation in processes can lead to unwanted variation in outcomes, and therefore seek to reduce or eliminate unwanted variation
- Possible to achieve continual improvement through small, incremental changes using the scientific method
- Continuous improvement is most effective when it is a natural part of the way everyday work is done

Core Steps in Continuous Improvement

- Form team that has knowledge of system needing improvement
- Define a clear aim
- Understand needs of people served by the system
- Identify and define measures of success

Core steps (continued)

- Brainstorm potential change strategies to get improvement
- Plan, collect, use data for facilitating effective decision-making
- Apply scientific method to test and refine changes

Benefits and risks

Benefits

- Happy customers (which ones? why?)
- Happy company (why?)
- Happy staff (why?)
- Happy stakeholders (who?)
- Happy company owners (why?)

Risks and what “they” say

- Added overhead
- Added cost
- Too much paperwork
- Company environment not spontaneous anymore
- Limited participation
- Lack of senior executive support
- Lack of commitment to process by anyone in the organization

The biggest risk

- Talking the talk, but not walking the walk
- Lip service from most senior levels of management
- Lack of involvement by all other levels of the company... down to the most junior
- CQI process message doesn't get through: everyone is individually responsible for quality

Implementation

Quality officer—responsibilities

- Oversight of plan and process
- Involving others in designing the plan
- Involving others in executing
- Reminding when failures to follow plan occur
- Reminding when failures of the system occur
- This position cannot be subservient to company hierarchy (“er...Mr. President you are not following our quality plan”)

Quality circles

- Discussion groups
- Short meeting times
- To the point
- Need secretary to document
- Proposed changes are then reviewed by quality officer with the quality team...if compatible with existing plan, they are integrated

Company-wide culture change

- Quality has to have currency in everything we do
- Everyone takes it seriously
- Everyone gets to say when the plan isn't being followed
- No negative repercussions (for not following process due to lack of understanding; whistle blowers)
- Everyone becomes process-minded
- But...don't take life too seriously

What are you going to do?

- Start small

Begin by identifying...

- Who are our customers?
- What quantifiable outcomes define quality for them?
- Do we have additional quality outcomes we want to achieve as company policy?
- Create plan

Continued next slide

- Document differences with current plan (or process)
- Define which changes to do first
- Keep early changes meaningful but simple
- As company's CQI maturity grows add bigger challenges

Discussion, questions, answers

About the seminar presenter

Joseph V.R. Paiva, PhD, PS, PE

Joseph V.R. Paiva is CEO of GeoLearn, LLC (www.geo-learn.com), which is launching an online professional education business for the geospatial industry in early 2014. Joe started this business with his partner Bob Morris, whose most recent global industry position was President of Leica Mapping. Previously, Dr. Paiva was CTO of SADAR 3D and COO of Gatewing NV, a Belgian unmanned airborne systems company. Prior engagements in consulting were in the field of geomatics and general business, particularly to international developers, manufacturers and distributors of instrumentation and other geomatics tools. Dr. Paiva and Mr. Morris continue to be involved in consultancy through a separate partnership called GeoSpatial Associates, LLC will continue this consultancy. Joe's career includes: managing director of Spatial Data Research, Inc., a GIS data collection, compilation and software development company; various assignments at Trimble Navigation Ltd. including senior scientist and technical advisor for Land Survey research & development, VP of the Land Survey group, and director of business development for the Engineering and Construction Division; vice president and a founder of Sokkia Technology, Inc., guiding development of GPS- and software-based products for surveying, mapping, measurement and positioning. He has also held senior technical management positions in The Lietz Co. and Sokkia Co. Ltd. Prior to that was assistant professor of civil engineering at the University of Missouri-Columbia, and a partner in a surveying/civil engineering consulting firm. He has continued his interest in teaching by serving as an adjunct instructor for online course development and teaching at the Missouri University of Science and Technology. His key contributions in the development field are: design of software flow for the SDR2, SDR20 series and SDR33 Electronic Field Books and software interface for the Trimble TTS500 total station. He is a registered Professional Engineer and Professional Land Surveyor, has served as ACSM representative to the Accrediting Board for Engineering and Technology (ABET), serving as a program evaluator, team chair, and commissioner and has more than 30 years experience working in civil engineering, surveying and mapping. He writes for *POB*, *GeoDataPoint* and *The Empire State Surveyor* magazines and has been a past contributor of columns to *Civil Engineering News*. Joe has also been a consultant to the Geomatics Industry Association of America, later reorganized under the Association of Equipment Manufacturers (AEM) as the Geospatial Industry Group, Joe has organized and presented workshops and authored and edited articles for the technical press in this role.

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