A Quality, Reliability and Continuous Improvement Institute: QR&CII

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Outline

- Problem statement
- Background analysis
- Consequences & alternatives
- Proposed solution: QR&CI Institute
- Creating and Operating the Institute
- Funding the Institute
- The Board of Directors
- Summary and Conclusions

The problem …

Engineers do not study enough statistics in college, for logistics reasons.

But …

Soon find out they need statistics to solve problems in the real world

Certification BOK as Comparison

- Certified Quality Engineer
  - Statistical content of the exam (50%+)
  - http://www.asq.org/certification/quality-engineer/bok.html
- Certified Reliability Engineer
  - Statistical content of the exam (40%+)
  - http://www.asq.org/certification/reliability-engineer/bok.html

Issue 1

There is a large gap between the Stats training our Engineers receive in college, and what they need in practice

Issue 2

Statistical training that practicing engineers receive to improve Stats BOK is unsystematic and inefficient

Practicing Engineers need a system

To Bridge the Gap

after graduation,

on their own,

via self-study,

with Mentoring.

BUT HOW?

We Investigated the Knowledge Gap

- Between what Statistics Engineers *learn* in college
  - and what Statistics they *need to know* in practice
- By Implementing a Survey on:

  How Engineers Learn Statistics on Their Own
  http://lcs.syr.edu/faculty/romeu/SurveyICOTS.html
- To Assess this Gap and Identify Key Issues:
  - Methods engineers use to learn on their own
  - Materials used in their learning process
  - Sources: web sites, exams, books, journals, etc.

Methods of self-learning used:

(1) Reading books, journals, manuals & other hard copy

(2) Reading Web and Internet materials

(3) On-line courses, learning software, etc.,

(4) Conferences and chapter meeting talks

(5) Preparation for professional certifications

(6) Taking short training courses

(7) Mentoring from more experienced colleagues

(8) Other sources: e.g. hands-on (practical) working experiences, taking Six Sigma & other training

Statistics Studied in College

- Among all engineers surveyed
  - 16% no statistics courses taken in college (33% among BS),
  - 38% took one course (38%)
  - 26% have taken 2 courses (24%)
- Those with a BS degree only
  - 33% have never taken a statistics course in college
  - 33% have taken a single stats course
  - Hence, 66% of all surveyed engineers had none, or very little, statistical training

Learning Methods Preferred

- Reading - the preferred method (38%)
  - Books and journals, web tutorials
  - Use of web tutorials (10%) is increasing with time
    - older engineers prefer hard copy; younger ones read web-based material (regression results)
- Short courses, exam preparations for professional certifications, and Black Belt training (33%).
- Mentoring received from more experienced colleagues and hands-on (learning by doing) (22%).

Problem Possible Alternatives

- Do nothing; maintain status quo
- Use Independent Consultants
- Create internal QR&CI training
- Create Institutes for QR&CI
  - Smaller, specialized, applied centers
  - Supported entirely by grants/donors:
  - Gov-Industry-Prof. Organizat.-Academe

The QR & CI Institute

- Operational Profile
- Structure
- Functions

Relevant Precedent: GI Bill

- Created After WWII, for Veterans
- Provide a Monetary Voucher
- Non-transferable; non-negotiable
- Only redeemable at the Institute
- To be used for college degree or training of individual veterans who opted to participate
- CREATED THE U.S. MIDDLE CLASS

  That fostered Post WWII Economic Boom

QR&CII Characteristics

- For small & medium size organizations
- Provides a Monetary Voucher
- Non-transferable; non negotiable
- Only redeemable at the Institute
- Pays for assessment or training for mid-sized organizations who qualify
- FOSTERS INDUSTRY RECUPERATION

  In these difficult economic times

The Two Institute Components

- Training and Education
  - Provide mentoring via web tutorials, courses etc.
  - Use college engineering students as interns and local expertise (consultants, faculty) as instructors
- Q&R Assessments
  - Provide free or affordable QR&CI services to small and medium size local organizations
  - Using vouchers from grants by local, state, federal government, industry, and other institutions

Some Institute Activities

- Assess, sequence, write new web tutorials
  - http://web.cortland.edu/romeu/urlstats.html
- Develop talks, workshops, & short courses
- Professional presentations and meetings
  - Foster and nurture *user community* at QR&CII
- Quality and Reliability assessments
  - Interns are college engineering students
- Presentations and talks for H.S. students

Networking

- With other Industry-Academe Centers
  - of different types, in the region
  - of the same type, in the nation
- Objectives:
  - enlarge and refine their activities
  - conduct synergetic activities
  - exchange students and faculty
  - teach synergetic QR&CI courses
  - support other mutually beneficial activities

Who Benefits?

- Industry/Service Organizations
  - Increase competitiveness, profits, survival
- Academe/Universities
  - Improve learning, teaching and research
- All Government Levels
  - Increase tax base and economic growth
- The Public
  - More Jobs, better services & quality of life

Possible Income Sources

- Federal, State & Local Government grants
  - NSF: educational function (engineering)
  - Other agencies sponsoring job development
- Prof. Organizations and Industry grants
  - To help local industry remain competitive
  - Save local jobs; revert regional emigration
- University and Institutional grants
  - Office space, phone, computers, interns

Performance Measures

- Number of Tutorials Assessed/Written
- Number of Tutorial Readers & Web Hits
- Number of Assessments & Money saved
- Number of Interns & Placement rates
- Number of Courses/Workshops & Students
- Number of Presentations & No. Attendees
- Number of Districts/Number H.S. Teachers
- Number of High Schools & of H.S. Students

Institute Board of Advisors

- Integrated by all Institute Stakeholders
  - State and Local Government
  - Assessment and education customers
  - Experts: academe and practitioners
  - Regional Professional Associations
  - External Donors ($$$)
- Board helps define directions to pursue
  - Focusing on problem-solving activities
- Helps find new Customers and Services

Conclusions

- QR&CI responds to a real need
  - Engineers need mentoring and learning materials
  - Small & medium organizations need tech support
- Situation, analogous in other knowledge areas
  - QR&CI is a “Proof of concept” approach
- Government, Industry and Academe
  - Will recuperate their investment with large return
  - In the same way that it happened with the GI Bill.