An Institute for Improving Manufacturing Efficiency in Central New York

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To survive today, manufacturing organizations must implement

- Continuous product improvements
- Continuous personnel training
- Continuous process updates
- OR THEY WILL DISAPPEAR
Improvements Dilemma

• Given limited amount of capital

• I) Invest in short term improvements
  – Immediate survival of the company
  – That will immediately improve sales

• ii) Invest in long-term problem
  – Takes more time, effort and resources
  – There may not be a customer tomorrow
  – Without the company surviving today!
Improvement Alternatives

• Do nothing: maintain status quo
• Use Independent Consultants
• Create internal QR&CI function
• Create Centers of Excellence:
  – Applied Institutes for QR&CI
  – Industry-Prof. Organizat.-Academe
  – For Joint/Cooperative work
The Status Quo

• Small, medium size companies:
  – Continue without QR&CI functions
  – Approach QR&CI problems as “fires”
  – With resources within the organization
  – Occasional crisis brings in a Consultant
  – Long term solutions seldom developed
  – No established QR&CI permanent plan
Our Proposed Solution

- Smaller, specialized, applied centers
- Supported entirely by grants/donors

Two Main Components or Functions:

I) Develop a “free” assessment function:
   - Service to small/medium size organizations

II) Train practicing engineers in QR&CI
   - Enhances undergraduate education
   - Prepares H.S. students for engineering
Relevant Precedent: the GI Bill

- Created After WWII, for Veterans
- Provided a Monetary Voucher
- Non-transferable; non negotiable
- Only Redeemable at a University
- Paid for college degree or training
- Of individual veterans who opted
- CREATED THE U.S. MIDDLE CLASS
Similarly, QR&CI Institutes

- Created for Small/Mid-Size organizations
- Also Provides a Monetary Voucher
- Non-transferable; non negotiable
- Only Redeemable at QR&CI Institute
- Pays for assessment or training
- Of midsized organizations who apply
- FOSTERS INDUSTRY RECUPERATION
The Assessment Component

• Provide free or affordable QR&CI assessment & services, to small & medium size organizations
• Supported with grants from local, state and federal institutions, with focus on increasing product and process quality and reliability
• Use college engineering students as interns, to provide hands-on experience and expertise
• Use local expertise (ASQ, consultants, faculty) as assessment directors and implementers.
The Education Component

• QR&CI-CNY addresses a Key problem of the education of current and future engineers.
• Two Key NSF reports:
Engineering Education “Situations”

• “Past” Situation (those in the field)
  – Practicing engineers obtain training in workshops/evening/short courses

• “Present” Situation (those in college)
  – Engineering students obtain hands-on experience via internships

• “Future” Situation (prospective students)
  – High School students and teachers exposed to engineering training
Issue 1: What statistics
Do practicing engineers learn in college?
The Basics!
Issue 2: What statistics do practicing engineers need, to perform in their work?

Specialized Methods
Examples of Methods

• Certified Quality Engineer
  – statistical content of the exam (50%+)

• Certified Reliability Engineer
  – statistical content of the exam (40%+)
There is a gap between college curriculum and engineering needs. That needs to be **Bridged**: After graduation, on their own, via self-study, with Mentoring.
Methods Preferred

I) **Readings**: books and journals, as well as web tutorials, provide 38% of statistics knowledge. The use of web tutorials (10%) is increasing with time: older engineers prefer hard copy, whereas younger ones read web-based material.

II) **Short courses**, exam preparations for the professional certifications, and Black Belt training, are also important methods of learning statistics (33%).

III) **Mentoring** from more experienced colleagues and hands-on (learning by doing), also constitute frequent learning activities (22%).
“Present” Situation

• QR&CI Institute will train college students
  – Currently little or no training, in classroom
• Provide Hands-on Experience on QR&CI
  – Through Work Internships in the Institute
• Contacts with Local Organizations
  – Hiring eased: both get to know each other
  – One of the most expensive/frustrating costs
  – Quality engineering workforce stays here!
“Future” Situation

• High School students enticed
  – To follow science/engineering careers
  – Currently, levels unacceptably low!

• High School teachers better trained
  – Currently engineering knowledge is poor
  – As HS teachers do not know what we do

• Engineering is not just math and science
  – Nor solely for excelling math students!
The Institute Operational Profile

- **Specialized**: QR&CI applications
- **Specific functions**: professional training
  - and QR&CI assessments for organizations
- **Supported**: by stakeholders and grants
- **Interns**: work by engineering students
- **Target**: small/medium size companies
- **Develop** workshops and short courses.
  - And a “nurturing” environment for QR&CI.
More Specific Functions

- QR&CI Assessments and Audits include
  - Web-based materials and questionnaires
- Develop additional QR&CI web tutorials
- Training of QR&CI technicians/engineers
- Development of new QR&CI short courses
- Periodic meetings, talks and presentations
- Special activities for High School Teachers
- Support activities for H.S. science students.
The Institute Networking Function

• With Other Industry-Academe Centers
  – Of different type, in the region
  – Of the same type, in the nation
  – To enlarge and refine their activities
  – To conduct synergistic activities
  – To exchange students and faculty
  – To teach synergistic QR&CI courses
  – And other mutually beneficial activities.
Stake Holders/Benefits

• From Industry/Service Organizations
  – Increase competitiveness, profits, survival
• From Academe/University
  – Improve teaching and research
• From All Government Levels
  – Increase tax base and economic growth
• From the Public at Large
  – More Jobs, better services & quality of life.
Possible Income Sources

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

- Number of Assessments/Money saved
- Number of Interns/Placement rates
- Number of Tutorials/Reader Web Hits
- Number of Workshops/Number of students
- Number of Presentations/No. Attendees
- Number of Districts/Number HS Teachers
- Number of Schools/Number of Students
The Institute Board of Advisors

• Integrated by Institute Stake Holders
  – Federal, State and Local Government
  – Assessment and education customers
  – Experts: academe and practitioners
  – Regional Professional Associations
  – Potential Institute Donors ($$$)

• Board helps define directions to pursue
  – Focusing on problem-solving activities

• Helps find new Customers and Services
P.I. Professional Experience

- Ph.D. in Ind. Eng./Oper. Research
- Chartered Statistician Fellow, Royal Stat. Soc.
- Senior Member, American Society for Quality
- Member, American Statistical Association
- Thirty years experience as research statistician:
  - Research Professor, Syracuse University
  - Illinois Inst. Of Tech. Research Inst./IITRI
  - Reliability Information Analysis Center/RIAC
  - Data and Anal. Center for Software/DACS
Previous Project Presentations

- Mayor Roy Bernardi’s letter (January 1998)
- Syracuse City Hall: Development Commission
- Rutgers University: Dept. Industrial Engineering
- ASQ Syracuse Section: Meeting Presentation
- NYS/CNY Economic Development Agency
- Senator DeFrancisco’s Syracuse Office
- Syracuse Research Corporation
- TACNY Sweet Lecture Series
- Spring Research Conf. NIST/DC
- American Statistical Assoc. Annual Conference
- Manuf. Assoc. of CNY/MACNY (May 2012)