

ASQ STATISTICS

D I V I S I O N

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Chair's Message

by Mark Kiel



Recently I received, as a volunteer leader, a survey request emailed to me with a link that led to a page with questions with radio buttons to pick from several answers. As a duly elected representative of the members in the Division, I felt a responsibility to voice my opinion. I was also very thankful that the staff at ASQ felt other leaders and myself, receiving the same email, worthy of giving our opinion. Some of the questions led to very complicated answers. I don't know about you, but when faced with a survey that I am going to finish, I put some thought into each question.

All of us, I'm sure, receive surveys at home in the mail or in our email regarding a variety of topics. How many of us fill them out and send them back? I've seen some come in the mail with a dollar enclosed. I guess its there to put some guilt into the picture to get people to respond. Some survey

requests say they will enter your name into a raffle to win some item if you respond to the survey. But, you never get an announcement of who won the prize.

But to get to the point about surveys, we are all statisticians, engineers or quality professional who use statistics in our job every day. Surveys are about statistics. Are responses random selections in there own universe? Or are responses only from advocates or detractors? Do middle of the road people respond to a survey that

doesn't stir their blood one way or another? I think not.

Election polls are another form of surveys. Recently, exit polls have been in the news. The controversy was why did the exit polls show Kerry a winner in Ohio when ultimately Bush won. The statistics were in question. According to the Washington Post, that army of cell phone voters that was supposed to sway the election for Democratic presidential candidate John F. Kerry showed up at the polls on Election Day, but so did everyone else,

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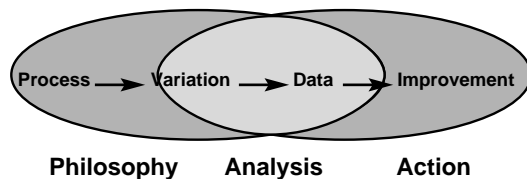
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MISSION

- Promote Statistical Thinking for quality and productivity improvement.
- Serve ASQ, business, industry, academia, and government as a resource for effective use of Statistical Thinking for quality and productivity improvement.
 - Our primary customers are Statistics Division members.
 - Other key customers are:
 - Management
 - Users and potential users of Statistical Thinking
 - Educators of the above customers
- Provide a focal point within ASQ for application-driven development and effective use of new statistical methods.
- Support the growth and development of ASQ Statistics Division members.

VISION

Statistical Thinking Everywhere
 Statistical Thinking Statistical Methods



DESIRED END STATE

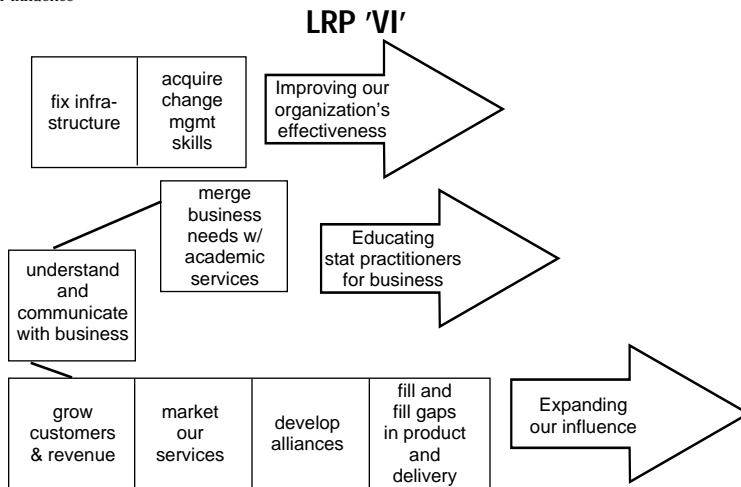
- Our members will be proud to be part of the Statistics Division.
- Our Division's operations will be a model for other organizations.
- We will be a widely influential authority on scientific approaches to quality and productivity improvement.

PRINCIPLES

- Our customers' needs will be continuously anticipated and met (i.e. Customer focused rather than customer driven).
- Our market focus for products and services is weighted as follows:
 - Greatest weight on intermediate level.
 - Nearly as much weight on basic level.
 - Much less weight on advanced level.
- Focus on a few key things.
- Balance short-term and long-term efforts.
- Value diversity (including geographical and occupational) of our membership.
- Be proactive.
- Recognize that we exist for our customers.
- View statistics from the broad perspective of quality management.
- Apply Statistical Thinking ourselves; that is, practice what we preach.
- Uphold professional ethics.
- Continuously improve.

STRATEGY

- Improve our organizational effectiveness
- Educate statistical practitioners for business
- Expand our influence



MEETING GROUND RULES

- Respect and listen to all participants.
- No speeches.
- No "side-bar" discussions.
- Decisions by consensus, if possible.
- We will be open and honest, even if it hurts.
- Support your ideas, don't defend them.
- We will delegate word-smithing to small groups.
- All help facilitate, although we will have a formal leader, facilitator, scribe, and timekeeper (including at breakouts).
- We will rotate scribes.
- We will keep a separate flipchart for To-Do's.
- Mission, Vision, Principles, Strategy, Ground Rules should be visible.

Disclaimer

The technical content of material published in the ASQ Statistics Division Newsletter may not have been refereed to the same extent as the rigorous refereeing that is undergone for publication in **Technometrics** or **IQT**. The objective of this newsletter is to be a forum for new ideas and to be open to differing points of view. The editor will strive to review all articles and to ask other statistics professionals to provide reviews of all content of this newsletter. We encourage readers with differing points of view to write to the editor and request an opportunity to present their views via a letter to the editor. The views expressed in material published in this newsletter represents the views of the author of the material, and may or may not represent the official views of the Statistics Division of ASQ.

Criteria for Basic Tools and Mini-Paper Columns

Basic Tools

Purpose: To inform/teach the "quality practitioner" about useful techniques that can be easily understood, applied and explained to others.

Criteria:

- Application oriented/not theory
- Non-technical in nature
- Techniques that can be understood and applied by non-statisticians.
- Approximately three to five pages or less in length (8 1/2" x 11" typewritten, single spaced.)
- Should be presented in "how to use it" fashion.
- Should include applicable examples.

Possible Topics:

New SPC techniques
 Graphical techniques
 Statistical thinking principles
 "Rehash" established methods

Mini-Paper

Purpose: To provide insight into application-oriented techniques of significant value to quality professionals.

Criteria:

- Application oriented.
- More technical than Basic Tools, but contains no mathematical derivations.
- Focus is on insight into why a technique is of value.
- Approximately six to eight pages or less in length (8 1/2" x 11" typewritten, single spaced.)
 Longer articles may be submitted and published in two parts.
- Not overly controversial.
- Should include applicable examples.

General Information

Authors should have a conceptual understanding of the topic and should be willing to answer questions relating to the article through the newsletter. Authors do not have to be members of the Statistics Division.

Submissions may be made at any time to the Statistics Division Newsletter Editor. All articles will be reviewed. The editor reserves discretionary right in determination of which articles are published.

Acceptance of articles does not imply any agreement that a given article will be published.

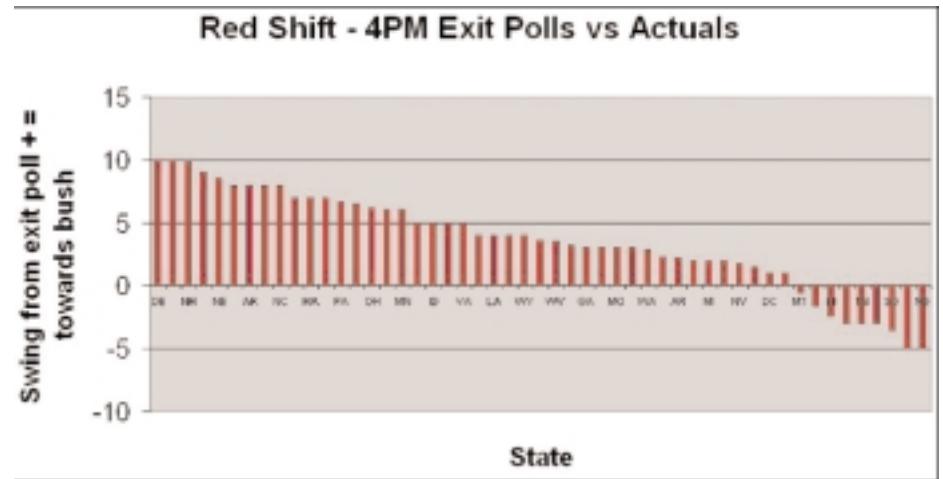
CHAIR'S MESSAGE

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muting their impact, according to exit polling. Buried in the survey data is the answer to a critical question raised during the campaign about traditional telephone surveys. Critics of the pre-election polls claimed that some voters, including many young people, now use only cell phones and have abandoned household phone service. That makes them unavailable to pollsters, who are prohibited by law from calling cell phone numbers.

The problem is, there are not many studies measuring how many Americans, not to mention voters, rely exclusively on their cell phones, so it's difficult to judge the effect on the quality of the polls. The exit pollsters cast new light on the issue by asking people leaving the voting booths about their phone service and use. The good news for telephone pollsters is that only 7 percent of all voters in 2004 were using cell phones as their sole service. The bad news is that this figure swelled to nearly 20 percent among voters between the ages of 18 and 29 years old. Not only are there lots of young people without household phone service, but these cell-phone-only voters voted 56 percent to 41 percent for Kerry, meaning missing them in telephone polls could produce polls that underestimated the Kerry vote.

But, happily, one other fact may have saved pollsters, at least during this campaign. Young people with cells were not much more likely to back Kerry than those in homes



with traditional phone service only or those who had both cell and traditional service. So missing them wouldn't dramatically skew the results.

The above graph shows what was already widely known about the swing in favor of George Bush, but amplifies the extent of that swing. The graph below shows the "red shift" between 2004 US General Election exit polls & the actual 2004 US Election results. In the data shown in the graph, we can see that 42 of the 51 states in the union swung towards George Bush while only nine swung towards Kerry. There has to date been no official explanation for the discrepancy. Ordinarily in the absence of an obvious mis-tabulation error, roughly the same number of states should have swung towards each candidate. Moreover many of the states that swung against Democratic Party hopeful John Kerry swung to an extent that is well beyond the margin of error in exit polls. Exit polls by their nature, they ask voters

how they actually voted rather than about their intentions, are typically considered highly accurate.

Later in an analysis of a different set of data, Dr Stephen F. Freeman from the University of Pennsylvania calculated that the odds of just three of the major swing states, Florida, Ohio and Pennsylvania all swinging as far as they did against their respective exit polls were 250 million to 1. Dr Freeman's academic paper contains a thorough description of why and how exit polls are conducted and considers a number of hypotheses for why this year's polls could have been so dramatically wrong. He concludes that the reasons are unknown.

The Internet is full of speculation, all with great statistics, on this subject. It's got everyone thinking statistics.

Mark Kiel

Tony Greenfield Receives ASQ Statistics Division's Hunter Award



The 2004 William G. Hunter Award was presented to Tony Greenfield at the 48th Annual Fall Technical Conference in Roanoke, Virginia

this past October. The Statistics Division of the American Society for Quality established the Hunter Award in 1987 in memory of the Division's founding chair to promote, encourage and acknowledge outstanding accomplishments during a career in the broad field of applied statistics. The attributes that characterize Bill Hunter's career – consultant, educator for practitioners, communicator, and integrator of statistical thinking into other disciplines – are shared by Tony as well.

Here are some excerpts from the award presentation:

Tony Greenfield was a journalist, specializing in technical and scientific reporting and feature writing, until he was 34. The managing director of a large stainless steel company asked him to join the OR section of the production control department. The reason was: "The OR section is full of very clever people who write reports that we don't understand. I want you to write interpretations for us."

In the course of this work he came across several statistical problems that he tackled himself. Praise from management for his

solutions of these problems encouraged him to earn a degree in statistics from London University.

Thus began Tony's work as a consultant, one of the talents for which Bill Hunter was known. Tony, like Bill, was also an innovator. In the early seventies he persuaded the directors to support the introduction of on-line computing. This was in the days before small computers were available for direct connection to machines. He nevertheless installed an IBM 1800 computer and linked it through a network of cables to research plant across an area of three acres.

Like Bill, Tony was also an educator for practitioners. He saw the need for training of medical staff in research methods and established a two-week course that he presented each year for five years. Tony also presented short courses over a long period in general statistics, data analysis, design of experiments, and on-line data capture for researchers in the steel industry.

He was concerned that control of industrial processes was being addressed from two approaches: 1. statistical process control with designed experiments and data analysis; 2. control engineering. There seemed to be little, if any, communication between the two disciplines. Through the Royal Statistical Society, where he was chairman of the quality forum, he established a conference to bring

the two disciplines together. This conference ran for several years in different parts of England.

Tony, like Bill, was also a wonderful communicator. In 1963, as editor of *The Hub* and on behalf of Sheffield Junior chamber of Commerce, he won the Junior Chamber International prize for the best JC magazine in the world. He proposed to the RSS that they should have a monthly newspaper which he was then authorized to start and he continued to edit it for nearly 20 years. It is still flourishing.

Ron Kenett, who nominated Tony, wrote the following:

I spent two years in Madison, Wisconsin, as a lecturer in the department of Statistics, and was fortunate to have an office next door to Bill Hunter's. This allowed for many conversations around coffee cups and simple breaks.

Having worked with Tony Greenfield in the last few years I know that he and Bill would have had lots to share. As a matter of fact they did talk several times and Bill has referenced some of Tony's works, although they never actually met.

Nominating Tony for the Hunter award seems to me like closing the circle and I was very happy that he agreed to be nominated.

Tony made the following remarks when he accepted the award:

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I believe I am the first person to receive this honour who never met Bill Hunter. But I knew him. I knew him first through his work with George Box. And I had known George for a long time through the Royal Statistical Society, of which I have been a fellow since the mid sixties, and through ICI: Imperial Chemical Industries, a large group of companies based in England.

Then I knew Bill because he telephoned me: from Madison to a small rural village in England. The voice said: "Tony, this is Bill Hunter. We haven't met but I have been reading some of your work and it seems we share some ideas." He telephoned me several times after that for a chat and then the calls stopped. I hadn't known he was ill and dying. I wish I had met him.

While his published work, especially the books that he co-authored were technical and without emotion, his conversation over the telephone was passionate, human and enthusiastic. He didn't preach. He really wanted to share his thoughts with me and my thoughts with him. We talked about the need to help people through making their work easier and more productive; we talked about the compassionate nature of statistical methods. I wish I had met him.

Some years later, in a university library, I glanced at a paper by Bill in which he referred to an experimental design problem and

wrote: "This has been solved by Greenfield". I felt a great glow. But I was researching something else at the time so didn't make a note and couldn't find the paper later.

Never mind. The glow has returned with the honour you have given me today. I am overwhelmed by this honour and by your recognition of my work that I see as minute compared with the works of former recipients. I am amazed too that this society, of which I am not a member, should reach across the ocean to honour me and to invite me to your conference in such a beautiful part of the United States. I am grateful too for this opportunity to meet you, so many friendly and welcoming people, and to put faces to names that so far have just been in print.

One of these names is Ron Snee, some of whose writing I had read over many years. He wrote to me a few years ago, just after my paper on communicating statistics had been published in the Royal Statistical Society's journal. His words in that letter were similar to those of Bill Hunter in his first phone call to me: "It seems we share some ideas." I have never met Ron and I am disappointed he is not here to continue with the sharing.

There is another Ron, whom I first knew only four years ago and who has become one of my closest friends. This is Ron Kenett. Ron is a joiner. He joins, without hesitation, any

organisation, any society, that interests him. But he is more than that: he is an active joiner. He takes the view, as I do, that as soon as you join an organisation you have a responsibility to be active in that organisation, to work for the benefit of the members, to keep it thriving and, if you can see a way, to make it better. I feel this responsibility so strongly myself that it has prevented me from joining the ASQ and the ASA: for many years I have had such a full plate, too many commitments the other side of the water that I couldn't add to them on this side.

Ron has no such limitations. He is to be seen and heard in many cities across Europe from Tel Aviv, through Turin, Budapest, Ljubljana, Copenhagen, Brussels and London and similarly across the United States. He is well known to many, if not all, of you. As well as a friend, he is a man whom I admire greatly so the pleasure I feel today in receiving this honour is all the greater because it was Ron Kenett who nominated me to receive it. Thank you Ron.

I met Ron Kenett at the first meeting of ENBIS in Amsterdam: the foundation meeting of the European Network for Business and Industrial Statistics. Ron and I and many others have devoted much of our time to this new organisation, that we call a network rather than a society, so I shall tell you something about it.

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Industrialists and businessmen across Europe know that international competition is getting tougher, product-development cycles shorter, and manufacturing processes more complex. Their customers expect higher quality in their products.

Statisticians across Europe know that statistical methods have improved business and industrial performance and can continue to do so in the future too. But many companies remain ignorant of how they can benefit from the application of statistical techniques. Witness the reply of one company director, when I asked: "What do you do about uncertainty and variation?" His response was: "They are not allowed."

ENBIS was founded to stimulate the application of statistical methods to economic and technical development and to business and industry across the whole of Europe. ENBIS is intended as a forum for the exchange of ideas and to provide a networking mechanism for statistical practitioners. We aim to stimulate the application of statistical methods to enhance economic and technical development and to improve competitiveness of business and industry across the whole of Europe.

Business and industrial statisticians from national societies, such as the Royal Statistical Society in the UK, have been working within companies,

or as consultants, to help businesses cut costs and improve quality. Now the availability of the Internet and easy travel within Europe has provided the opportunity to create a new society, ENBIS.

The need for networking arose from the realisation that many applied statisticians and statistical practitioners work in environments where they are isolated from interactions with, and stimulation by, likeminded professionals. ENBIS was created by a small band of enthusiasts and had its official launch at the University of Amsterdam, with more than 80 attending. The provisional executive committee had 14 members drawn from eight European countries. This first meeting had six interest groups: Design of experiments; General statistical modelling; Data mining and data warehousing; Process modelling and control; Reliability and safety; Quality improvement. Since then, two more interest groups have been formed: Statistical consultancy; and Measurement uncertainty.

The first meeting was followed by a three-day course, for local industry as well as members, on design of experiments. This is a pattern that has been followed at the annual conferences, the first of which was in Oslo and was followed by a three day introductory course on Six Sigma. Courses presented before and after subsequent conferences, in Rimini, Barcelona and Copenhagen, covered Evaluating

the Effectiveness of Advertising, consultancy skills and Six Sigma.

Since that first meeting, solid foundations have been built: membership has grown to about 1,000 from nearly 40 countries (most members are European but a few are American); a constitution has been written; financial management has been created; a secretariat established; and, most visibly, a website has been developed. It carries reports of the interest groups; information about future meetings and other activities; a report of the first conference; membership details and how to join; and a list of members of the executive committee.

The website has a 'members only' section. This includes a discussion page, enabling members to post messages and reply to others. There is also a network page, which displays all ENBIS members with their affiliations and email addresses. Members can also show further information about themselves, such as their special interests and areas of expertise. Each interest group has its own discussion page to exchange ideas; all members can join in. Membership of ENBIS, and hence of its interest groups, is open to engineers, scientists and managers working in business and industry who use statistical methods in their work. The discussions and information exchanges through the interest group pages are valuable resources for these 'statistical practitioners' as well as

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for the professional statisticians who are also eligible for membership.

Businesses and industries of Europe do need ENBIS. Some of them know this; many do not. Our task is to reach out and show how statistics can help them succeed in their own enterprises. We shall succeed because, among our members we have visionaries and we have enthusiasts, all sharing the aim of ENBIS:

To promote the widespread use of sound science-driven, applied statistical methods in European business and industry.

A major force for achieving our aim during the last three years has been Pro-ENBIS. This is a thematic network contracted for three years by the European Commission to implement the aim of ENBIS. As part of the contract, deliverables were quantified. So we have a record of works visits such as to:

- an Italian company making transmission belts;
- a Swedish company developing components for three major truck companies;
- another Swedish company, this time making heavy-duty diesel engines;
- an English company making steering units;
- an Italian bank;
- a Spanish electrical power and transmission company;
- an American medical devices company based in England;
- a Portuguese hardwood pulp producer;
- a Norwegian electrical heating company.

We have provided many workshops on design of experiments, quality control, six sigma, data mining, and statistical methods for business and industry. From these have sprung requests for more workshops, for courses, and for consultancy. Ron Kenett and I have jointly presented workshops in Tel Aviv and in Budapest.

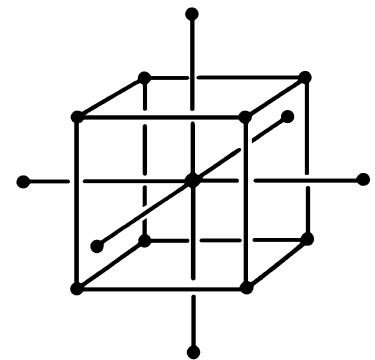
Sadly, our Pro-ENBIS contract will end this year and ENBIS will face the challenge to continue these activities without financial support from EC. So where will our driving force come from? From our visionaries, our enthusiasts and those members who work behind the scenes to plan and organise our conference and other meetings, maintain and extend our website and care for our finances <http://www.enbis.org>.

While the European Commission recognises the value of our work, their financial support has ended. So how do we fund our continuing promotion? Most of the larger companies already acknowledge the advantages of statistical methods and are implementing six sigma programs. I believe that it is to the advantage of these large companies if the small and medium companies learn about how statistical methods can help them. I hope therefore to establish a perpetual fund among the larger companies with this in view. But that is just a seed of an idea so far. Watch this space!

The blossoming of ENBIS has been so rapid that it has surprised

many of us. How did this happen? It happened because we were led by a small handful of active visionaries of whom the most notable, in my view, was Søren Bisgaard: a member of the ASQ and a winner, two years ago, of the Hunter award. I know that you all know Søren. I too have known him for several years and am proud to count him among my friends. He too has had a roving career with many experiences that have contributed to his stature in the field of industrial statistics and to his conviction that statistical methods are essential for the success of business and industry and hence for the continuing improvement of living standards throughout the world.

So thank you Søren for all your hard work, leadership, creativity, teaching and friendship. And my thanks again to the Statistics Division of the ASQ for this great honour you have given me, for inviting me to join the conference in Roanoke, a great experience in itself, and for your hospitality and friendship. I hope you all enjoy the conference as much as I am sure I shall.



2004 W. J. YOUTDEN MEMORIAL ADDRESS

“THE VIEW FROM AN IVORY TOWER” PRESENTED AT THE 48TH ANNUAL FALL TECHNICAL CONFERENCE, ROANOKE, VA.

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Introduction

It is quite an honor to deliver the 2004 Youden Address.

I will touch on the following four topics: economic trends affecting U.S. industry and the future of our professions, the changing academic environment, the use of journal article citation rates, and the relatively new development of quality profile monitoring.

U. S. Economic Trends

In preparing my presentation I found it very helpful to read the addresses of the last twenty Youden speakers, available at the ASQ Statistics Division website (<http://www.asqstatdiv.org/newsletterarch.php>).

Brian Joiner's 1984 Address was entitled "The Key Role of Statisticians in the Transformation of North American Industry". His focus was on the survival of U.S. industry. In 1985, Ron Snee began his Address stating, "Some feel that, if the U.S. is not careful, it will become a colony once again – exporting raw materials and importing finished goods."

What has happened in the past twenty years?

Well, the Six-Sigma initiative incorporates many of the aspects of the managerial climate recommended by Joiner. These include a scientific approach with a focus on processes, the use of teams, and the elimination of barriers between departments. Snee reported, "W. E. Deming tells us that statistics is too important to be left to statisticians. The goal is to get many statistically-minded workers, scientists, engineers, and managers in industry; it is not to employ a lot of statisticians." Indeed, this has happened through Six-Sigma. The success of Six-Sigma is due, in large part, to the contributions of statistics and statisticians.

But what is happening now with respect to the U.S. economy and manufacturing? I make no claim to being an economist, but the trends that were of primary concern twenty years ago appear to be of even greater concern now. Figure 1 shows the number of manufacturing jobs in the U.S. over the last fifty-five years. The recent drop in manufacturing jobs is at least as dramatic as that so troubling twenty years ago. Manufacturing jobs as a percentage of the total non-farm payroll jobs have continued to decrease, from 19% in the 1980s to 11% in 2003.

Last February you may have heard that the Bush administration's economic team was floating the idea that fast food employment be reclassified as a manufacturing job. The Economic Report of the President prominently featured, "Sometimes seemingly subtle differences can determine whether an industry is classified as manufacturing. For example, mixing water and concentrate to produce soft drinks is classified as manufacturing. However, if that activity is performed at a snack bar, it is considered a service." From my reading of the more complete passage, however, I don't think the idea of reclassification was seriously being proposed.

Figure 1: Total U. S. Manufacturing Jobs (in millions).

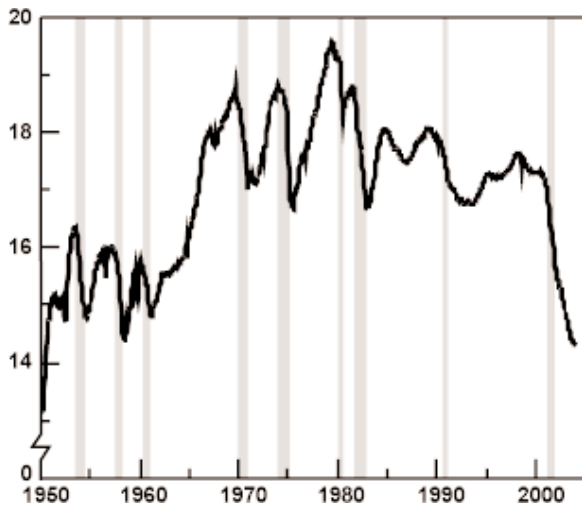
Sources: Congressional Budget Office; Department of Labor, Bureau of Labor Statistics.

Note: The vertical bars indicate periods of recession as defined by the National Bureau of Economic Research.

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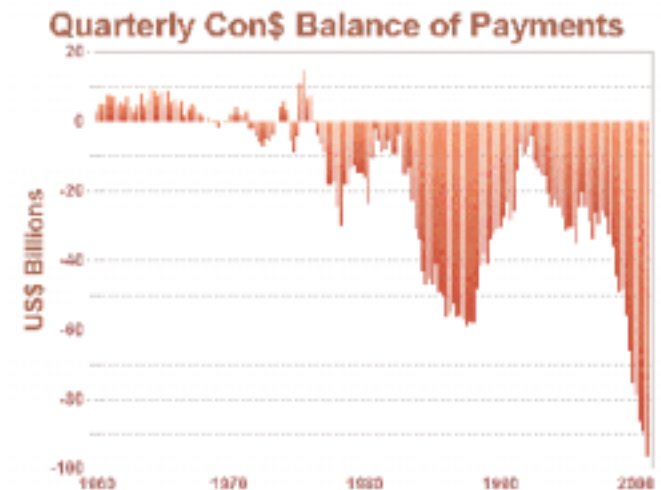
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From Figure 2, one can see the U. S. trade deficit situation is more unfavorable now than it was twenty years ago. The trade deficit as a percentage of the GDP is roughly twice what it was in the mid 1980s and setting record highs. Although many argue otherwise in our new information economy, I cannot imagine us maintaining a prosperous economy without a reasonable trade balance or maintaining a thriving middle class without relatively high-paying manufacturing jobs.

Figure 2: U. S. Trade Balance, Source: U.S. Department of Commerce.

In the large healthcare portion of our economy there are many opportunities for the effective use of statistics and for quality improvement. Health care is not in danger of being outsourced. The tremendous quality, waste, and



inefficiency problems in this industry have been well-documented. See, for example, Institute of Medicine (2001). It has been estimated that as many as 90,000 people die each year due to medical errors of some sort.

As evidence of the distance to go in health care improvement, a June 6, 2004 Associated Press article, "New Rules Fight Surgery Mix-Ups", reported on new methods to identify that the patient and body part due to be operated on were indeed the correct ones. There have been 275 known cases of errors in this regard since 1999, although such errors are reported voluntarily and thus undercounted. Researchers found that the marking of operation locations had been inconsistent, for example, with some hospitals using an "X" on the body to indicate "operate here" and others using "X" to indicate "don't operate here". Another problem was the posting of X-rays backwards. The final word of advice by Dr. Dennis O'Leary, who heads the Joint Commission on Accreditation of Healthcare Organizations, was for the patient to speak up before being anesthetized if it is not clear that proper identification has been made. It is not reassuring that the patient must be the final quality control inspector in this situation.

It seems that basic industrial problem solving could go a long way toward health care quality improvement. There seems to be a lot of low-hanging fruit. Medical applications often require modifications of industrial methods. For example, in health care the monitoring of mortality rates is not as straightforward as monitoring defect rates in industry since it often requires risk adjustment in which a model is used to account for the level of severity of illness for each patient. For more information on process monitoring in healthcare and public health, the reader is referred to Steiner, Cook, Farewell, and Treasure (2000), Benneyan and Borgman (2003), Sonesson and Bock (2003), and Grigg and Farewell (2004).

The University Environment

Webster's New World Dictionary defines "ivory tower" as *a place, such as a university, thought of as being more peaceful than the real world and set apart from its problems*. The ivory tower is, however, much less set apart from the real world than it used to be.

Many universities, especially large state universities, have moved toward the "corporate" management model. The key elements of this model are the following: requiring more and more faculty members to generate revenue to

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support themselves and their graduate students, viewing students as customers to be satisfied, increasing class sizes, devaluing faculty input in university decisions, hiring part-time and adjunct faculty for cost savings, and directly or indirectly attacking tenure. Many of the changes imposed by administrators are designed to improve the metrics by which universities, colleges, and departments are ranked. Virginia Tech administrators, for example, want us to be in the top thirty research universities, for example, as measured solely by research expenditures.

State funding for U. S. public universities has declined. For example, since 2001, Virginia funding for in-state college and university students fell 22%, from \$6,352 per student to \$4,949. State legislatures often impose restrictions on tuition increases. This combination has resulted in increasing pressure for universities to seek federal and corporate grants and contracts. When I spoke on academic life at the 2002 FTC in Valley Forge, PA, I discussed “Publish or Perish” and “Publish or Languish” imperatives for faculty. Now these increasingly out-of-date slogans are being replaced by “Show Me the Money.”

The emphasis on grantsmanship, in particular, places many academic statisticians at a serious disadvantage since we do not have the large equipment requirements that account for much of the funding in many of the other sciences and engineering disciplines. Funding expectations vary widely by university and by college within university, with, for example, engineering faculty with the greatest expectations and business faculty with the least. It is becoming more and more tempting for many administrators, however, to hire professors who can attract large amounts of federal and corporate funding. This can hurt many of the important disciplines, such as statistics and industrial engineering, with professors that don't generally fall into this category.

Since there is increased competition for limited federal funding, it will become increasingly necessary for corporations to provide financial and political support to the academic departments that they value. Corporate financial support for research, particularly from pharmaceutical companies, often comes with strings attached. Stein (2004, p. 13) reported that corporate sponsors of university research reserved the right to withhold or block publication to protect industry secrets about half of the time. Some question whether university professors should be doing this type of research.

I might add that professors are generally allowed to do corporate and other consulting averaging up to one day a week. The funding of many professors who do corporate training and consulting does not flow through the university since, for one reason, the overhead charged by the university can represent up to a third of the budget. From the university point of view, this type of funding obviously does not count.

In my view the corporate model leads to a lowering of the quality of education and, in the extreme, to a loss of academic freedom. For a more complete discussion of these issues, see Scott (2001). Overall, academic life is becoming more difficult and demanding for those of us interested in industrial statistics.

Journal Article Citation Counts

I find the study of citation counts of journal articles to be quite interesting, although many question its value. Citation counts are limited in assessing the impact of papers, but I believe that they shed some light on which papers have been found to be most useful by researchers in statistics and other fields. Citation counts are playing an increasing role in the rankings of journals and researchers. Citation analyses are also required in many academic tenure and promotion decisions, especially at the full professor level.

The two journals most closely associated with the FTC are *Technometrics* and the *Journal of Quality Technology (JQT)*. The Appendix contains lists of some of the current most-cited papers in these journals based on Web of Science data. The overall most-cited *Technometrics* papers in List 1 tend to be on widely applicable statistical methods; in particular, regression, ridge regression, multivariate analysis, and outlier detection. It is interesting that the paper on multiple comparison methods by Dunn (1964) is so highly cited. Ryan and Woodall (2004) found that the most-cited papers in statistics included several on multiple comparison methods.

List 2, with the most-cited *Technometrics* paper by volume, contains quite a few SPC and DOE-related papers. In contrast List 1 contained only one paper in these categories, Box and Behnken (1960). List 3 shows the most-cited *JQT* papers by volume. Authors Bill Hunter, Jim Lucas, John MacGregor, Geoff Vining, Derek Bingham, and Randy Sitter appear on both lists.

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Surprisingly, the most-cited paper in *JQT* was cited more than the most cited paper in *Technometrics* for several years of publication.

Although there has been no study to identify the most-cited *JQT* and *Technometrics* authors, the clear leader in this category for *Technometrics* is George Box with 2,634 citations (as of 7/6/04). The Web of Science lists separate entries for the spelling and various misspellings of an author's name. Professor Box, for example, is listed as EPG Box, G Box, GE Box, GEP Box, GET Box, GPE Box and P Box! This type of database issue complicates the determination of accurate citation counts.

Technometrics is more highly cited than *JQT*. In 2003, *Technometrics* papers received 2,511 citations while *JQT* papers received 846. All citation counts are undercounts since the Web of Science does not cover citations in all journals, e.g., those in *Quality Engineering*. Journals are usually ranked on the basis of the citation impact factor. This metric is the ratio of the total number of citations received in a given year to papers published in the journal in the previous two years to the number of articles published in these previous two years. The two-year time frame seems much too short to meaningfully compare statistical journals due to the length of the review and publication process.

Figure 3 shows the number of citations to *Technometrics* papers in 2003 by year of their publication in *Technometrics*. The citation counts for 2002 and 2001 were used to calculate the 2003 citation impact factor of 0.775.

Figure 3: Number of Citations to *Technometrics* Papers in 2003 by Year of Publication.
(From *Journal Citation Reports*.)

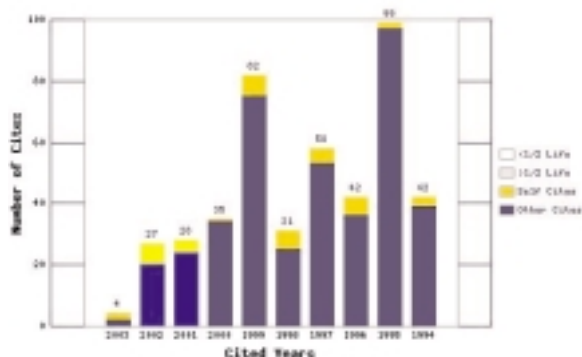
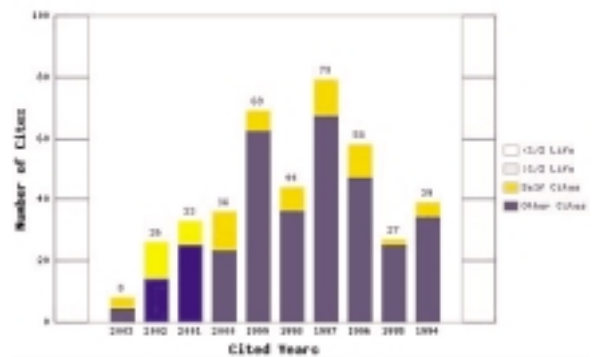


Figure 4 contains citation results for *JQT*, which had a 2003 citation impact factor of 0.766. The total numbers of citations in 2003 for articles published since 1994 are very similar for the two journals with *Technometrics* at 448 and *JQT* at 419. *JQT* has a higher rate of journal self-citations, but this is not surprising given its more narrow focus.

Figure 4: Number of Citations to *JQT* Papers in 2003 by Year of Publication.
(From *Journal Citation Reports*.)



Ryan and Woodall (2004) reported that the most-cited statistical paper is Kaplan and Meier (1958) with roughly 28,000 citations. For some perspective, the citation impact of this single paper is greater than that of all of the contributions of George Box published in *Technometrics* combined together and then multiplied by a factor of ten. To make the list of the top twenty-five most-cited statistical papers required over 2,000 citations.

We need to support our key technical journals. Full electronic access to all past issues of *Technometrics* and *JQT* is inexpensive. Although citation rates are relatively strong, both journals are declining in circulation to a disturbing degree. I encourage you to subscribe to these journals if you don't already have access. If you are not finding the types of articles you need, I urge you to contact the editors with your input and suggestions, perhaps with ideas for a review or tutorial paper that would be of interest.

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Quality Profile Monitoring

In his Address in 1994 Roger Hoerl pointed to the limitations of research in statistical process control (SPC). He stated, "Those of us who work on two (or three) dimensional products, such as rolls of steel or paper, where well-known patterns exist in the two dimensions, are not particularly interested in SPC papers which assume 'random sampling'." In his 1995 Address John MacGregor reported a tremendous resistance by statisticians to using more complex and alternative approaches to SPC. He advised moving beyond the overly simple univariate and typical multivariate assumptions.

Most of my research over the past twenty years has been on control charting. I found it difficult to move as far as John MacGregor has recommended, however, because I am not a chemical engineer and no chemical plant manager in his or her right mind is going to give me control of one of their reactors.

In most statistical process control (SPC) applications it is assumed that the quality of a process or product can be adequately represented by the distribution of a univariate quality characteristic or by the general multivariate distribution of a vector consisting of several correlated quality characteristics. In many practical situations, however, the quality of a process or product is better characterized and summarized by a relationship between a response variable and one or more explanatory variables. Thus, at each sampling stage one observes a collection of data points that can be represented by a curve (or profile). It is the relationship between the variables that is to be modeled and monitored. Woodall et al. (2004) gave a review of profile monitoring. The model-fitting approaches have involved linear regression, non-linear regression, nonparametric regression, and the use of wavelets. There are many calibration and manufacturing applications. The monitoring of quality profiles clearly moves SPC in the directions indicated as needed by Roger Hoerl and John MacGregor.

Conclusions

We have limited influence on the U.S. economy, but I think we should support initiatives and political leaders that show promise for supporting a stronger manufacturing base in the U.S. An obvious major adverse factor is the globalization of the economy. If our manufacturing base continues to weaken, many quality

professionals may consider moving from manufacturing to health care.

The corporate management model is generally inappropriate for universities. The most important step for maintaining the excellence of higher education would be for states to adequately fund universities, even if this requires raising taxes. If all tax cuts were good and all tax increases bad, then the optimal level of taxes would be zero. This is clearly absurd. I agree with Mote (2004), the president of the University of Maryland, that if the federal and state governments continue to shift financing responsibilities to the universities, then access and/or quality will decrease. Those in academia should consider joining the American Association for University Professors (AAUP), which fights against the excesses resulting from the use of the corporate model.

If you are an author of journal papers, consider the effect of your reference lists. It would be helpful for authors to review the literature not just before a paper is written, but also after it has been accepted for publication. Relevant papers most likely will have appeared in the literature during this time. Citing these new articles can strengthen a paper and increase the citation impact factors of our journals.

Finally, I encourage you to investigate the subject of profile monitoring. I see this as the most exciting and promising area of research in SPC. It opens the SPC up to many areas of applied statistics involving model-fitting and allows us to address a much wider variety of engineering applications.

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APPENDIX: Most-Cited *Technometrics* and *JQT* Papers

List 1: Overall Most-Cited Papers in *Technometrics* (as of 7/6/04 Web of Science)

- 1077** Wold, Svante (1978), "Cross-validatory estimation of the number of components in factor and principal components models", *Technometrics*, 20, 397-405.
- 1003** Hoerl, Arthur E., and Kennard, Robert W. (1970), "Ridge regression: Biased estimation for nonorthogonal problems", *Technometrics*, 12, 55-67.
- 837** Mallows, C. L. (1973), "Some comments on C_p ", *Technometrics*, 15, 661-675.
- 829** Dunn, Olive Jean (1964), "Multiple comparisons using rank sums", *Technometrics*, 6, 241-252.
- 698** Spendley, W., Hext, G. R., and Himsforth, F. R. (1962), "Sequential application of simplex designs in optimisation and evolutionary operation", *Technometrics*, 4, 441-461.
- 664** Lachenbruch, Peter A., and Mickey, M. Ray (1968), "Estimation of error rates in discriminant analysis (Com: V10 p204-205; Add: V10 p431)", *Technometrics*, 10, 1-11. Lachenbruch, Peter A. (1968), "Addendum to "Estimation of error rates in discriminant analysis" (V10 p1-11)", *Technometrics*, 10, 431-432.
- 597** Hartley, H. O. (1961), "The modified Gauss-Newton method for the fitting of non-linear regression functions by least squares", *Technometrics*, 3, 269-280.
- 490** McKay, M. D., Beckman, R. J., and Conover, W. J. (1979), "A comparison of three methods for selecting values of input variables in the analysis of output from a computer code", *Technometrics*, 21, 239-245.
- 479** Box, G. E. P., and Behnken, D. W. (1960), "Some new three level designs for the study of quantitative variables (Corr: V3 p131; V3 p576)", *Technometrics*, 2, 455-475.
- 472** Cook, R. Dennis (1977), "Detection of influential observation in linear regression", *Technometrics*, 19, 15-18.
- 469** Hoerl, Arthur E., and Kennard, Robert W. (1970), "Ridge regression: Applications to nonorthogonal problems (Corr: V12 p723)", *Technometrics*, 12, 69-82.

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432 Marquardt, Donald W. (1970), "Generalized inverses, ridge regression, biased linear estimation, and nonlinear estimation", *Technometrics*, 12, 591-612.

423 Grubbs, Frank E. (1969), "Procedures for detecting outlying observations in samples", *Technometrics*, 11, 1-21.

List 2: Most Cited *Technometrics* Papers by Volume (1980-2003)

152 Jones, Richard H. (1980), "Maximum likelihood fitting of ARMA models to time series with missing observations", *Technometrics*, 22, 389-395.

164 Conover, W. J., Johnson, Mark E., and Johnson, Myrle M. (1981), "A comparative study of tests for homogeneity of variances, with applications to the outer continental shelf bidding data (Corr: V26 p302)", *Technometrics*, 23, 351-361.

114 Lucas, James M., and Crosier, Ronald B. (1982), "Fast initial response for CUSUM quality-control schemes: Give your CUSUM a head start", *Technometrics*, 24, 199-205.

142 Beckman, R. J., and Cook, R. D. (1983), "Outlier.....s (C/R: p150-163)", *Technometrics*, 25, 119-149.

119 Steinberg, David M., and Hunter, William G. (1984), "Experimental design: Review and comment (C/R: p98-130)", *Technometrics*, 26, 71-97.

185 Hosking, J. R. M., Wallis, J. R., and Wood, E. F. (1985), "Estimation of the generalized extreme-value distribution by the method of probability-weighted moments", *Technometrics*, 27, 251-261.

202 Bohachevsky, Ihor O., Johnson, Mark E., and Stein, Myron L. (1986), "Generalized simulated annealing for function optimization", *Technometrics*, 28, 209-217.

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161 Box, George (1988), "Signal-to-noise ratios, performance criteria, and transformations (C/R: p19-40)", *Technometrics*, 30, 1-17.

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97 Wardell, Don G., Moskowitz, Herbert, and Plante, Robert D. (1994), "Run-length distributions of special-cause control charts for correlated processes (Disc: p17-27)", *Technometrics*, 36, 3-17.

172 Nomikos, Paul, and MacGregor, John F. (1995), "Multivariate SPC charts for monitoring batch processes", *Technometrics*, 37, 41-59.

43 Nguyen, Nam-Ky (1996), "An algorithmic approach to constructing supersaturated designs", *Technometrics*, 38, 69-73.

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- 22 Zhang, Nien Fan (1998), "A statistical control chart for stationary process data", *Technometrics*, 40, 24-38.
- 61 Rousseeuw, Peter J., and Van Driessen, Katrien (1999), "A fast algorithm for the minimum covariance determinant estimator", *Technometrics*, 41, 212-223.
- 15 Fang, Kai-Tai, Lin, Dennis K. J., Winker, Peter, and Zhang, Yong (2000), "Uniform design: Theory and application", *Technometrics*, 42 (3), 237-248.
- 9 Jones, L. Allison, and Champ, Charles W., and Rigdon, Steven E. (2001), "The performance of exponentially weighted moving average charts with estimated parameters", *Technometrics*, 43 (2), 156-167.
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List 3: The Most-Cited Papers in the *Journal of Quality Technology* by Volume

- 134 NELSON, W. (1969), "Hazard Plotting for Incomplete Failure Data", 1, 27-52.
- 32 HAHN, G.J. (1970), "Statistical Intervals for a Normal Population: Part 1. Tables, Examples and Applications", 2, 115-125.
- 44 SNEE, R.D. (1971), "Design and Analysis of Mixture Experiments", 3, 159-169.
- 9 JACKSON, J.E. (1972), "All Count Distributions Are Not Alike", 4, 86-92.
- 36 SNEE, R.D.(1973), "Some Aspects of Nonorthogonal Data Analysis: Part I. Developing Prediction Equations", 5, 67-79.

- 94 OLSSON, D.M. (1974), "A Sequential Simplex Program for Solving Minimization Problems", 6, 53-57.
- 45 OWEN D.B., MCINTIRE D., and SEYMOUR, E. (1975), "Tables Using One or Two Screening Variables to Increase Acceptable Product Under One-Sided Specifications", 7, 127-138.
- 62 LUCAS, J.M. (1976), "The Design and Use of V-Mask Control Schemes", 8, 1-12.
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- 67 LUCAS, J.M. (1982), "Combined Shewhart-CUSUM Quality Control Schemes", 14, 51-59.
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- 216* KACKAR, R.N. (1985), "Off-Line Quality Control, Parameter Design, and the Taguchi Method", 17, 176-188.
- 169 KANE, V.E. (1986), "Process Capability Indices", 18, 41-52.
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- 18 VINING, G.G. (1998), "A Compromise Approach to Multiresponse Optimization", 30, 309-313.
- 31 WOODALL, W.H., and MONTGOMERY, D.C. (1999), "Research Issues and Ideas in Statistical Process Control", 31, 276-286.
- 18* WOODALL, W. H. (2000), "Controversies and Contradictions in Statistical Process Control", 32, 341-350. (Available at www.asq.org/pub/jqt)
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* Most-cited **JQT** article cited more than most-cited **Technometrics** article.

Citation counts are based on the Web of Science (7/8/04).

Call for Papers

49th Annual Fall Technical Conference

Statistics: The Gateway to Improved Quality

October 20-21, 2005

St. Louis Hilton at the Airport, St. Louis, MO

Co-sponsored by:

*American Society for Quality
Chemical and Process Industry Division
Statistics Division*

*American Statistical Association
Section on Physical and Engineering Sciences
Quality & Productivity Section*

We invite you to submit papers for presentation to the 49th Fall Technical Conference. The Fall Technical Conference has long been a forum for both statistics and quality. The goal of this conference is to engage researchers and practitioners in a dialogue that leads to more effective use of statistics to improve quality.

Achieving higher quality levels is a requirement in today's dynamic global economy. Successful organizations deliver quality products and/or services. These organizations must focus not only on improving existing products and processes but also on the development of new products and processes. Establishing clear quantitative quality measures enables us to improve and achieve quality. Effective use of statistics permits the interpretation of data to improve and achieve quality. The conference will serve to bring innovations in statistical methodologies and quality tools to the forefront. Papers submitted to this conference typically include novel developments in the area of quality or applications of more established approaches in an innovative way.

The conference will be held in St. Louis, a city with many attractions. They include a cruise on the mighty Mississippi, a ride to the top of the Gateway Arch for a bird's eye view of St. Louis, or seeking Lady Luck on a riverboat casino.



If you're interested in presenting an applied or expository paper in any of three parallel sessions (Statistics, Quality Control or Tutorial/Case Studies) contact any of the committee members listed below, preferably by e-mail. Work should be strongly justified by application to a problem in engineering, manufacturing, process/chemical industry, physical sciences, or a service industry. The mathematical level of the papers may range from basic to that of the Journal of Quality Technology or Technometrics.

The submission deadline is **February 18, 2005**.

Committee Members:

STAT: Gordon Clark (Chair), The Ohio State University, (614) 847-1394, clark.17@osu.edu

CPID: Erika Abbas, E Ink Corporation, (617) 499-6049, eabbas@eink.com

Q&P: Martha Gardner, General Electric Global Research, (518) 387-6546, gardner@crd.ge.com

SPES: Joe Pigeon, Villanova University, (610) 519-7347, joeseph.pigeon@villanova.edu

It is important to follow the abstract format (provided below). Papers are selected based on subject matter, technical correctness, usefulness, interest, clarity, and readability.

The program committee welcomes any suggestions for special session topics or speakers. If you have ideas, please contact one of the program committee listed on the Call for Papers.

Abstract Format

(use only a single page please)

Title of Presentation

First Author
affiliation
phone number (day)
fax number
paper mail address
e-mail address

Second Author
affiliation
phone number (day)
fax number
paper mail address
e-mail address

Third Author
affiliation
phone number (day)
fax number
paper mail address
e-mail address

Presenter: Name of presenter

Keywords: Include 3 to 5 key words or phrases

Purpose: One sentence. To derive, prove, synthesize, review, present, inform, encourage, motivate, enlighten, exemplify, highlight, etc.

Abstract

The abstract should include the following 3 components:

1. Motivation or Background:
2. Description: Describe the work done.
3. Significance: Are there improvements, applications, new abilities, new points of view, etc.? How will the status quo be changed?

Session Preference: (choose one)

- Statistics
 Quality Control
 Tutorial/Case Study

Where did you learn about the Call for Papers?

- Quality Progress ASQ-CPID newsletter On Q
 ASQ-STAT newsletter AMSTAT news ASA-SPES/Q&P news
 electronic (where?) _____
 other (please explain) _____

ASQ STATISTICS DIVISION

FTC Council Meeting Minutes

Wednesday, October 13, 2004

Roanoke, Virginia

Statistics Division Attendees:

Mark Kiel
Scott Kowalski
Gordon Clark
Doug Hlavacek
Geoff Vining
Ed Schilling

Student Attendees:

Li Liang – Va Tech,
Cheryl Dingus – Ohio State,
Shuohui Chen – Penn State,
Ayca Orol-Godfrey – Va Tech

- Called 2004 FTC Council/Open Business Meeting to Order
- Brief introduction of attendees
- Agenda accepted and approved as presented
- MK reviewed Mission Vision Strategy and Principles
- 2004 AQC Council meeting minutes approved
- Treasurer reports – division is in good shape with the exception of Special Publication (\$1k budgeted but \$8k spent, timing of when costs hit our budget versus expected was to blame, budgeted for Spec Pub last year yet bill hit us this year), DH to attach Marcey's spreadsheet to meeting minutes, Treasurer's report accepted and approved
- All positions within Statistics Division are filled, Daksha Chokshi will replace Marcey in Treasurer's position starting in 2005, GV has potential candidate for vice chair
- Still looking for good FTC locations beyond St Louis, major cities tend to pull crowds in (Washington DC), need local section to take responsibility, Chicago – more outlying area, Milwaukee (50th), Minneapolis/St Paul (2006 or 2007),
- E-Zine update – GC has provided call for papers for 2005, MK shared E-Zine process with IJ, GV to author E-Zine on six sigma discussion board
- Website migration update – link on ASQ site back to our old website, major effort to make it happen, old website getting 50k/month, 92% are originating from user bookmarks and not from prior web page, small % comes from ASQ website, Statistics meta-tags on our web pages are heavy hitters on Google, MSN, Bob Mitchell has put narrated PowerPoint slide in free stuff, large download, looking for big names to narrate with potential cut of the royalties
- Need Newsletter editor for Stats Division since Eve Varner has run into time constraints, editor only compiles the information, target is to have name in place by for newsletter editor by Nov conference call
- Any Spec Publications planned for 2005??
- GC had trouble with last month's conference call on primary toll free number, appears start time (CST versus EST) was the problem, ASQ recently switched vendors from AT&T to SBC, send email to MK if anyone wants to use conference call for division business
- Jonathon Andell – has reserved activity room, but Seattle AQC booth still to be determined
- Cheryl Jennings – ??
- GC has formed committee for 2005 FTC, E-Zine calling for papers completed and will be handed out at FTC, catch phrase is "Statistics – The Gateway to Quality Improvement", slow to get publicity out on CPID website, should get announcement on each sponsoring websites, StatDiv, CPID, ASA, QMP, as well as ASQ Org main website (MK to pursue this), GC couldn't get onto CPID website, need additional publicity for getting his call for papers out
- ES circulated report summarizing activities of the Statistics Division Standards Committed. Report was accepted and approved.
- Ott Scholarship
- Tony Greenfield to be named Hunter Award winner
- FTC Student Grants – reported from Todd Nelson that four students received FTC grants

MEETING MINUTES – 10/13/04

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REPORT OF THE STATISTICS DIVISION STANDARDS COMMITTEE

The following summarizes the activities of the Statistics Division Standards Committee as of this date.

Writing groups report as follows:

- B1, B2, B3, **Guide to Control Charts** (Robert Hertz, CH, Georgia Kay Carter, Edward Schilling)
Reviewing and revising standards. Investigating potential of revising existing standards and supplementing them later with standards on other types of charts (cusum, etc.)
- S1, **An Attribute Skip Lot Plan** (Aridiman Jain, CH, Jack Keyser, Kenneth Stephens)
Paperwork completed. On hold pending changes in ASQ Standards Committee Bi-laws.
- S3, **An Attribute Chain Sampling Plan** (Aridiman Jain, CH, Jack Keyser, Kenneth Stephens)
New work item - materials submitted to ASQ Standard is in development. Balloting will be on hold pending ASQ action.
- Z1.9, **Sampling Procedures and Tables for Inspection by Variables for Percent Nonconforming** (Herbert Monnich, CH, Rudy Kittlitz, Paul Roediger, Edward Schilling)
Transferred to ASQ Z1 Committee by ASQ Standards Committee - Standard was issued in December, 2003, as ANSI/ASQ Z1.9 (2003). May be transferred back to Statistics Division pending action by ASQ Standards Committee.
- Z1.4, **Sampling Procedures and Tables for Inspection by Attributes**. Transferred to ASQ Z-1 Committee by ASQ Standards Committee. Standard was issued in December, 2003, as ANSI/ASQ Z1.4 (2003). May be transferred back to Statistics Division pending action by ASQ Standards Committee.

Edward G. Schilling
Chair Statistics Division
Standards Committee

10/13/04

STATISTICS DIVISION COMMITTEE ROSTER

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2004-2005

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**UPCOMING
NEWSLETTER
DEADLINES FOR
SUBMISSIONS**

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