ASQ STATISTICS DIVISION Newsletter©

Volume 24, No. 3 Summer 2006

Chair's Message

by Geoff Vining

I hope that everyone is having a wonderful summer! Our Division is still busy as we make the annual transition in leadership. On 1 July, I rotate out as Chair as Gordon Clark takes over. Gordon is well prepared for the upcoming year.

In May, we had a wonderful World Conference on Quality and Improvement. J.D. Williams organized a great program that was well attended. The officers met many of our members at the booth and at the hospitality suite. Gordon Clark chaired the annual tactical planning meeting where the officers laid out the course for the next year in light of our strategic plan. The division will focus on our body of knowledge and on our narrated PowerPoint presentations. We also are reaching out to the Quality Management Division.

In July, Gordon will chair the annual operational planning meeting in Nashville, Tennessee. In this meeting, the officers will lay out the time line for the year in accordance with our tactical plan. For more information, please email Gordon at clark.17@osu.edu.

John Cornell has organized several outstanding sessions for the Fall Technical Conference. We are celebrating the 50th FTC this year! The Division is sponsoring a special invited session in which Ray Myers will give a retrospective on response surface methodology and Greg Piepel will give a retrospective on mixture experiments. The Division also is sponsoring a short course on statistical consulting and change management by Sue Ellen and Soren Bisgaard. Please plan to attend.

It is a great honor to be able to serve the members of our division. Please let us know how we can serve your needs better.

Geoff

Inside This Issue

VISION

- Data Driven Decisions Through Statistical Thinking
- We are the recognized forum that advances data-driven decision making through Statistical Thinking.

MISSION

- Advance data driven decision making through Statistical Thinking.
- Improve the public's perception and understanding of statistical methods and data driven decisions.
- Be the source for the statistical components of the ASQ body of knowledge.
- Support the growth and development of ASQ Statistics Division members.
- Increase the credibility, marketability and influence of ASQ Statistics Division members.

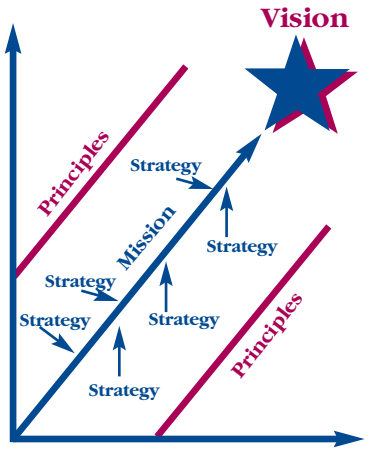
STRATEGIC FOCUS

1. BODY OF KNOWLEDGE
   - What it is?
   - Where is it?
   - How to categorize it?
   - Disseminate via web page
   - Keep current
   - Partner with HQ
   - Goals to understand, organize, make accessible, inventory, gap analysis

2. COMMUNICATION
   - Newsletter
   - E-Zines
   - Align both to vision and mission
   - Gap analysis with primary audiences
   - Discussion boards
   - Promote via E-Zine, conference booths
   - Align discussion boards to vision and mission
   - Evaluate whether to continue

3. VOICE OF THE CUSTOMER
   - Members, other divisions, audiences
   - Proactive way to engage (go, see listen)

4. DATA DRIVEN DECISIONS
   - How do we advance/
   - Do we broaden the audience?
   - AQC session?
   - Partnerships?



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.

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

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:
1. Application oriented/not theory
2. Non-technical in nature
3. Techniques that can be understood and applied by non-statisticians.
4. Approximately three to five pages or less in length (8 1/2" x 11" typewritten, single spaced.)
5. Should be presented in "how to use it" fashion.
6. 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:
1. Application oriented.
2. More technical than Basic Tools, but contains no mathematical derivations.
3. Focus is on insight into why a technique is of value.
4. 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.
5. Not overly controversial.
6. 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.

Editor's Corner

by Brian Sersion

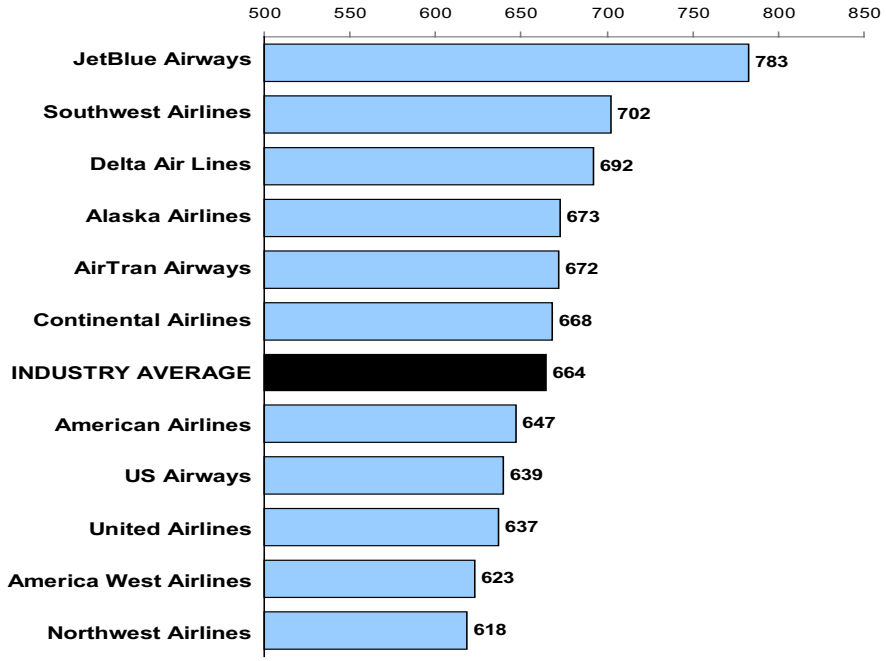
Call it poetic license. The Summer Newsletter has given the Statistics Division an opportunity to feature a paper on Knowledge Management Taxonomy. Since there were no traditional Mini-Paper submittals received for this edition, I decided to take this opportunity to build on Dr. Soren Bisgaard's Youden Address; *The Future of Quality Technology* (see Winter 2006 Newsletter, Volume 24, No.2). Surprisingly enough, finding an application oriented paper on the subject of knowledge management as it pertains to statistical analysis was more difficult than I had expected. Fortunately, while reading numerous papers on the more general subject, I came across a paper entitled *The Five Tier Knowledge Management Hierarchy*. The great thing about this paper is that it has an applications emphasis. After describing a taxonomy for knowledge management, the authors go on to explain how one can use it. On behalf of the Statistics Division I would like to thank the authors, Richard C. Hicks, Ronald Dattero and Stuart D. Galup.

If we are to become knowledge workers in the new knowledge economy it would be best for us as professionals to learn to speak the same language. It is up to our membership to build upon this initial offering. How does the statistician fit into the new knowledge economy? Did I hear someone say . . . Research Project? I'll expect your Mini-Paper submittal on the subject of knowledge management in statistics by August 31, which just happens to be our Fall Newsletter, Mini-Paper deadline. Cheers!

Data Matters

J.D. Power and Associates
2005 Airline Satisfaction Index Study℠

Overall Customer Satisfaction Index Scores
(Based on a 1,000-point scale)



NOTE: ATA/American Trans Air is included in the study, but is not ranked due to insufficient sample size.
Rankings include major U.S. carriers that earn at least $1 billion a year in passenger revenue.

Source: J.D. Power and Associates 2005 Airline Satisfaction Index Study℠ (J.D. Power & Associates)

Special Feature

The Five Tier Knowledge Management Taxonomy

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Abstract

Many terms commonly used in the field of Knowledge Management (KM), such as knowledge, have multiple uses and sometimes conflicting definitions because they are adapted from other research streams. In addition, the most common paradigm for discussing the various hierarchies of data, information, and knowledge, the Knowledge Hierarchy, is limited in providing support for KM. In this paper, a new set of terminology is defined and a Five Tier Knowledge Management Hierarchy (5TKMH) is developed specifically for KM.

The 5TKMH is developed by extending the Knowledge Hierarchy to include Personal Knowledge. The five Tiers of Knowledge Management are: 1) Individual, 2) Facts, 3) Influences, 4) Solutions, and 5) Innovation. The Individual Tier accesses the human mind and may use it to create, use, and maintain Codified knowledge in the Facts, Influences, and Solutions Tiers. The Facts Tier stores raw data. The Influences Tier integrates data in context to help make decisions. The Solutions Tier integrates reasoning, Facts, and Influences to provide a complete, actionable solution. The Innovation Tier integrates knowledge from the other tiers including the Individual Tier. Its results are often reflected in corporate strategy, increased efficiency, increased effectiveness, or the creation of value-added goods and/or services.

The 5TKMH can be employed to evaluate KM efforts, inventory knowledge assets, alleviate possible confusion, support a KM life-cycle that provides guidance to the Chief Knowledge Officer, and plan and manage the evolution of knowledge assets in the firm.

Introduction

There are many definitions of Knowledge Management (KM) but the following definition by the Gartner Group is quite succinct and appropriate for the perspective expressed in this paper: "Knowledge management promotes an integrated approach to identifying, capturing, retrieving, sharing, and evaluating an enterprise's information assets. These information assets may include databases, documents, policies and procedures, as well as the un-captured tacit expertise and experience stored in individual workers' heads." (Gartner 1999).

Before proceeding, we should define our terms, as the definition of knowledge has been debated since the Greeks and is still being debated in academic circles. A common theme in the KM literature is that data is combined to create information, and information is combined to create knowledge. There is a consensus that data are discrete facts, but after that, consensus is lacking. The lack of consistent definitions for data,

information, and knowledge make rigorous discussions of KM difficult. For example, Alavi (2001) states "we posit that information is converted into knowledge once it is processed in the minds of individuals and knowledge becomes information once it is articulated and presented in the form of text, graphics, words, or other symbolic forms." In other words, the same unit of knowledge becomes information when it is stored in a computer, but then becomes knowledge again when it is transferred to another human.

Information has been defined as data with special relevance and purpose (Drucker 1995). It has also been defined as data that makes a difference (King 1993), data in context (Galup et al. 2002), and a result of analyzing and interpreting data that carries meaning (Bourdreau and Couillard 1999).

There is even less consensus about the meaning of knowledge. Knowledge has been defined as the power to act and make decisions (Kantner 1999), information in context coupled with an understanding of how to use it (Davenport and Prusak 1998), professional expertise appropriate for the domain (Bourdreau and Couillard 1999), things that are held to be true and drive people to action (Bourdreau and Couillard 1999), justified personal belief that increases an individual's capacity to take effective action (Alavi and Leidner 1999), information that has been authenticated and thought to be true (Vance 1997), integrated information in context (Galup et al. et al. 2002), information made actionable (Mahlitta 1996), and information made actionable in a way that adds value to the enterprise (Vail 1999). Following the lead of Polanyi (1958), some even contend that knowledge exists only in a human mind (Nonaka 1994), which is similar to the concept expressed by Churchman (1972) that "knowledge resides in the user and not in the collection."

In the next section, a discussion of the various hierarchies of data, information, knowledge, and other related terms will be presented. Although of value, these hierarchies are limited in providing support for KM so a new set of terminology is defined and a Five Tier Knowledge Management Hierarchy (5TKMH) is developed. Following this will be a section on how to apply 5TKMH to provide guidance to managers involved in KM efforts. The last section contains our conclusions and directions for future research.

The Knowledge Hierarchy

The most common paradigm in the KM literature is the Knowledge Hierarchy (Nissen 2000, Davenport 1998), which is depicted in Figure 1. The Knowledge Hierarchy depicts the conventional concept of knowledge transformations, where data is transformed into information, and information is transformed into knowledge.

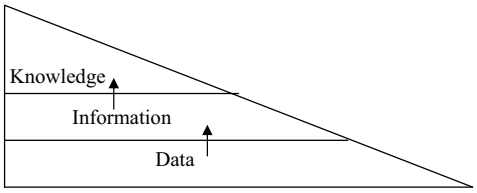

Figure 1: Knowledge Hierarchy

Variations on this central theme include Tuomi (1999), who proposes an inverted hierarchy. His position is that knowledge is required to represent information, which must be done to store data. Nissen (2000) extends this concept with a model containing two hierarchies. One hierarchy models the view of the knowledge seeker, where the second hierarchy is inverted and represents the view of the knowledge creator. From the seeker's perspective, data is placed in context to create information, and information that becomes actionable is knowledge. From the creator's perspective, knowledge is necessary to create information, which in turn is necessary to create data. These transformations are not mutually exclusive. An extension to the Knowledge Hierarchy is expressed by Ackoff (1996), who defines Data as symbols, Information as data that are processed to be useful, Knowledge as application of data and information to answer "how" questions, Understanding as the ability to answer "why" questions, and Wisdom as evaluated understanding. Instead of a hierarchy, Kakabadse et al. (2003) views data, information, realization, action/reflection, and wisdom as a "chain of knowledge flow". Realization refers to information put to productive use. Action/reflection is reflective and integrative thought and the will to act. Through action/reflection, one may gain wisdom. As understanding and wisdom are unlikely to be possessed by computers (Ackoff 1996), we consider them to be dimensions of Personal Knowledge.

The Knowledge Hierarchy can be used to predict the actionability and volume of each tier in the hierarchy. Knowledge is the most actionable level but the rarest, where data is the least actionable level but has the greatest volume (Nissen 2000).

Personal Knowledge and KM

There is also a lively debate about the definitions of explicit and tacit knowledge. "Tacit knowledge is an elusive or maybe illusive term that its implication depends on the nature and resources of tacitness expected." (Li and Gao 2003). A useful perspective is shown by Tsui, who classifies KM initiatives as Codified and Personal (Tsui 2003). Codified systems emphasize explicit knowledge and technology. Personal systems, on the other hand, focus on individual knowledge and sharing through common interests. We will use this

perspective to define the following classes of knowledge in the context of KM:

Personal Knowledge is defined as "knowledge contained only in the mind of one person."
Codified Knowledge is defined as "knowledge that has been captured and may be shared."

The Knowledge Hierarchy was introduced to describe Management Information Systems (Davenport, 1998), which by definition are Codified systems. The Knowledge Hierarchy is useful but limited in respect to KM because it excludes Personal Knowledge. Personal Knowledge is half of the foundation of KM and is in some way the source of all Codified data, information, and knowledge. Personal Knowledge may contain Facts, Influences, Solutions, and Innovations. Personal Knowledge is stored only in the mind of the expert and, while contact information for the expert can be stored in a knowledge directory or "Yellow Pages", the knowledge itself is not available for inspection and has not been captured.

Marcus (2001) adds that "Only explicit knowledge is the province of information technology, including the communication systems by which people informally share their observations and the more formal repositories in which structured knowledge is stored for later reuse." This position encourages the storage and algorithmic execution of all knowledge. As an example, should knowledge about drug interactions be used only in the mind of a human or should it also be used in a function of a prescription delivery software system? Codified knowledge is retained by the company, where Personal Knowledge walks out the door every night (Edvinsson and Malone 1997). Knowledge embedded in a computer program, as exemplified by expert systems, can be used to automate complex processes with the result of higher effectiveness, higher efficiency, and lowered costs. Codified Knowledge also provides a basis for deriving value producing knowledge-based products or services.

The Five Tiers of Knowledge Management

To derive a hierarchy suitable for KM research, we extend the Knowledge Hierarchy by adding a new Personal Knowledge Class consisting of two tiers -- the Individual Tier and the Innovation Tier (see Figure 2). As Individuals create, use, and maintain all of the tiers of the Codified Knowledge Class, we will position the Individual Tier as the foundation of our hierarchy. We add Innovation as the highest level because it integrates all of the other tiers, using strategy to exploit both Personal and Codified knowledge assets.

Since there is considerable debate over the definitions of the terms data, information, and knowledge, we will use instead the classifications Facts, Influences, and Solutions, respectively. We do this in order to reach a consensus between the various viewpoints and still arrive at a clearly distinguishable set of definitions for the 5TKMH. The definitions for all five tiers are.

Individual Knowledge is defined as "knowledge contained only in the mind of a person."
Facts are defined as "atomic attribute values about the domain."
Influences are defined as "data in context that has been processed and/or prepared for presentation."
Solutions are defined as "clear instructions and authority to perform a task."
Innovation is defined as "the exploitation of knowledge-based resources."

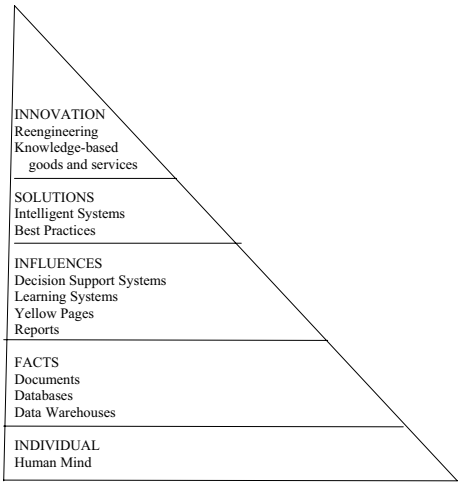

Figure 2: Five Tier Knowledge Management Hierarchy

Individual Tier

The role of the Individual Tier is to create, use, and maintain all tiers of knowledge. The Individual Tier contains or may use the Facts, Influences, and Solutions that are stored only in the mind of each individual, and not in any book, computer, or other shared media. It can be located computationally with a "Yellow Pages" system but cannot be stored, integrated, or retained.

Some researchers may contend that the Individual Tier represents the peak, not the foundation, of the hierarchy because one of the goals of KM is to transfer knowledge between individuals. We have positioned the Individual Tier as the foundation of the hierarchy because it is a necessary pre-condition for the other tiers.

A Codified KM system is only as effective as the knowledge that it obtains from the knowledge holder and that can be delivered to the knowledge seeker. The three Codified tiers of Facts, Influences, and Solutions are by definition implemented as a set of software solutions which must be able to acquire the necessary knowledge and distribute it to all knowledge seekers. This implies that the knowledge holder and knowledge seeker must have access to and training in the selected software such as groupware, databases, and expert systems.

Facts Tier

The role of the Facts Tier in KM is to provide raw data for higher level KM tiers. Much of the Codified data about the company is contained in documents, which are discussed in the Influences Tier, and stored in databases at the Facts Tier. Data warehouses and data marts are constructed with the purpose of creating Influences for decision-making, while transaction databases contain most of the accessible facts about the company and its business. Many software programs exist that focus on the analysis of data housed in databases.

Influences Tier

The role of the Influence Tier is to assist people in making decisions. Influence is defined as integrated data put in context, often through presentation or processing. In this tier, data is processed by Learning systems, Decision Support Systems (DSS), reports, knowledge pooling, and knowledge directory systems to influence decisions. The Influence Tier consists of three subclasses: Computer-assisted Decision Making, Cooperative Influence Creation, and Computer Assisted Influence Dissemination.

There are three main types of computer-assisted decision making systems: Learning Systems, DSS, and Reports. Learning Systems are composed of computer software applications that may be used to create Solutions or Influences through analysis of data without human intervention. DSS use a static set of models that analyze local data. As their name implies, these systems provide assistance for decisions, but do not make decisions. Reports represent data that has been processed and presented in context.

The differences between learning systems and DSS systems are: 1) that the context is predefined in the DSS systems and must be defined for Learning Systems, 2) the DSS uses generic models with data, where the Learning school does not necessarily use models, and 3) no human intervention is needed with Learning Systems. Learning Systems themselves are classified as Influences because they are a tool used by the knowledge seeker, not the desired knowledge itself. The output of Learning Systems may become Influences or Solutions, depending on the completeness and actionability of the output. Examples of Learning Systems applications are (on a continuum from creating Solutions to creating Influences): induction, case-based reasoning, neural networks, genetic algorithms, intelligent agents, data mining, executive information systems, and geographic information systems. As an example, Visa uses neural networks to locate fraud in credit card use. In 1995, Visa lost $655 million to fraud. In less than one year of neural network use, fraud losses were reduced by over sixteen percent. Nike uses intelligent agents to support employee cafeteria-style benefit programs (Turban 2001).

The second subclass of the Influence Tier is cooperative influence creation. Knowledge pooling and groupware are integrated in context, facilitating the creation of Solutions and Influences.

The third subclass of the Influence Tier, computer-assisted dissemination of influence, contains three subclasses. They are "Yellow Pages" that locate humans containing individual Influence or Solutions, Document Management Systems that locate and display documents by context, and systems that catalog and locate intellectual property. Individual documents are classified by their content as Facts, Influences, or Solutions.

Solutions Tier

The role of the Solution Tier is to make decisions and execute them. As defined in this paper, the Solution Tier is defined as a shareable source that contains a complete solution for a specific task and the authority to act. This implies a complete, verified solution for the decision-making context combined with local data. Expert systems are an example of a Solution Tier system, as these systems contain all of the knowledge necessary to solve a problem, access to local data, and the ability to make and execute a decision.

Another subclass of the Solution Tier is best practices. These represent the company's "school solution" to a decision-making context. We classify these systems as Solutions instead of Influences because they define the complete solution desired by the company, implying that the solution is complete and verified. It should be noted that deviation from the best practices might be difficult to justify, where deviation from a solution reached by influences is defensible.

Innovation Tier

As defined by Edvinsson et al. (2004), Innovation = (reuse + invention) x exploitation. Innovation occurs when knowledge from any tier is combined with strategy, facilitating a process reengineering, increasing corporate efficiency, increasing corporate effectiveness, or creating knowledge based goods or services. The NIMCube thinking process defined the following dimensions of innovation: stakeholder contribution, knowledge reuse, mutation of existing knowledge, exploitation, outcome measures, and operating context (Edvinsson et al. 2004). Innovation may result from the integration of sources from many tiers with corporate strategy. For example, Frito-Lay's hand-held computer system, which used data from the Facts Tier combined with a corporate strategy that integrated and analyzed data from all of the computers to reengineer the job of the salesman and the processes that the salesman performed (Applegate 1991). Another example, Visa, uses neural networks from the Influences Tier for fraud detection (Turban et al. 2001). Another example, the XCON computer configuration expert systems used by

Digital, enabled the company's strategy (Bachant 1989). Examples of the marketing of knowledge-based goods and services include consultants, magazines, and computer software. In each of these cases, a strong corporate strategy facilitates Innovation.

The Innovation Tier and Individual Tier are very closely related to the Intellectual Agility and Competence sub-divisions, respectively, of Human Capital by Roos et al. (1997). Examples of Intellectual Agility include innovation, imitation, adaptation, and packaging. Often, successful diversification can be traced to Intellectual Agility. Roos et al. (1997) use The Virgin Group and Philip Morris as examples. Competence is composed of Knowledge and Skills. "If Competence is the content, Intellectual Agility is the ability to use the knowledge and skills, building on it, applying it in practical contexts and increasing it through learning" (Roos et al. 1997).

Transformations

The traditional Knowledge Hierarchy supports the transformation of data to information and the transformation of information into knowledge. Extensions to these transformations are supported in the double hierarchy and the reverse hierarchy as previously noted. In addition to the previously identified transformations, the 5TKMH supports transformations directly between any of the tiers. For example, data from the Facts Tier can be transformed into a Solution by neural networks without creating Influences, and the database used in an Innovation may be transposed into Facts when used in another context by another KM asset.

The 5TKMH and Knowledge Management

We hold that the 5TKMH is more suitable for KM research than the Knowledge Hierarchy because it encompasses Personal Knowledge. As an example of the breadth of KM, Earl's (2001) taxonomy derives the three major branches of KM: the Technocratic School, which consists of Codified systems; the Commercial School, which uses Codified systems to manage intellectual assets; and the Behavioral School, which is concerned with Personal Knowledge. The Knowledge Hierarchy includes Earl's Technocratic and Commercial Schools, but does not include the Behavioral School.

The 5TKMH includes all of the KM systems classified by Earl. The Individual Tier includes the social culture component of the Organizational School. The Facts Tier contains databases and data warehouses from Earl's Engineering School. The Influences Tier of the 5TKMH contains the KM components contained in Earl's Cartographic School, Commercial School, and groupware contained in Earl's Organizational School. The Solutions Tier contains the Systems School and the best practices component of the Organizational School in Earl's Taxonomy, and the Innovation Tier contains Earl's Strategic School and Spatial School. In summary, the 5TKMH encompasses all of the Schools of KM identified by Earl (Earl 2001).

Using the Five Tier Knowledge Management Hierarchy

The 5TKMH can be used to evaluate KM efforts, inventory knowledge assets, alleviate possible confusion, support a KM life-cycle that provides guidance to the Chief Knowledge Officer (CKO), and plan and manage the evolution of knowledge assets in the firm. Some managers may prefer to view the 5TKMH in a table format, as shown in Table 1.

Knowledge Tier	KM Application	Example
Individual (PK Class)	Stored in human mind, accessed by "yellow pages"	Bain and Company (Hansen 1999), Shell (Earl 2001)
Facts (CK Class)	Databases, data warehouses	Frito-Lay (Applegate 1991), CIGNA (Turban 2001)
Influences (CK Class)	Learning systems, DSS, reports, yellow pages, knowledge pooling	Visa (Turban 2001), Skandia (Earl 94), IBM (Willigan 2000), Bain and Company (Hansen 1999), Shell (Earl 2001)
Solutions (CK Class)	Best Practices, expert systems	Shell (Earl 2001)
Innovation (PK Class)	Integrates various KM systems with corporate strategy	Frito-Lay (Applegate 1991), Scandia (Earl 94)

Table 1: Knowledge Management Tiers and Examples

The 5TKMH can be used to evaluate the current state of the KM effort in a company from both depth and breadth perspectives. A Knowledge Inventory is developed, classifying KM systems by tier and obtaining metrics. The depth of the KM effort of the company can be determined by evaluating the knowledge inventory and metrics. The breadth of KM in the company can be determined by determining the highest tier identified in the inventory, or by a weighted calculation based on the performance of the KM assets in different tiers. A company with transaction processing systems that were not utilized for decision support would be said to be at the Facts Tier. To move to the Influences Tier, the company may leverage this data by using it in decision support systems, learning systems, or reports. It may also move to the Influences Tier by adopting unrelated KM technologies such as "Yellow Pages" or Knowledge Dictionaries.

The second use for this hierarchy is to identify opportunities for the evolution of the KM effort within a company. Evolution of KM within a company can be guided by the availability of sources and software, as knowledge at one tier of the hierarchy can be used as sources for knowledge at a higher tier, as shown in the KM Path of Least Resistance shown in Figure 3. Firms with databases or data warehouses, for example, can use them as input to learning systems, DSS, and reports to create Influence. Firms with groupware for Influence dissemination can also use them for Influence creation through knowledge pooling. Firms with a "Yellow Pages" effort have identified many of the personnel necessary to create a Best Practices component or an expert system.

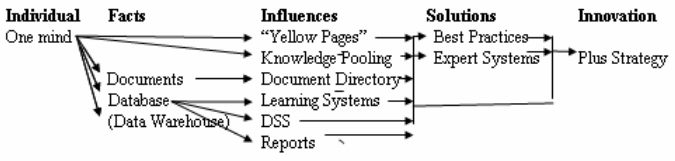

Figure 3: KM Path of Least Resistance

Let us now consider the use of the 5TKMH in business. Most importantly, can it be used to answer the eternal Chief Knowledge Officer (CKO) question – "What do I do next?" The following life cycle uses the 5TKMH as a tool in the management of the KM assets in a firm.

Step 1: Develop a knowledge inventory. Identify each KM asset, context, 5TKMH Tier, knowledge holders and/or data source, knowledge seekers supported, potential knowledge seekers, software availability, acquisition system, and delivery system. As this inventory is being developed, evaluate the usage, reliability and accuracy of the existing knowledge assets. Perform any necessary maintenance.

Each Knowledge Inventory provides a checkpoint describing the state of the KM effort in the firm. Use the 5TKMH to determine the highest tier of KM available in the firm, and the Knowledge Inventory to determine the breadth of KM assets. When complete, this inventory can be used to implement a delivery system such as the Enterprise Knowledge Dictionary (Galup et al. 2002), which allows knowledge seekers throughout the organization to see what types of KM assets are available and access the asset and the necessary software from a common interface.

Step 2: Determine the knowledge needs of the firm. Some knowledge cannot be captured, some knowledge is not worth capturing, and some problems cannot be solved with KM. Starting with the firm's core competency, determine the tasks that are most expensive or most difficult to perform. Evaluate potential KM and IT solutions to these tasks. Use the KM Path of Least Resistance to identify opportunities for leveraging existing KM assets.

Step 3: Develop an integrated KM strategy which maximizes the impact of KM assets on the firm's strategy within political, budget, and manpower constraints. In addition to developing an appropriate portfolio of KM projects and maintenance for internal use, the strategy may include marketing knowledge-based goods and services for external use. The KM strategy must then be accepted and funded by the stakeholders.

Step 4: Implement the KM strategy. Each new KM asset may involve application development, hardware acquisitions, software acquisitions, training, knowledge acquisition, metrics development, data costs, maintenance, and distribution issues.

Step 5: Evaluate the performance of KM assets toward achieving the firm's strategy. Compare the metrics of the new solution to those at the last knowledge inventory. For new systems, reevaluate costs and benefits using actual performance instead of estimates.

After evaluation is complete, return to step one. Update the knowledge inventory by adding the new KM assets, and evaluate the firm's operations for the next sequence of KM opportunities.

Finally, let us consider the predictive characteristics of the 5TKMH. The Knowledge Hierarchy, which corresponds to the Facts, Influences, and Solutions tiers, is predictive in volume and actionability (Nissen 2000). To facilitate this discussion, we have created the following graphs (Figure 4) that extend the Knowledge Hierarchy to indicate the potential volume and actionability of KM assets.

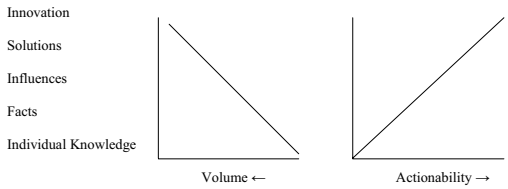

Figure 4: Volume and Actionability of the Knowledge Tiers

Empirical evidence does not exist, but we argue that the 5TKMH is an accurate predictor of volume and actionability. We would expect the largest volume of knowledge to be in the Individual Tier, as it contains all of the knowledge in all of the worker's minds. The Knowledge Hierarchy has established (Nissen 2000) that there is a greater volume of Facts than Influences, and more Influences than Solutions. Finally, we contend that there are fewer Innovations than Solutions, indicating that the 5TKMH is accurate in predicting the volume of KM assets.

Ranking of actionability is slightly more problematic. We contend that when comparing the actionability of the Individual Tier is comparable to a Codified source, the actionability of the Individual Tier is lower than that of Facts because the persistent, retrievable nature of Codified sources and their high accuracy. If, for example, a worker stated that he had mined 16 tons of coal, and the computer weighing station had only recorded 15 tons, the Facts would usually be judged as more actionable. Additionally, it could be argued that one individual can transform the company, to which we respond that the transformation would be classified as Innovation. The actionability of Facts, Influences, and Solutions becomes higher with each tier, as in the Knowledge Hierarchy (Nissen 2000). Innovation, as a component of corporate policy, would seem to be the most actionable, indicating that the 5TKMH is an accurate predictor of the actionability of KM assets.

The 5TKMH will provide a CKO with a tool that is

useful in inventorying knowledge assets, planning KM projects, leveraging existing knowledge sources, and evaluating the performance of KM assets. The tiers indicate the amount of corporate effort that has been made toward the goal of being a knowledge driven company. A company with only Individual and Facts Tiers is not as advanced in their KM as a company that utilizes DSS, "Yellow Pages", and reports with information needed for business decisions from the Influences Tier.

The Challenge of Sharing Knowledge

There is considerable discussion about the best ways to codify knowledge, so let us consider the implementation needs of the two Personal Knowledge tiers.

The Innovation Tier exploits all classes of knowledge, and includes the Strategic and Spatial Schools in Earl's Taxonomy (2001). The Spatial School is implemented by placing knowledge workers in an environment that promotes personal interaction and sharing. The Strategic School focuses on the use of KM to reengineer processes or create knowledge-based goods and services. Sharing of the strategy may be done through a variety of computerized and non-computerized means, but creation of the strategy is still a task that requires the human mind.

The Individual Tier represents the knowledge that is stored in the mind of an individual. It may be located through "yellow pages" or similar lists. The sharing of knowledge is predominantly performed on a person to person basis.

Locating any type of knowledge can be difficult. An Enterprise Knowledge Dictionary (Galup et al. 2003) acts as a Knowledge Portal. The user selects a topic and the relevant knowledge is presented in list boxes for each tier of knowledge or type of implementation. Selecting a knowledge source executes the appropriate application and data.

A n-tier architecture suitable for Active and Passive Knowledge is described in (Galup et al. 2002). It uses a Knowledge Management Directory (Figure 5), much like the Enterprise Knowledge Dictionary described above, to present the user with the available knowledge and connect the user to the source.

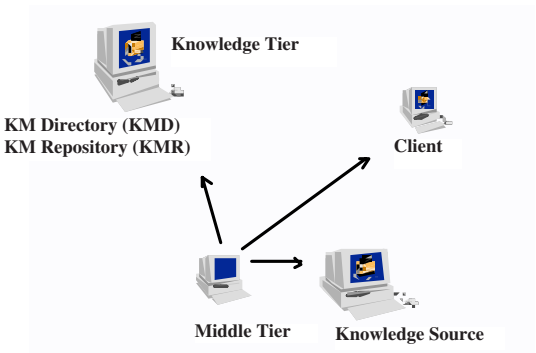

Figure 5: Management System Architecture

Conclusions and Future Research

This paper classified knowledge into the following tiers: Individual, Facts, Influences, Solutions, and Innovation. The 5TKMH includes all of the types of KM identified in the literature, provides a tool for evaluating the KM effort in a firm, identifies the relationships between knowledge sources, and provides a path of least resistance for KM efforts within the firm.

Even with the new perspective of this expanded hierarchy, a KM system is still only as good as the quality of the knowledge and the effectiveness of the knowledge integration in the organization. The quality of the knowledge is based on the overall quality of the knowledge residing in the five tiers. The Personal Knowledge Class consisting of two tiers, the Individual Tier and the Innovation Tier, creates new knowledge. Knowledge integration entails broadcasting, searching, teaching, and sharing (McElroy 2000). The Codified tiers of Facts, Influences, and Solutions are the set of software solutions responsible for codified knowledge storage and knowledge integration.

Having identified tiers of knowledge, sources of knowledge, and a progression of sources from Individual to Innovation, the question becomes "What tier of knowledge management is appropriate for this company?" Testing of several hypotheses seems in order, such as:

1. Is the tier of KM dictated by the processes in the industry?
2. Is the tier of KM dictated by the tier of competition in the industry?
3. Is the tier of KM dictated by management style?

Another research item suggested by this research is determining if the 5TKMH has predictive characteristics. A starting set of hypothesis might include the following: KM assets at the lower end of the 5TKMH have larger volume, lower specialty, lower actionability, lower risk, lower cost, lower potential payback, and wider dissemination than those at the higher end of the 5TKMH.

McElroy (2000) differentiates first-generation KM systems as focusing on knowledge integration or supply-side KM while second-generation KM systems focus on knowledge production or demand-side KM. Since the 5TKMH considers both knowledge integration and knowledge production or innovation, the 5TKMH can also aid in the study of both first-generation and second-generation KM systems.

It is hoped that this paper will assist researchers and practitioners in the study of KM through our new set of terminology and the 5TKMH.

Notice: This paper is based on a paper presented at the Proceedings of the 35th Annual Meeting of the Decision Sciences Institute, Boston, MA. November 2004.

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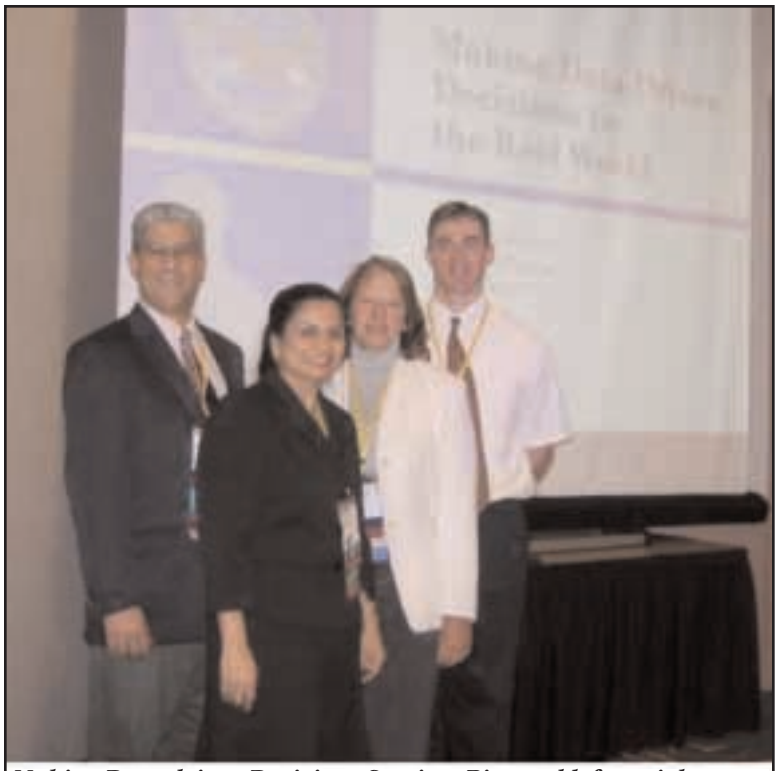
ASQ World Conference on Quality and Improvement

May 1-3, 2006
Milwaukee, Wisconsin

Statistics Division Booth: Pictured left to right are Daksha Chokshi, Scott Kowalski, Gordon Clark and Mark Kiel.

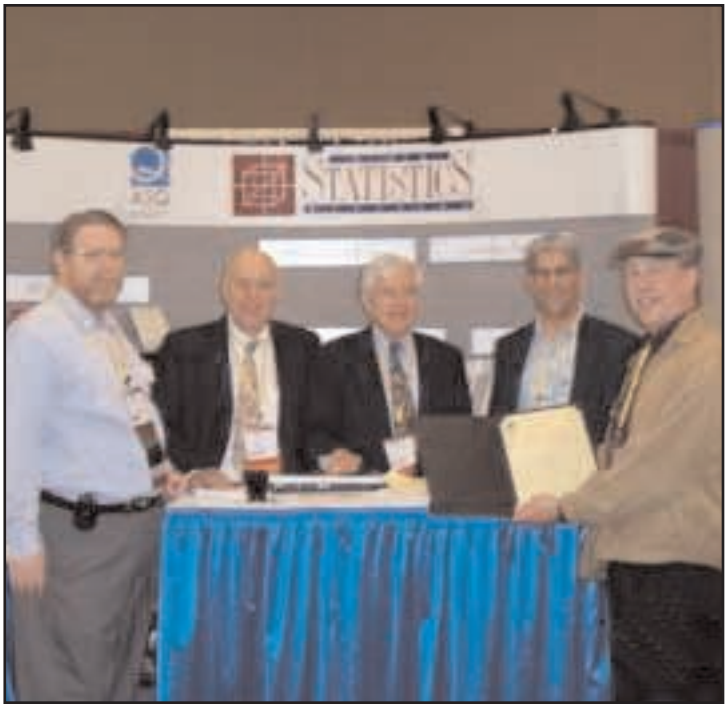


Making Data-driven Decisions Session: Pictured left to right are Jonathon Andell, Daksha Chokshi, Carrie Brookman-May and James Williams.

WCQI Statistics Division Booth

by Gordon Clark

The Statistics Division provided a booth throughout the 2006 WCQI conference. We joined with the Design & Construction, Inspection and Measurement Quality divisions to sponsor an activity for increasing attendance at our respective booths. On Monday and Tuesday, we had a drawing for a $100 Quality Press gift certificate awarded to a person who visited all four division booths. The figure shows the award given to Dan Mazur on Monday. The individuals in the figure are Graeme Payne (Chair of Inspection), Mark Kiel (Past Chair of Statistics), Gordon Clark (Chair Elect of Statistics), Jonathan Andell (Membership Chair of Statistics) and Dan Mazur (member of Statistics and Inspection). Tom Alejos (not pictured) won the gift certificate on Tuesday.



IN CASE YOU MISSED IT

- 50th Annual Fall Technical Conference (October 6-13, 2006)

  This year's conference theme is ***Statistics and Quality: Fifty years of Exploration and Discovery.*** The conference is co-sponsored by the Statistics and Chemical & Process Industry Divisions of ASQ and the Physical & Engineering Sciences and Quality & Productivity Sections of ASA. For more information, go to http://www.asq.org/cpi/conferences/index.html or contact Kevin White at kwhite@voridian.com.

- Philip Crosby, Genichi Taguchi, and Armand Feigenbaum are featured on this Web site from the Murton Group. The site includes a short biography and explanation of the theories and tools that each person developed or used, including examples.
  http://www.murtongroup.com/qgurus.htm

- 2006 Society for Risk Analysis Annual Meeting (December 3-6, Baltimore, MD). For more information, go to http://www.sra.org/events_2006_meeting.php.

- Data Driven Decision Making QMD Technical Committee

  We are pleased to announce a new partnership between the Quality Management Division and the Statistics Division, in the form of a QMD Technical Committee. The Data Driven Decision Making Committee will emphasize the opportunities to employ statistical thinking in management. The committee is seeking members from both divisions. QMD members benefit by having access to the division whose focus is to provide statistical expertise, while the Statistics Division's message of statistical thinking expands to reach the community of decision makers. Topics of interest are likely to include; 1. The statistical linkage between defects and fiscal outcomes, and 2. Aligning decisions to the nature of process variation, specifically common cause vs. special cause. The committee chair is Jonathon Andell, a QMD member as well as Membership Chair of the Statistics Division. Jonathon says, "This precedent-setting partnership enhances the ability of both divisions to serve our constituent customers in a win-win manner." Those interested in joining the committee should contact Jonathon at jandell@hotmail.com, or 602-689-6041.

Tactical Planning Meeting Minutes

ASQ Statistics Division
April 30, 2006
Milwaukee, Wisconsin

Participants: Jonathan Andell, Daksha Chokshi, Gordon Clark, Gary Gehring, Douglas Hlavacek, Mark Kiel, Scott Kowalski, Geoffrey Vining.

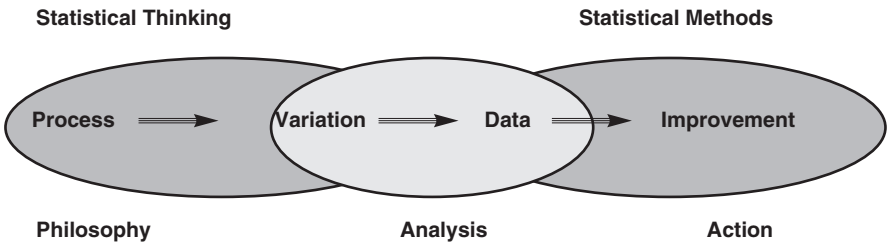
Tactical Plan: Implementing the Long-Range Plan

This tactical planning meeting followed the Long Range Planning Meeting in Jacksonville, FL on March 5-6, 2005. That meeting established four key strategies for accomplishing our Vision and Mission. Our plans for achieving these strategies appear below. Due to the importance of Statistical Thinking to our Vision and Mission, we reaffirmed our commitment to the following definition.

Statistical Thinking is a philosophy of learning and action based on the following fundamental principles:

- *All work occurs in a system of interconnected processes*
- *Variation exists in all processes*
- *Understanding and reducing variation are the keys to success*

The following figure depicts the relationship between Statistical Thinking and Statistical Methods.



Key Strategy 1: Understand, organize, and disseminate the Statistics Division's body of knowledge

- The first step to accomplish this key strategy will be to compile a listing of all information items such as publications, presentations and newsletters that present material relevant to the Statistics Division Body of Knowledge. Some of the listed items could include a complete copy in electronic form. One objective will be to establish a search engine that identifies items relevant to particular topics as requested by members. The consensus was that this first step is sufficiently important to merit expenditure of funds, if necessary, to assist in its achievement.

- Wayne Levin has been asked to initiate this first step as described above. The suggestion was made that the accomplishment of this first step will require a committee to insure a variety of viewpoints.

Key Strategy 2: Develop and deliver useful and useable communication vehicles

- Mark Kiel and Bob Mitchell are responsible for our web sites.
- Scott Kowalski described his plan for significantly expanding our library of Narrated Slide Shows. He has defined seven main topic areas, and he plans to have 4 to 6 modules in each topic area. He plans to complete about half of the modules in a year. These narrated slide shows will be available on our web site.

- We need to approach the FTC Steering Committee again to obtain permission to create narrated slide shows of live FTC presentations. Last year they denied our request. Our past chair is a member of the FTC steering committee and will do this.
- We need to increase the frequency of sending E-Zines to our members. Some examples of appropriate topics are:
  - o Announcing new narrated slide shows
  - o Describing our discussion boards and inviting members to use them.
- The discussion boards on our web site are not being used. Very few questions and/or comments have been entered on the each discussion board.
  - o One suggestion to increase their use is to seed the boards with questions. One way to do this is to ask section-level local discussion groups to submit items to division discussion boards. See the local discussion boards under the next key strategy.
  - o Mark Kiel stated that the lack of link between the ASQ web site and ours is restricting the traffic to our discussion boards. Mark is going to investigate the establishment of such a link.
  - o Distribute an E-Zine promoting the local discussion boards

Key Strategy 3: Proactively engage the voice of our customers in decision making

- One way to obtain member input is to foster local discussion groups consisting of Statistics Division members. Each executive committee member will work with his/her local section to form a local discussion group. Gordon will give each executive committee member a list of Statistics Division members in his/her section. An initial session of a local discussion group can compile a list of member comments and desires with respect to division services.
- Formulate questions and collect responses to these questions from visitors to next year's WCQI booth. Limit the number of questions to no more than five.
- Distribute a survey at each session of next year's WCQI Statistics Division sessions.
- Jonathan will construct an open-ended survey questionnaire.
- Have the speaker at the opening FTC session announce and invite each attendee to their respective council meeting.
- Have E-Zines and newsletter articles announcing planning and council meetings. These announcements will invite members to attend.

Key Strategy 4: Advance data driven decision making through Statistical Thinking

- Jonathan, Gordon and Daksha have plans to present a Statistical Thinking short course at the next Quality Management Division meeting. This course could also be presented at the next WCQI.
- Since "Statistical Thinking" is a prominent component of our Vision and Mission, we should add our definition and description of Statistical Thinking to our web site. Gordon will supply statistical thinking material to Mark for use on our web site.
- Jonathan is leading a data-driven decision making technical committee for the quality management division.
- The society has an aggressive effort to influence upper management in selected companies by making an Economic Case for Quality (ECQ). We have participated in conference calls involving the leadership in the ECQ effort. They expressed a strong interest in the Statistics Division constructing one or more case studies that use statistical methods to improve quality and make substantial contributions to an organization's bottom line. The ECQ effort has a number of case studies appearing on the society's web site; however, they provide no description or minimal description of the approach used. We discussed plans for constructing these case studies.
  - o Create case study descriptions as a joint effort between a Statistics Division member and individuals actually doing the work. Possibly the documented case study can be published in a journal.
  - o Jonathan will write an article about Statistical Thinking and the cost of quality.
  - o Cosponsor one or two tracks at the next WCQI about statistical thinking and the cost of quality.

50th Annual Fall Technical Conference, Columbus, Ohio

Thursday, October 12, 2006

7:30 Registration Desk Opens

8:00-9:00 WELCOME / PLENARY SESSION
Speaker: J. Stuart Hunter
Presiding: Connie M. Borror, Arizona State University West, FTC General Chair

Session 1	A 50th Anniversary: CPID Invited	B Advances in CUSUM	C Measurement Analysis
9:15-10:00	**Ridge Analysis** Norman Draper *University of Wisconsin* **Moderator:**	**Robust-Likelihood CUSUM Charts** Youlan Rao Steven N. MacEachern *Ohio State University* **Moderator:**	**Honest Gage R&R Studies** Donald Wheeler *SPC Press* **Moderator:**
10:00-10:30	BREAK		
Session 2	**A** **50th Anniversary: STAT Invited**	**B** **Multivariate Process Monitoring**	**C** **Quality Management**
10:30-12:00	**Response Surface in 1956 and Now: Changes, Beneficiaries, and Benefactors** Raymond H. Myers	**Dimension Reduction of Multivariate Process Data** Søren Bisgaard Xuan Huang *University of Massachusetts Amherst*	**Integrating Management Systems and Audits in the Chemical Industry** Barry Stutts *Bayer MaterialScience*
	Key Developments in the History of Mixture Experiments Greg Piepel *Pacific Northwest National Laboratory* **Moderator:**	**Multivariate SPC with Cross- and Autocorrelated Data** Murat Kulahci *Arizona State University, Tempe* Søren Bisgaard Xuan Huang *University of Massachusetts Amherst* **Moderator**:	**When Quality *Manufactures* a Premium Product** Susan Christopher *Spectro Coating Corporation* **Moderator:**
12:15-1:45	LUNCHEON Speaker: Topic: Presiding: Lori Pfahler, Merck & Co., Inc. ASQ-CPID Chair		
Session 3	**A** **Journal of Quality Technology**	**B** **Design and Analysis of Experiments**	**C** **Tutorial in Experimental Design**
2:00-3:30	**Split-Plot Fractional Designs: Is Minimum Aberration Enough?** Murat Kulahci *Arizona State University* José G. Ramírez *W. L. Gore & Associates, Inc* *Randy Tobias, SAS Institute, Inc* **Lower System Reliability Bounds from Binary Failure Data Using Bootstrapping** Lawrence M. Leemis **Moderator:**	General Balance Metric for Mixed-Level Fractional Factorial Designs Yong Guo James R. Simpson Joseph J. Pignatiello, Jr. *Florida State University* **Rethinking Steepest Ascent** Robert Mee Jihua (Regina) Xiao *University of Tennessee* **Moderator:**	**A Factorial Design Planning Process** Shari Kraber Pat Whitcomb *Stat-Ease, Inc.* **Running a Randomized and a Split-Plot Experiment for the Same Experimental Situation** James M. Lucas *J.M. Lucas and Associates* Malcolm C. Hazel *Consumers Union* **Moderator:**
4:00-5:00	Presentation of WILLIAM G. HUNTER AWARD W. J. YOUDEN MEMORIAL ADDRESS Speaker: Topic: Presiding:		

	Friday, October 13, 2006		
7:30	Registration Desk Opens		
Session	**A**	**B**	**C**
4	**Technometrics: Metrology**	**Special Topics**	**Case Studies in Control Charts**
8:00-9:30	**Combining Data in Small Multiple Method Studies** Charles Hagwood *NIST*	**Estimation of Transmitted Errors in Computer Experiments** Richard N. McGrath Arthur B. Yeh Nanhua Zhang *Bowling Green State Univ* *Yu Zheng, University of Florida*	**Evaluating Process Homogeneity** Julia O'Neill Robert DeSonier Stephen Conway *Merck & Co., Inc.*
	Bayesian Approaches to Calculating a Reference Value in Key Comparison Experiments Blaza Toman *NIST* **Moderator**:	**Screening Experiments for Noise Variables** David Drain *Univ of Missouri, Rolla* Theresa L. Utlaut *Intel Corporation* **Moderator:**	**Improving The Hospital Discharge Process: A Case Study** Mary Ann Megimose-McClay *Sagata Ltd.* Theodore Allen *Ohio State University* **Moderator:**
9:30-10:00	BREAK		
Session	**A**	**B**	**C**
5	**Super-saturated Designs: SPES Invited**	**Process Capability**	**Case-Studies in Split-Plot Design**
10:00-11:30	**Supersaturated Design: A Global Review and Some Research Potentials** Dennis Lin *Penn State University*	**Cpk; Shooting at the Wrong Target** W. T. Brydges *Hypertherm, Inc.*	**A First Principles Tutorial of Industrial Split-Plot Designs** Timothy J. Robinson *University of Wyoming* William A. Brenneman William R. Myers *Procter & Gamble Company*
	An Industrial Application of Supersaturated Designs Denise R. Vermilya Robert G. Wilkinson *Lubrizol Corporation*	**A Customer Satisfaction/Process Capability Approach to Short Run Processes** Fred Spiring *The University of Manitoba*	**Split-Plot Experimental Designs in a High Throughput Reactor** Flor Castillo Jeff Sweeney *The Dow Chemical Company*
	Discussant: Angela Dean *Ohio State University* **Moderator:**	**Moderator:**	**Moderator:**
11:45-1:15	LUNCHEON Speaker: Mary Ellen Bock, Purdue University, Department Head, Department of Statistics, ASA President-Elect Topic: Presiding: Robert Wilkinson, The Lubrizol Corporation, ASA-SPES Chair		
Session	**A**	**B**	**C**
6	**Recent Advances in DOE**	**Control Charting**	**Data Exploration**
1:30-3:00	**Designing Factorial Experiments with Binary Response** David M. Steinberg *Tel Aviv University*	**Asymptotic behavior of the variance of the EWMA statistic for autoregressive processes** M.B. (Thijs) Vermaat *University of Amsterdam*	**Interactive Data Mining and DOE: Accelerating Improvement in Six Sigma** Philip J. Ramsey *University of New Hampshire* Marie Gaudard Mia L. Stephens, *North Haven Group*
	Prediction Variance Properties and G-Criterion Location for Second-Order Cuboidal SPD Wayne Wesley James Simpson *Florida State University* Peter Parker Joseph Pignatiello, Jr *NASA Langley Research Center* **Moderator:**	**Monitoring Multivariate Process Variability for Individual Observations** Arthur B. Yeh, *Bowling Green State Univ* Longcheen Huwang Chien-Wei Wu *National Tsing Hua University* **Moderator:**	**Effective use of meta-modeling for industrial process development** Theresa L. Utlaut *Intel Corporation* David Drain, *Univ of Missouri, Rolla* **Moderator:**

FTC SHORT COURSE OFFERINGS

Hands-On Bayesian Data Analysis Using WinBUGS by William F. Guthrie ($250) - Wednesday, October 11th

This workshop is designed to provide statisticians, scientists, or engineers with the tools necessary to begin to easily use Bayesian inference in applied problems. Participants in the course will learn the basics of Bayesian modeling and inference using Markov chain Monte Carlo simulation with the open-source software package Win BUGS. The workshop will introduce some of the theory underlying Bayesian analysis, but will primarily focus on Bayesian analysis of "real-world" scientific applications using examples from collaborative research with NIST scientists and engineers. Topics discussed will include Bayesian modeling, Markov chain Monte Carlo algorithms, convergence tests, model validation and inference. No knowledge of Bayesian methods is assumed, but experience analyzing different types of data will be helpful. The workshop will be very hands-on. Laptop computers will be available for each participant (or bring your own), and will be installed with data and software to be used throughout the day. Each participant will also receive a CD with all examples and exercises.

Statistical Consulting and Change Management Workshop by Sue Ellen Bisgaard and Soren Bisgaard ($250) - Wednesday, October 11th.

How do I identify the real problem? Why would a client lie to me? What if I don't know the answer? Why did they hire me if they don't want to do what I tell them to do? Just because it does not appear rational to you does not mean that the client is irrational. What does a consulting contract look like? How do I handle confidential information? How do I charge for my services? Effective consulting involves more than having technical expert knowledge. Every system has a unique culture that may appear to be trying to block you. The goal of this workshop is to help you identify underlying manifestations of resistance and understand some approaches that may help you overcome, intervene and be more effective as a statistical consultant. We will also provide you with a number of practical tips based on our experience gained from consulting in many different industries and cultures.

Logistic and Poisson Regression with Applications by Douglas C. Montgomery ($250) - Saturday, October 14th.

Many modeling building and data analysis problems involve responses that are either binary or counts. Examples include customer satisfaction studies, failure analysis, risk modeling and financial decision making, and dose-response studies in the pharmaceutical industry. The analysis of this type of data often involves logistic regression for the binary case and Poisson regression for counts. This course is an introduction to these techniques. Participants should have a basic working knowledge of linear regression. Minitab and JMP will be featured prominently, and course participants will develop a good understanding of how these techniques are implemented in these two software packages. Applications are drawn from a variety of industrial and business settings. Course topics will include a review of linear regression fundamentals, some key topics from nonlinear models, binary responses - the logistic regression model, fitting logistic regression models, Wald inference and likelihood inference, model diagnostics, nominal and ordinal logistic regression, Poisson regression model fitting, checking, and inference; and, overdispersion.

Concrete R for Statistics and Quality Improvement by Antonio Possolo ($250) - Saturday, October 14th.

This course provides an introduction to statistical computation using R for quality professionals and statisticians. R is free software, both in the sense that no fees or registration are required to download it from http://www.r-project.org or to use it. This course will be particularly useful to those who contemplate migrating from a point-and-click interface to an accessible, flexible programming environment for statistical computation and graphics. A series of complete, self-contained examples of R at work to solve concrete statistical problems, involving applications of statistical methods in a wide range of areas in science and technology will be presented. Participants should be familiar with standard statistical methods and models, such as graphical and exploratory data analysis, analysis of variance, linear and non-linear regression, time series analysis, and experimental design. Participants will have ample opportunity to use R themselves throughout the course. Laptop computers, and all necessary supporting materials (software, documentation, and data) will be made available for individual use. An Introduction to R, by W.N. Venables, D.M. Smith, and the R Development Core Team (freely available at http://cran.r-project.org/doc/manuals/R-intro.pdf) provides a leisurely, useful overview of R.

TREASURER'S REPORT

Statistics Division

3/31/06

Revenue (as of March 31, 2006)	2005-2006 Budget	YTD Actual
Dues	$60,000.00	$41,580.00
Retail Sales	400.00	48.00
Interest/Royalties	600.00	1,579.07
Teleclass Revenue	$0.00	$0.00
AQC Tutorials	$0.00	$0.00
FTC Short Courses	$0.00	$0.00
Total	**$61,000.00**	**$43,207.07**

Expenses (as of March 31, 2006)

New Member Mailings	$1,500.00	$0.00
Teleconferences	500.00	152.76
General Fund	**$2,000.00**	**$152.76**

DAC Meetings (Nov., May)	1,500.00	2,436.92
Travel, Hotel	*1,500.00*	*2,436.92*
Strategic Planning (Mar., AQC)	6,500.00	4,031.70
AQC Meeting	*4,000.00*	*4,031.70*
AQC Travel	*2,500.00*	*0.00*
Operational Planning (Aug.)	7,000.00	4,914.43
Travel, Hotel, Meals	*7,000.00*	*4,914.43*
Tactical Planning (FTC)	3,000.00	598.98
FTC Meeting	*500.00*	*0.00*
FTC Travel	*2,500.00*	*598.98*
Long Range Planning (3 yrs)	0.00	0.00
Planning Committee	**$18,000.00**	**$11,982.03**
Auditing Committee	**0.00**	
Bylaws Committee	**0.00**	
Certification Committee	**0.00**	
Examining Committee	**0.00**	
AQC Exhibitor Fees	2,000.00	
AQC Promotional Items	1,000.00	44.00
Membership Committee	**3,000.00**	**44.00**
Regular Newsletter (3)	2,500.00	225.00
Printing (Layout, pdf files)	*2,000.00*	*225.00*
Postage/Miscellaneous	*500.00*	*0.00*
Special Publication (even years)		
Spring 2004 - Six Sigma	12,000.00	0.00
Sp Pub Printing	*8,000.00*	*0.00*
Sp Pub Postage	*2,500.00*	*0.00*
Sp Pub Reprints	*1,000.00*	
Sp Pub Honorarium	*500.00*	
Newsletter Committee	**14,500.00**	**0.00**

Expenses (continued)	2005-2006 Budget	YTD Actual
Nominating Comm	**0.00**	
Programs Comm	**0.00**	**0.00**
Publications Comm	**1,000.00**	
Standards Comm	**6,000.00**	**0.00**
Promotions Comm	**0.00**	
Committees Sub-Total	**$42,500.00**	**$12,251.03**
Web Design & Maintenance	3,000.00	989.40
Teleclasses	1,000.00	0.00
Virtual Academy	0.00	
Outreach Projects	7,100.00	2,500.00
FTC Sponsorships	3,500.00	
ISBIS Conference Short Courses	2,500.00	2,500.00
Other	*$1,100.00*	
Tactical Plans Sub-Total	**$11,100.00**	**$3,489.40**
Hunter Award (plaque)	300.00	86.50
Hunter Awardee Honorarium (travel)	1,000.00	569.67
Youden Speaker gift (FTC)	1,000.00	
FTC Student Grants	1,500.00	175.00
ASQ Testimonials ($50 each)	100.00	
Service Awards (AQC, FTC Reps)	300.00	
Outgoing Chair's Gift	500.00	
Awards Sub-Total	**$4,700.00**	**$831.17**
Misc/postage	100.00	
Misc/travel	500.00	
Misc/other	100.00	0.00
Misc- Sub-Total	**$700.00**	**$0.00**
Total Expenses	**$61,000.00**	**$16,724.36**

Ott Scholarship	**Proposed**	**YTD Actual**
Assets		
Scholarship Fund	$200,000.00	$243,754.69
Expenses		
Scholarship (2)	$10,000.00	$10,000.00

Ending Balances (as of March 31, 2006)

Checking	$33,759.70	
Money Market	97,307.36	
Accounts Receivable	4,549.20	
ASQ	*4,549.20*	
Dividends		
Current Assets	**140,616.26**	
Capital Assets	**6,413.00**	
depreciated to	**0.00**	
Long Term Assets	**311,373.12**	
from reserve fund	*67,618.43*	
Ott fund	*$243,754.69*	
Total Assets		**$451,989.38**

STATISTICS DIVISION COMMITTEE ROSTER

Voting Members of STAT Council

2005-2006

Committee	Name	Division Position	ASQ Member #	E-mail address	Telephone
OFFICERS					
	Geoff Vining	Division Chair	85577	vining@vt.edu	540-231-5657
	Gordon Clark	Chair-Elect	1037887	clark.17@osu.edu	614-847-1394
	Daksha Chokshi	Treasurer	994536	daksha.chokshi@pw.utc.com	561-796-8373
	Doug Hlavacek	Secretary	127270	douglas.hlavacek@ecolab.com	651-306-5833
STANDING					
Examining					
Chair	Howard Swartz	Examining Chair	26025	swartzhc@aaicorp.com	410-628-3278
Auditing					
Chair	Geoff Vining	Division Chair	85577	vining@vt.edu	540-231-5657
By-Laws					
Chair	Mark Kiel	Past Chair	617887	mhkiel@uss.com	219-888-3788
Nominating					
Chair	Mark Kiel	Past Chair	617887	mhkiel@uss.com	219-888-3788
Program					
Co-Chair	Doug Hlavacek	Secretary	127270	douglas.hlavacek@ecolab.com	651-306-5833
Co-Chair	Scott Kowalski	Vice Chair - Products & Services	1087689	skowalski@minitab.com	407-328-9609
Publications					
Co-Chair	Doug Hlavacek	Secretary	127270	douglas.hlavacek@ecolab.com	651-306-5833
Co-Chair	Scott Kowalski	Vice Chair - Products & Services	1087689	skowalski@minitab.com	407-328-9609
Voting Member	Brian Sersion	Newsletter Editor	63027969	sersiob@ucmail.uc.edu	513-556-4350
Voting Member	Bill Rodebaugh	Special Publications Editor	1258249	bill.rodebaugh@grace.com	215-743-0406
Non-Voting Member	Rudy Kittlitz	Glossary & Tables Editor	18478	e300@overland.net	915-837-9937
Strategic Planning					
Chair	Geoff Vining	Division Chair	85577	vining@vt.edu	540-231-5657
CONSTITUTED					
Tactical Planning					
Chair	Gordon Clark	Chair-Elect	1037887	clark.17@osu.edu	614-847-1394
Promotions					
Co-Chair	Daksha Chokshi	Treasurer	994536	daksha.chokshi@pw.utc.com	561-796-8373
Co-Chair	Mark Kiel	Vice Chair - Outreach	617887	mhkiel@uss.com	219-888-3788
Non Member	Small Web Solutions	Web Master	Contact	jwebster@smallwebsolutions.com	219-988-3139
Membership Needs					
Co-Chair	Daksha Chokshi	Treasurer	994536	daksha.chokshi@pw.utc.com	561-796-8373
Co-Chair	Mark Kiel	Vice Chair - Outreach	617887	mhkiel@uss.com	219-888-3788
Voting Member	Jonathon Andell	Membership Chair	571003	jandell@hotmail.com	480-893-9004
Voting Member	Ed Schilling	Standards Chair	29108	egscta@rit.edu	585-475-6129
Voting Member	Harry Koval	Certification Chair	18974	hkoval@comcast.net	651-776-9503
Awards					
Chair	Lynne Hare	Awards Chair	15152	lynne.hare@kraft.com	973-503-4154
Non-Voting Member	Lynne Hare	Ott Scholarship	15152	lynne.hare@kraft.com	973-503-4154
Non-Voting Member	Todd Nelson	FTC Student Grants	540557	trnelson3@mmm.com	651-737-4420
Non-Voting Member	OPEN	Hunter Award Chair			
ACTIVITY CHAIRS					
FTC Representative	John Cornell			jcornell@ufl.edu	352-332-2828
WCI Session Manager	OPEN				

The *ASQ Statistics Division Newsletter* is published quarterly by the Statistics Division of the American Society for Quality.

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UPCOMING NEWSLETTER DEADLINES FOR SUBMISSIONS

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