



Desired Characteristics of a Senior Cost Estimator

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**Joint ISPA-SCEA International Conference
June 12–15 2007 ... New Orleans**

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Abstract

Introduction. This paper provides a comprehensive overview of the skills, strategy, and work style of a Senior Cost Estimator. Our purpose is to encourage younger Estimators to proactively improve their knowledge, methods, and inter-personal skills, thereby increasing their value to the organization. Management relies on the contributions of Estimators in making sound business decisions.

Train the next generation, so they will surpass our achievements.

Professional work style. The senior estimator lives a work style which exemplifies teamwork, effective communication, creative problem-solving, and integrity. They find a way to overcome obstacles which would defeat less experienced estimators. They inspire others and build a team, while developing high-integrity estimates.

Customer orientation. The purpose of cost estimates and analyses is to support our customers toward sound business decisions. These decisions include go/no-go, bid/no-bid, proposal pricing, competitive strategies, design-cost trades, Congressional funding levels, and a host of other cost and pricing issues.

Superior information, well presented, increases the likelihood of program success. Consequently, the cost estimator’s worth to the organization rises as he/she prepares and presents information which is easily understood, well substantiated, and supportive to the business decision. The seasoned estimator holds a coveted position as business strategist and trusted advisor to the business head and Government customer.

Techniques and tools. These skills include the important knowledge and tools that a senior cost estimator would be expected to master. These areas include functional work experience, estimating tools, methodology, data collection, related training, and certifications. Successful integration of these skills enables the estimator to be recognized as a Subject Matter Expert, and then assist professional colleagues.

Survey of senior cost estimating experts. To lend credibility to this paper, the authors surveyed twenty senior cost estimators with estimating experience in both aerospace and non-aerospace industries. The authors relied on their relevant cost experience to evaluate qualities which should be evidenced by a successful senior cost estimator. The survey results are depicted in this paper, with Pareto graphs providing the rankings for fifty-three Senior Cost Estimator traits.



Aspirations and Career Goals

Our aspirations and goals vary by individual, yet share the following common threads:

- **Successful completion of a challenging opportunity** -- to conquer a mountain peak once in a while.
- **Contribution to company, community, and national goals** – to meaningfully contribute to a cause bigger than ourselves, with lasting value.
- **Personal growth** – to “sharpen our saw blade,” in the words of Stephen R. Covey, (Seven Habits of Highly Effective People); to improve our competence, relationships, and integrity.
- **Recognition for work well done** – to become the ‘Lance Armstrong’ of Estimating.

One of the purposes of this paper is to provide a checklist to help younger estimators prioritize the skills, personal attributes, and knowledge needed to reach their aspirations and career goals. We believe the survey of senior cost estimators will help re-focus personal growth goals toward personal development and accomplishment.

Unique Career – Cost Estimating

Cost Estimating, whether in Aerospace or another technical industry, is a blend of many tools, skills, and abilities. The Universities do not offer a degree in “Cost Estimating.,” therefore the cost estimators must build their tools and knowledge from diverse studies, such as ...

- Management accounting
- Engineering
- Statistics
- Economics
- Operations research

Cost estimation mixes techniques, tools, management science, operations modeling, and micro-economic dynamics of both the commercial and Government markets. The cost technology encompasses ground, air, space, and water systems. Labor functions include design, manufacturing, and logistics into a composite Life Cycle Cost profile.

Newcomers to Aerospace Cost Estimating are in absolute culture shock. Government-derived acronyms, procurement vernacular, complexity of tools, and overwhelming mounds of historical data put the novice into a wide-eyed, near-catatonic, mental panic. ISPA and SCEA have greatly assisted cost estimators through national conferences, the SCEA Dictionary, and certification exams. The objective of this paper is to help the younger estimator focus on the most important traits and tools on their career growth path.



53 Desired Traits – Industry Survey

The authors recently surveyed senior Boeing’s Integrated Defense Systems cost estimators in leadership positions with (aerospace and non-aerospace backgrounds) to discover what one company’s Estimating/Pricing leaders believe to be the most desired traits of a senior estimator. The survey encompassed 20 twenty Boeing Chief Estimators senior cost estimating leaders, from 12 multiple sites, managing several hundred Estimating & Pricing employees. These top 53 fifty-three traits were derived from the following sources:

- Leadership and character references listed at the back of this paper
- ISPA and SCEA conference papers

The authors sorted the 53 traits into 11 categories, and these categories into 3 broad areas (Professional Work Style, Customer Orientation, and Techniques/Tools), as depicted in the text box at the right.

This box reflects the authors’ view (based on their own experience) of the relative importance of these 11 categories and 3 broad areas. We believe work style is more important than customer orientation, which is more important than techniques/tools. Furthermore, we view integrity as the “king of traits,” followed by other personal traits, leadership, and communication. Within “customer orientation,” we prioritize customer satisfaction, supporting business decisions, and finally risk analysis. Similarly, we have ranked categories 8-11.

This broad ranking reflects our belief that “who we are” (our integrity and work style) supports everything we do, and that the customer is more important than our techniques and tools.

We emphasize that all 53 traits are important – very important – and were sifted and prioritized over several years by “blue ribbon” HR, Finance, and Contracts/Pricing manager teams from a much longer lists. Boeing’s A portion of the survey respondents Chief Estimators were concerned that some of the traits might be mis-construed as only “so-so” important, thus we re-emphasize that all traits are highly important.

The body of this paper is sequenced to reflect the 3 broad areas and 11 categories in the text box, above. One survey graphic is shown for each of the 11 categories, and indicates the relative importance of the traits within that category.

Please note that we have not displayed an X-axis scale for the survey graphs. The left-most (lowest) score approximates 80% in importance. Since all traits are important, the pareto indicates relative importance, to help younger estimators focus on key growth areas. Benjamin Franklin (in his Almanac) was famous for setting personal growth goals at the rate of one per day, because (so he said) he could not focus on more than one growth priority at a time.

Finally, the authors wish to humbly note that no one achieves perfection in any area. These desired characteristics are the goals, or stars, to which we strive.

<u>Survey Trait Categories</u>	
<u>Professional Work Style</u>	
1	Integrity
2	Personal Traits
3	Leadership and Working Together
4	Communication
<u>Customer Orientation</u>	
5	Customer Satisfaction
6	Business decisions
7	Risk analysis
<u>Techniques & Tools</u>	
8	Functional Estimating experience
9	Data and tools
10	Estimating
11	Mentor-leader





Presented at the 2007 ISPA/SCEA Joint Annual International Conference and Workshop - www.iceaaonline.com

“High aims form high characters, and great objects bring out great minds” (Tryon Edwards, *Quotationsbooks.com*).



Professional Work Style

Integrity

High ethical standards. Personal integrity is the single most important trait. Why? Because it undergirds the quality of all we do and say. Integrity is “who we are,” our “**BE-ing**.” Thus integrity determines the quality of our “**DO-ing**,” relationships, words, and work products.

Integrity encompasses the essence of who we are ... our priorities, values, morals, and standards. John Maxwell, a well-known, national speaker and writer in this field recently wrote a book, with the tongue-in-cheek title, There’s No such Thing as Business Ethics. His primary point is that we cannot have two sets of ethics ... one for business and another for personal life. We are the same person under all situations. Accordingly, we must have the same high standards for business dealings as we do for family, church, and neighbors.

Integrity is first among values. “A person of integrity is a person undivided. The word conveys not so much single-mindedness as completeness ... the serenity of a person who is confident in the knowledge that he or she is living rightly. A person of integrity is one we feel we can trust to do right, to play by the rules, to keep commitments. The rest of what we think matters very little if we lack essential integrity, the courage of our convictions, the willingness to act and speak in behalf of what we know to be right” (Maxwell, Business Ethics, page 7).

John Maxwell proposes a global guideline for ethics to facilitate right choices in ‘grey areas’ with uncertain rules (Business Ethics, page 8).

“It is clear that ... this rule cuts across all cultures and religious boundaries, and is embraced by people from nearly every part of the world. It’s the closest thing to a universal guideline for ethics a person can find. The Josephson Institute of Ethics, a non-partisan, non-profit organization, that exists to improve the ethical quality of society, states it well when they say, ‘Ethics is about how we meet the challenge of doing the right thing when it will cost more than we want to pay. There are two aspects to ethics: The first involves the ability to discern right from wrong, good from evil, and propriety from impropriety. The second involves the commitment to do what is right, good, and proper. Ethics entails actions; it is not just a topic to mull or debate.’ “

If we followed this guideline, most ethical dilemmas would be quickly solved. False promises, half truths, slander, data theft, economic espionage, kick-backs, and a host of other wrong behavior would be dramatically reduced.

In the words of Dr. Martin Luther King, “The time is always right to do what is right.”

Judaism. What is hateful to you, do not do to your fellow man.

Islam. No one of you is a believer until he loves for his neighbor what he loves himself.

Buddhism. Hurt not others with that which pains yourself.

Hinduism. This is the sum of duty: Do naught unto others what you would not have them do unto you.

Confucianism. What you do not want done to yourself, do not do unto others.

Baha’i. And if thine eyes be turned toward justice, choose thou for thy neighbor that which thou chooseth for thyself.

Jainism. A man should wander about, treating all creatures as he himself would be treated.

Zoroastrianism. Whatever is disagreeable to yourself, do not do unto others.

Yoruba proverb (Nigeria). One going to take a pointed stick to pinch a baby bird should first try it on himself to feel how it hurts.

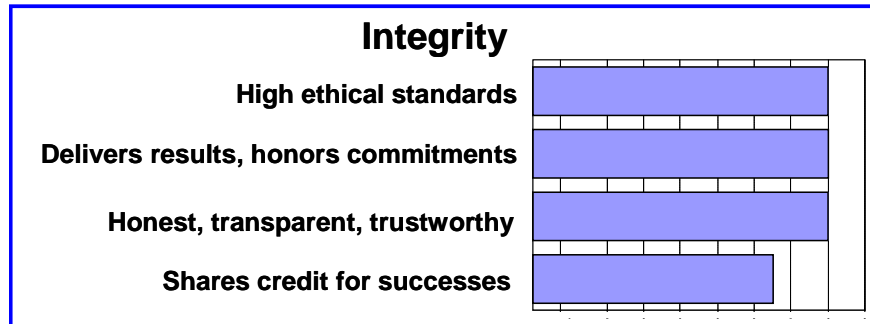
Christianity. Do unto others what you would have them do unto you.



Integrity is the umbrella over a host of other character traits, including the next two traits (“Delivers results” and “honesty”). Accordingly, these next traits were given the same top-ranking as ethics in the Boeing Chiefsenior cost Estimator estimator survey, and are viewed by many writers and authorities as sub-sections of ethics.

Delivers results and honors commitment. “His word is as good as gold,” “he walks his talk,” “gentleman’s handshake.” “she fulfilled her promises” ... idiomatic metaphors which have been woven into our culture’s vocabulary.

Delivering results, as promised, is a double-edged sword. It protects us from over-promising (due to over-optimism or excessive desire to please others). It also ensures we will invest the energy and time to produce on-time quality, even at personal loss or expense.



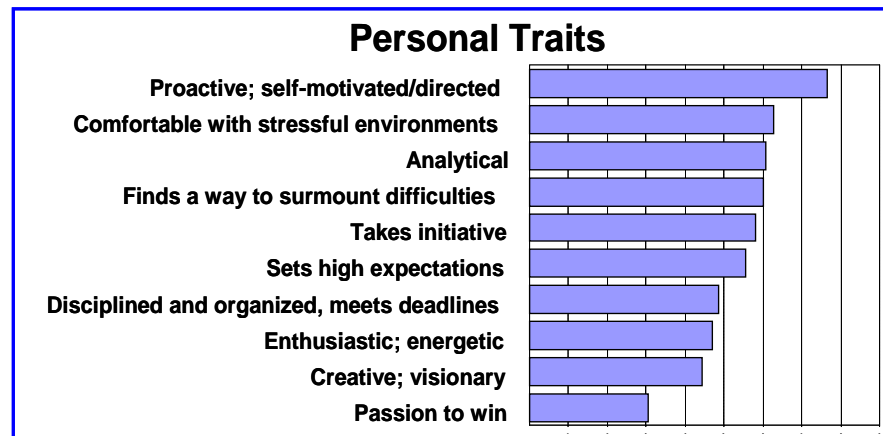
Economies which follow this guideline operate more efficiently, with higher productivity and lower cost. The “Just In Time” aspect of lean manufacturing, relies on sub-contractors delivering the right amount on time, and reduces ‘Muda’ (Japanese for ‘wasted time’).

Honest, transparent, trustworthy. Honesty is similar to transparency ... “what you see is solid reality, through and through.” Transparency is openness, lack of guile (deceit), and sincerity. “Trustworthy” is dependable to perform as promised. These characteristics are exceedingly important to all customers, including Government evaluators, because this proven trust enhances the legitimacy of cost estimates. Furthermore, business decisions, based on assurances and promises, can be made with higher confidence and fewer management reserves.

Personal Traits

The senior estimator is expected to manifest world-class character, attributes, and work habits. There are 10 traits in this section. However, four characteristics dominate the list: Initiative, Stress-Handling, Reflective Analysis, and Reaching High.

Pro-active, self motivated / directed. The senior estimator must be a self starter who does not require direct supervision to accomplish tasks. This initiative stems from self discipline, global vision, and having the confidence to step out in front and lead the way.



Comfortable with stressful environment. Stress can be



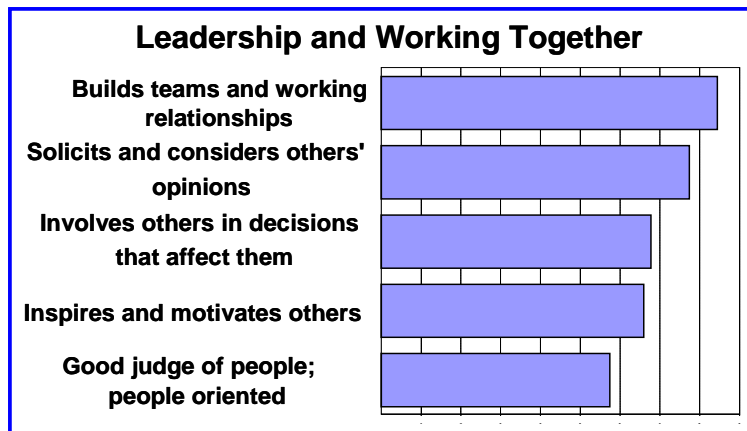
good for us, as when it spurs us to excellence. Unfortunately, stress can be destructive, as when it pushes us to overwork, breaks our self control, or drives us to unethical actions. Accordingly, the senior estimator should have learned how to manage (overrule) external and internal stress. Stress management can be taught by professionals or at an initial level in self-help books. Here is a sampling of the better-known techniques: (a) Thought Stopping, (b) Realistic Self Talk, (c) Physical Exercise, (d) Desensitization, and (e) Time Management.

Analytical. The senior estimator needs to learn how to support assertions with data & calculations, rather than judgment. Further, he/she should reflect and cross-examine all aspects of a business problem, and integrate the insights of other team members.

Finds way to surmount difficulties. While the senior estimator should not over-promise, he/she is responsible for discovering solutions to difficult challenges. “Find a way” is one aspect of being a trusted advisor with unique expertise. The senior estimator generally finds solutions to problems which at first seem insurmountable. This ‘can-do’ spirit refuses to admit defeat.

Leadership and Working Together

An effective senior estimator demonstrates leadership that inspires their teammates to successfully complete tasks in a timely manner. They are undaunted by the difficulties of the task. They adhere to the Henry Ford quotation, “Obstacles are those frightful things you see when you take your eyes off the goal.”



Specific desired leadership actions include the following characteristics:

Builds teams and working relationships. Leadership skills are evidenced by encouraging team based solutions, supporting team decisions, being flexible to alternative approaches and providing challenging assignments. Guiding and mentoring skills help ensure the team’s success.

Solicits and considers others’ opinions. The senior estimator shows that they care by being a good listener. They ask open ended and probing questions and invite open, honest and on-going two way communication.

“Many counselors bring success.”

Involves others in decisions that affect them. Communication consists of both positive and negative feedback. However it is important for the senior estimator to communicate negative feedback in a coaching manner in order to allow the situation to become a learning and growth experience. Finally, feedback is provided real-time to ensure both positive reinforcement and corrective action, as the case may determine.

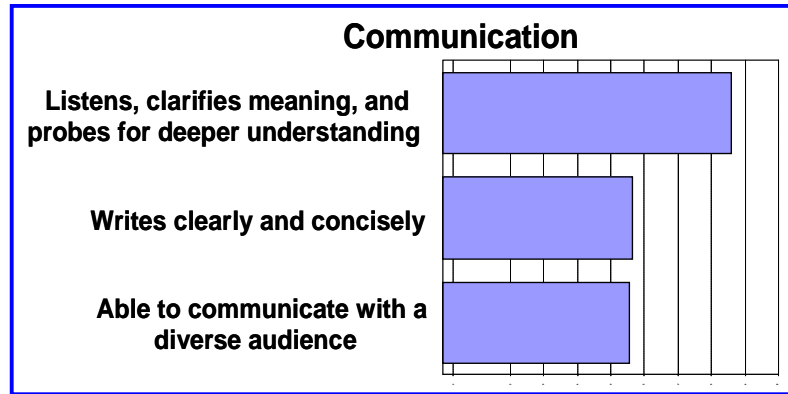
Inspires and motivates others. Coaching-guidance recognizes newer estimators’ accomplishments and gives them feedback in areas that may require improvement. Specific



examples should be given in both areas in order to preclude any possibility for miscommunication.

Communication

The following quotation is attributed to the 1960s rock star, Jimi Hendrix. “Knowledge speaks, but wisdom listens.” The successful senior estimator is well versed in the skill of effective communication. Presenting a point or position is meaningless, unless the recipient or audience is receiving and comprehending the message. This requires the senior estimator to listen, solicit feedback, and receive confirmation that the intended message is being both conveyed and understood.



Important traits for the senior estimator to keep in mind include the following:

“Knowledge speaks, but wisdom listens.”
Jimi Hendrix

Effective listening and ability to probe for deeper understanding. The senior estimator demonstrates the ability to comprehend complex data, and at the same time, the willingness and desire to seek answers for areas in which clarification is needed.

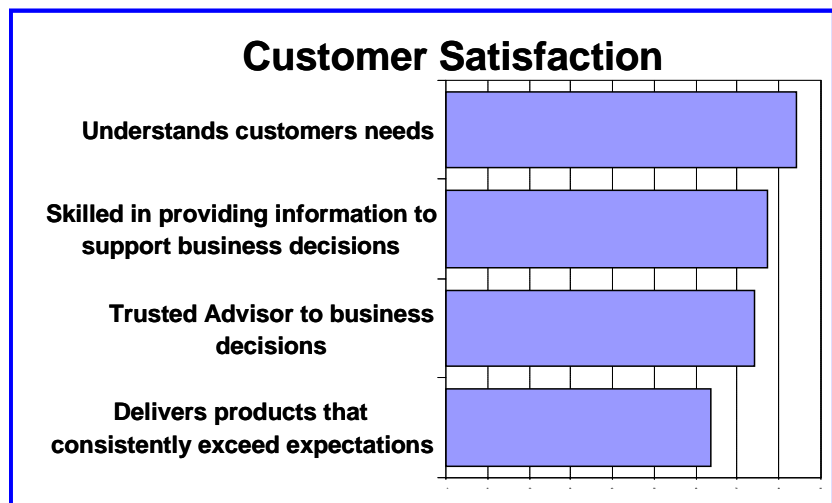
Ability to communicate with a diverse audience. This ability for effective communication is necessary for all of the contacts of the senior estimator, including customers, peers, subordinates and management.

Ability to write clearly and concisely. This important trait is sometimes overlooked, but is nevertheless a required skill for the senior estimator. The results of their cost analysis can only be appreciated if the intended audience for the message can grasp and appreciate the meaning of the results. As a result, important topics are clearly emphasized and extraneous topics are not included. The data is presented in an orderly logical manner that enhances the message and allows it to be easily understood.

Customer Orientation

Customer satisfaction

Next to personal integrity, customer orientation is one of the most important traits of a senior estimator. The “Customer Is King,” whether they be an internal manager, the U.S. Government, or a





Commercial enterprise.

Desire to please the customer may open the estimator to biased analysis. On the one hand, senior estimators seek to satisfy their customers requests. On the other hand, the estimator must honestly predict costs on the basis of historical facts. He/she cannot please everyone, and must be careful to not compromise the estimate for the sake of optimistic (unrealistic) pressure.

Understanding. The survey results place “understands customers needs” as the most important skill. Understanding involves three deliberate steps:

- (a) deriving insight from years of previous experience
- (b) focusing intently on the customer’s words and non-verbal communication
- (c) probing with questions for deeper understanding.

Understanding results from back-and-forth discussion with the customer, similar to the farmer who prepares the soil by criss-cross plowing the field, corner to corner. This “active listening” requires the heart and mind to be absolutely open, without personal pride, bias, or pre-conceived quick-fix solutions.



Providing information. The customer knows approximately what he/she wants, yet needs more information to help make the business decision. Accordingly, the senior estimator is a key source of valuable business insight. The customer wants a thoughtful consideration of likely hurdles, outcomes, and risks in order to help pursue the wisest course of action. “Yes Sir! Three bags full!,” is a delicate balance between thorough understanding, willingness to let the customer lead, and wisely suggesting changes to the customer’s plan to ensure success.

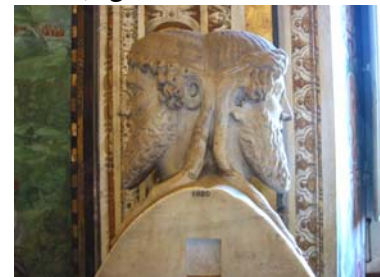
Trusted advisor. The senior estimator has gradually earned the right to serve as a trusted advisor in the “king’s court.” He/she slowly moved up into this role based on personal reputation, character, and the wealth of information gathered through years of diligent practice. The college graduate, accustomed to MBA courses which placed them in the role of a top decision maker, will generally feel under-utilized in the first 5-10 years in their career. This feeling is fairly common, until one develops tools, knowledge, and skills which exceed the customer’s expertise.

Exceeds expectations. Everyone loves to be surprised by an excessive gift at their birthday party. In the same way, customer’s love positive surprises which exceed their expectations. Accordingly, the senior estimator is continuously hunting data, perspectives, and presentation methods which will earn the customer’s “Well done” compliment. Earning these high marks requires imagination, energy, and the collective inputs of other estimators. Peer reviews by colleagues will greatly increase the probability of our surpassing our customer’s threshold ... and enabling them to make wise business decisions.

Business Decisions

Ultimately, all information from Finance, Pricing, and Estimating serves to support business decisions. Our data (products) assist thousands of decisions, from small (e.g., “the vendor needs to reimburse us for freight overcharges”) to large (e.g., “we should cancel this program, due to high cost risk”).

Our estimating data is like the mythical two-faced Janus, who





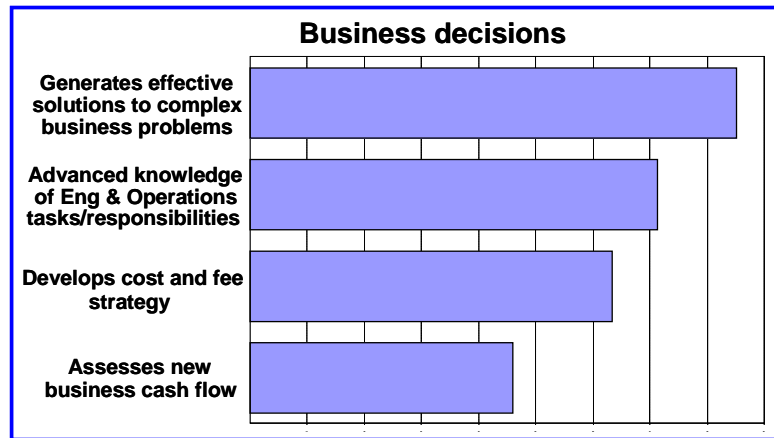
looks backward and forward at the same time. Janus is often used to symbolize transitions, such as the progression of past to future, of one condition to another, of one vision to another, of beginnings, and youth to adulthood.

Similarly, the Estimator plays a particularly important and difficult role in the decision process, because he/she is both predicting the future and reporting the past.

It's tough to make predictions, especially about the future."
Yogi Berra.

Understanding what happened in the past requires much analysis. Predicting the future requires many tools and skills, reviewed elsewhere in this paper. The ability to predict the future and support business decisions with reasonable probability is one of the senior estimator's fortes.

Generate effective solutions. This is perhaps the most challenging assignment for the senior estimator – to understand the business, develop strategy options, and present well-researched data to enable an informed decision. Through many years, analyses, and program decisions, the senior estimator understands the fine points of business decisions. Through repeated practice, he/she knows what data gathering, analysis, and presentation format will best satisfy the customer's needs.



The senior estimator will directly support customer decisions needing cost and price information, such as program go/shutdown, proposal bid/no-bid, acceptable bid cost risk, design-cost trades, and fee strategies.

Advanced knowledge of Engineering and Operations tasks. This knowledge of design and production functions is essential to generating effective solutions to business problems. Every industry has a unique technology, cost structure, and market dynamic. Estimators are urged to take initiative and spend much time with design and fab personnel, preferably in their shops, to understand the problems, processes, and products of engineers and producers.

Get out of your comfortable office/cube, visit the line organization, look over their shoulders, ask questions, and insert yourself into their world. You won't receive Continuing Education Unit (CEU) credits, recognition rewards, or a master's diploma ... but you will, bit by bit, begin to think like designers and fabricators, talk their language, walk in their shoes, understand their predicaments, and add your expertise to help them make smart business choices.



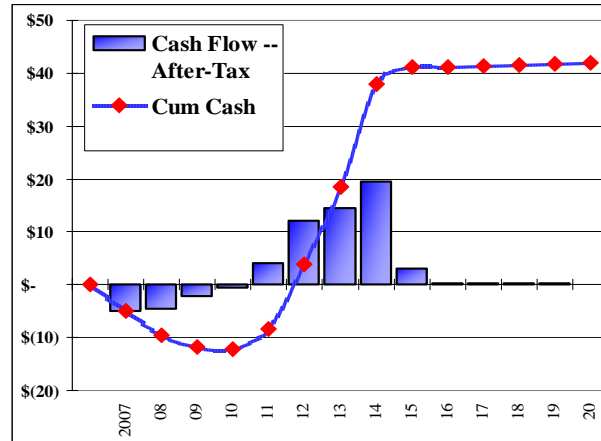
Develop cost and fee strategy. The customer/manager is continually seeking



information which will strengthen the enterprise (e.g., increase product performance and safety, reduce cost, increase profits, stabilize the workforce, deliver on schedule).

The experienced estimator gradually develops the mind-set of the program owner/operator. He/she re-enters the 'graduate school' environment, thinks globally, and integrates the pieces of the big picture to develop a comprehensive decision.

Assess new business cash flow. Pro forma life cycle cash flow is one of the most comprehensive time-phased profiles of an enterprise (others include income statement, balance sheet, and econometric models). Market price, quantity, fixed and variable cost, design, manufacturing, staffing, capital investment, schedule, profit, and risk probability are pulled into a composite financial analysis (see cash flow example at right).



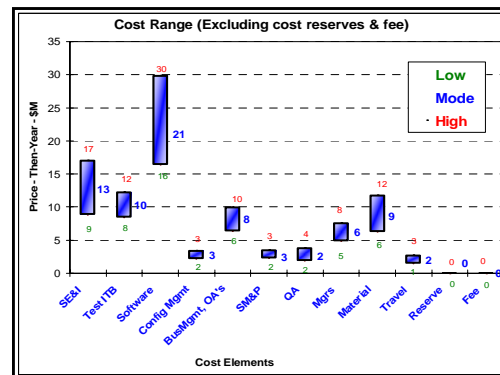
The senior estimator is challenged to apply every skill and tool in their cost arsenal, and integrate estimating, incentive fees, design-cost trades, affordability, and risk probability. The composite business cash flow is one of the most challenging and fun products in the life of an estimator ... where his/her product goes to the top of the decision-making totem pole and directly supports specific decisions.

Financial Profile	
IRR	33%
Modified IRR	12%
NPV \$M	\$ 16.4
ROSAT	6%
RONAT	47%
Sales - Discounted \$M	\$ 794
Sales - Undiscounted \$M	\$ 1,650
Opt'g Earnings - Disc'd \$M	\$ 49
Economic Profit \$M	\$ 26
NBE \$M	\$ 4
Sales/NBE	198

Presenting decision information. The method and format of presenting data to support decisions is important to quick understanding by our customers.

The authors have found the following rules to be very helpful in presentations (example shown):

- **Easy to understand**
 - “10-second” rule ... Instant comprehension
 - Graphics ... Analog data is more intuitive
 - 50% white space ... Delete distractions
 - Color ... Focus attention
- *Well substantiated* ... Show historical data
- *Applicable data* ... evidence supports conclusion



Risk Analysis

It is not sufficient for the weather forecaster to predict “rain today.” Rather, we expect the weatherman to tell us “60% chance of rain today.” In the same fashion, the professional cost estimator should provide cost probabilities to the business decision team.



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Cost estimation and budgeting are an integral part of American business. Predicting and controlling cost is one of the cornerstones of effective business along with product performance and on-time schedules.