

PREFACE

This document represents a 1997 update to an original version that was developed in 1994/5 by the Concept Analysis, Evaluation and Planning (CAEP) Department of the Naval Air Warfare Center Weapons Division, China Lake, California. In late 1995 the document was further distributed, with endorsement, to all-hands of the CAEP Department at Naval Air Systems Command Headquarters and at the Naval Air Warfare Center Aircraft Division. In 1997 these three units of the CAEP Department collaborated to review and update the original document. The product of that process is this document.

This document is strongly endorsed by CAEP Department management for use by all Naval Air Systems Command analysts. It is believed that this document offers a foundation to focus and further evolve the Department's collective vision about the nature of our processes and products and the needs of our customers.

The analysis elements described in this document provide a guideline for navigating through the processes involved in producing a top-quality analysis. It is not a checklist. A checklist focuses the analyst's thoughts on completing "steps" and robs the analyst of his/her greatest tools—the ability to solve the problem at hand using past "lessons learned" and creative innovation. Like the scientific method, the elements outlined here are intended to provide the general framework within which an analysis is to be conducted. Discussions included with each "element" are intended to assist in reminding the analyst of the administrative details, organizational approaches, available assistance, and proven technical processes that facilitate the completion of a top-quality analysis. Although not a "how-to" checklist, this document describes our basic process for conducting a top-quality analysis.

Top-quality analysis must be the goal of every CAEP analyst. Top-quality analysis begins with a top-quality analyst and ends with a top-quality product. To become the "organization of choice" for analysis products, we must maintain and constantly enhance the CAEP tradition of providing the customer with a top-quality product. A first step in that direction is to consistently revisit and continuously improve our processes for meeting the customer's needs. This document is intended to provide the impetus in ensuring that top-quality analysis remains at the heart of our professional culture.

DEFINITION OF TOP-QUALITY ANALYSIS

Top-quality analysis involves using whatever tools are appropriate—analysis is not necessarily mathematical or technically complex. A point paper can be absolutely unchallengeable and still be a purely logical argument.

Top-quality analysis is thorough, sound, and defensible in a scientific sense. It is directly useful to the customer for his intended purposes. No matter how well executed technically, an analysis product not used because it did not meet a customer's needs is not top quality. The product must be timely; if it is too late it may be of no value to the customer no matter how well it is done.

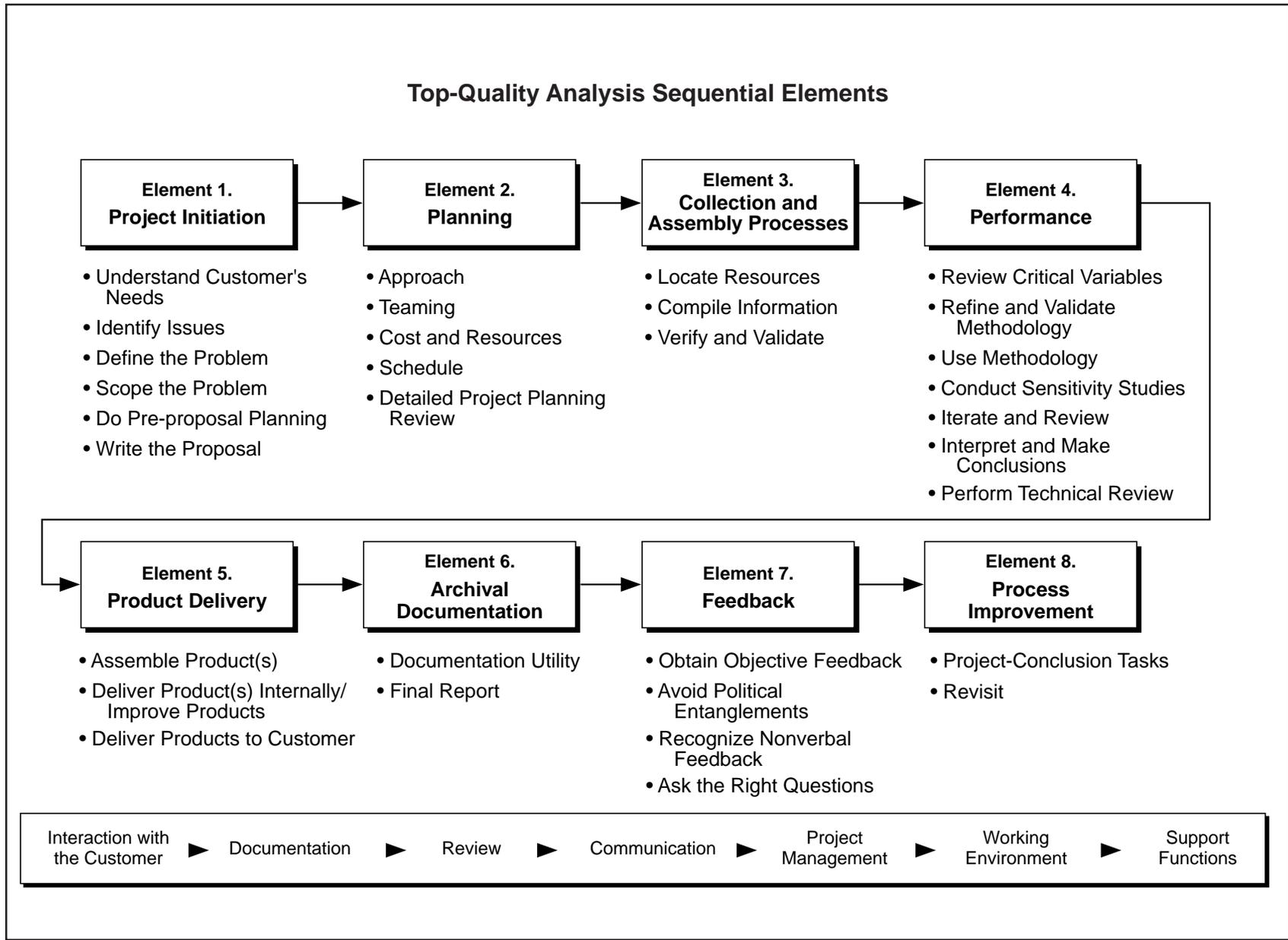
Primary attributes of top-quality analysis include the following:



- Identifying what drives the results and determining sensitivities to the assumptions made.
- Exceeding customer expectations, uncovering questions not asked, improving insight into the problem, impacting decisions, and building trust.
- Standing up under scrutiny by knowledgeable and objective people.
- Being grounded in reality.
- Being communicated in an understandable way.
- Being supported by thorough, quality documentation.
- Building credibility for both the customer team and analysis team.
- Providing an opportunity to learn or expand the organization's capabilities.

Overall, top-quality analysis offers a thorough assessment of the pertinent issues and is valid, understandable, timely, affordable, and honest.

The Elements of Top-Quality Analysis



STEP-PHASED ELEMENTS OF TOP-QUALITY ANALYSIS

1. Project Initiation
2. Planning
3. Collection and Assembly
Processes
4. Analysis Performance
5. Product Delivery
6. Archival Documentation
7. Feedback
8. Process Improvement

Since our purpose is to define how top-quality analysis is achieved, the following definitions are not necessarily dictionary definitions. For example, a dictionary definition for a word like *review* is not provided.

Obviously there are different kinds of analyses, levels of detail, customer needs, and time requirements. Analytical processes are affected by such factors as whether the analyst is dealing with a 2-hour deadline or a 3-year analysis project, as well as the level, complexity, and audience orientation of the analysis. Consequently, one might think a generalized set of definitions describing characteristics of top-quality analysis might be unattainable or irrelevant to characteristics of individual analysis tasks. However, all analytical ventures reflect the same primary processes, even though in some instances these processes may be less overt or less visible. Stages of the analytical process, as well as functions performed during each stage, are generally the same for a quick response or a deliberate long-term study; though again; some elements may be less visible or explicit. Therefore, the processes described are relevant to a wide spectrum of analytical tasks.

The following definitions accompany the flowcharts summarizing the top-quality analysis process and are presented in a similar order.

The Elements of Top-Quality Analysis

Element 1. Project Initiation

Project initiation is the negotiation stage leading to a formal agreement to do a task. The steps involved in this process are described; however, these steps are not necessarily sequential in execution. The customer is assumed to be involved in each step.

1. Project Initiation

2. Planning

3. Collection and Assembly Processes

4. Analysis Performance

5. Product Delivery

6. Archival Documentation

7. Feedback

8. Process Improvement

Understand the Customer's Needs. Determine the customer's perspective and environment. Look beyond the immediate context of the analysis project under discussion to understand other factors, such as how the results will be used, who the intended customer is, what the political environment is surrounding the project, and how this study might affect other projects and related issues under consideration (e.g., gaining an awareness of similar or competing systems and the politics surrounding these systems).

What the customer wants and needs is of fundamental importance, as is the concept of what the customer perceives as quality—which may differ from what we think. A hastily assembled response to an urgent requirement may be just what the customer needs and appreciates, while a finely crafted product, which would make an excellent professional journal article, may not be perceived as a quality response to the customer if it arrives late or costs too much.

Communicate your needs to the customer (e.g., identifying or being a data source, opening doors to other offices, establishing military contacts, requesting clearances). Develop a shared understanding of the appropriate level of customer participation and importance to the project's success.

Identify Issues. What are really important factors influencing the analysis and answers it produces? At this pre-project stage, emphasis is focused on recognizing major drivers and issues. The effectiveness of this process is heavily dependent on the existing knowledge of the planning participants because this stage is based on thinking and talking, not on extensive quantitative analysis, which comes later.

Define the Problem. What are we trying to solve? Do we need to help the customer formulate the problem? What question is being asked? Is there more than one question? Who is the audience for the final product? Who is the product intended to influence? What will the analysis be used for? Based on these questions, are we asking the right question? What is the final product? (e.g., a brief? a report?).

Scope the Problem. How do we structure the analysis process to come up with something manageable and worthwhile, given the inevitable limits on time, resources, and available funding? Determining the scope of the analysis calls for identifying key skill requirements for the core analysis team. Like other elements of initial project planning, this effort is also largely dependent on the experience of the participants and their ability to make informed judgments. This process is not scientific but judgmental. Once the scope has been defined, we must once again ask—is the original question still appropriate, given the defined resources and scope? If not, can we still help the customer?

Do Pre-Proposal Planning. It is extremely important to plan sufficiently, even before accepting a task, to establish a sound basis for making the commitment. Sometimes we commit to something and then cannot deliver. Why? Because we find out too late that we cannot gather the resources to do the job in the promised time frame. A conditional acceptance may be warranted at times, pending verification of the commitment (e.g., we will be back in 2 weeks with a plan that says what we can do for the funds available).

The person who is going to lead the project and other key team members must be involved as early as possible, before submission of a formal proposal, and should be a participant in the pre-proposal planning process.

The Elements of Top-Quality Analysis

Write the Proposal. The proposal is a written statement of the understanding resulting from these five initial steps, with a tentative schedule and resource estimate (including dollars) required to complete the work. The project is formally initiated when the customer accepts this proposal and provides the required funding (normally via a work request for an industrially funded activity).

Besides the written tasking statement, appropriate verbal communication with the customer is necessary to ensure understanding and shared agreement. If necessary, the written tasking statement is modified to reflect these communications.

Element 2. Planning

1. Project Initiation
- 2. Planning**
3. Collection and Assembly Processes
4. Analysis Performance
5. Product Delivery
6. Archival Documentation
7. Feedback
8. Process Improvement

A major component of top-quality analysis is top-quality planning. Lessons learned from projects that were not successful or well received are most often traceable to insufficient up-front planning. Our experience indicates top-quality analysis requires more detailed planning than we think—in some studies as much as 50% of the total effort should be detailed planning. (Experience also demonstrates time devoted to up-front planning is often saved later.)

Approach. Planning the methodological approach to the task includes the following:

- Identifying *assumptions* and *constraints* (or limitations) affecting the study.
- Identifying *key drivers* or *critical factors* influencing the study's results.
- Refining the *scope* of the study; renegotiating deadlines and resources if necessary.
- Ensuring balance between actual project costs and funding received.
- *Assessing risks.* Are there high-risk subtasks requiring special attention to avoid delays, cost overruns, or project failures? Are required databases readily available? Are the data sources correct or authorized?

The Elements of Top-Quality Analysis

(If not, the analysis may be discredited later.) Can existing models be modified, or new ones developed in the allotted time?

- Paying attention to the *level of detail*. Is the level of detail for the agreed-upon study appropriate and consistent?
- Identifying and defining the overall *technical approach* (including measures of merit (MOMs) investigated) and ensuring that methodologies, tools, and processes are available at required levels. MOMs include measures of objectives (e.g., achieve air superiority), measures of effectiveness (e.g., exchange ratio), and measures of performance (e.g., missile launch range).
- Identifying information sources on *operational strategy* and *tactics* (a realistic depiction of operational realities).
- Identifying *form, format, and content* of final product(s). Developing an outline of the agreed-upon final product(s). Archival needs should be identified early to ensure proper recording of events, databases, sources, etc.
- Provisioning for *sanity checks, evaluations, error analyses, and proper review levels*. Provisioning for recurring data verification and validation, continuing assumptions validity, and models accreditation (model appropriate for intended use).
- Maintaining a close *customer relationship* throughout the process.
- Recognizing the need to effectively *communicate* within the analysis team (described in the section *Teaming*) and with the customer.
- Determining (and incorporating in the plan) something that will exceed the customer's expectations. The intent here is to find ways to provide "added value" to what the customer would normally receive for a similar analysis project and funding level. This step helps us continually look for ways to improve our products and service, and frequently has a significant impact on customer satisfaction.

The Elements of Top-Quality Analysis

Teaming. The plan must include detailed arrangements for team formation and functioning, including the following:

- Revalidating *key skill requirements* for the core analysis team.
- Name-identifying *key analysts* of the core analysis team—including their commitment and supervisor's commitment for their time.
- Identifying *additional skill requirements* and/or *team members* who may cycle in and out of the analysis effort (e.g., technical support, security personnel, documentation experts, and illustrators, along with the time frame their skill will be needed).
- Identifying specific *training requirements* for team members.
- Defining the *team's structure*, including the project leader, lead analysts, and various points of contact to coordinate planned tasking. This step includes deciding how team members, both internal and external, will communicate and defining the reporting structure.
- Defining the *project leader's role*, reporting relationships, and accountability. The project leader will direct the project and therefore needs to have commensurate authority to do so in addition to the assurance of management backing and resources provision.
- Including *management* as part of the team to assist in controlling assets and process tasking.
- Ensuring *management's and peer's commitment* to timely review.

Cost and Resources. The plan must address identifying required materiel resources, including facilities, equipment, models, databases, and expendables, and management's commitment to the availability and timing of all required resources.

Consideration should be given to using disciplined processes, including configuration management. This obligation will require considerable advance planning. If software must be developed, this need must be rigorously addressed in the planning stage, and the cost in time and dollars must be recognized.

Schedule. The project's schedule should be a no-kidding deadline for completing a task, with recognition of the following:

- Time versus detail (allotted time commensurate to level of detail).
- Risk assessment, including time for inevitable problems (technical, financial, schedule, and customer's acceptance of product).
- Review scheduling and time for response to feedback.
- Lead times for required training; receiving funds, scheduling facilities; obtaining security clearances; and procuring, installing, and integrating resources.

Detailed Project Planning Review. Reviewing the detailed project plan is the most critical step in the process. Reviewers include the project leader, customer, management (as appropriate), and any other individuals with experience in similar projects. Every element in the detailed plan must be reviewed. A thorough planning review pays for itself many times over before the project is finished.

The Elements of Top-Quality Analysis

Element 3.

Collection and Assembly Processes

_____ The gathering of valid information needed for the study is another critical element.

Locate Resources. Once funding has been received, the following steps will help you assemble and collect the resources needed for the analysis.

1. Project Initiation
2. Planning
- 3. Collection and Assembly Processes**
4. Analysis Performance
5. Product Delivery
6. Archival Documentation
7. Feedback
8. Process Improvement

- Reaffirm project personnel assignments, including levels of effort and timing and individuals external to the organization (e.g., military representatives and analysts from other organizations).
- Establish Methodology. Decide on the models, databases, and processes to be used in the study.
- Acquire models, databases, and processes not already available from the appropriate authorized sources.
- Access required facilities, equipment, and security.
- Reaffirm the customer's role as a team member and establish guidelines to ensure participation.
- Create or tailor the tools and skills required for the project.

Compile Information. Data should be acquired as needed and available. If there is a data source chartered to provide such data, go to that source. You can run into a minefield by going to the wrong or unauthorized source even if the data obtained are good. It is a bad idea to bypass or evade people who have a charter to provide needed resources.

Database designs should be developed as needed to maintain and retrieve data.

Previous studies should be considered and built on. Do not limit your information sources to local studies. Determine who is working in your field at other activities and what they are doing, including both published and unpublished work.

Verify and Validate. Verification and validation of information are essential. Appropriate efforts to verify the accuracy of information should be conducted. This effort includes ensuring continued validity of assumptions, accuracy of data, and appropriateness and reliability of models. This step also involves ensuring participation of the right people, for both technical and political considerations (e.g., if a system under consideration is a high-visibility program at risk for congressional funding cuts, spend appropriate time with project personnel reviewing the system's data and assumptions). Failure to get necessary buy-in early on can lead to major rework late in the project (e.g., the project office questions or discredits existing data and assumptions). A worst-case situation arises if the completed analysis is dismissed as flawed and not usable. Equally damaging is the impact on the professional reputation of the analysis team and customer and their working relationship.

Element 4. Analysis Performance

1. Project Initiation
2. Planning
3. Collection and Assembly Processes
- 4. Analysis Performance**
5. Product Delivery
6. Archival Documentation
7. Feedback
8. Process Improvement

To this point, efforts have focused on preparing to perform the analysis. Analysis performance includes the following:

Review Critical Variables. A key factor in the value of an analysis is identifying critical variables impacting the study's results or critical to understanding the problem. If factors significantly influencing the outcome are omitted from the analysis, or not defined to an appropriate level of detail, then the analysis will be irrelevant. Conversely, excessive attention to details having limited effect on the outcome can result in a product that is expensive, late, and obscure.

Refine and Validate Methodology. As the problem and data become better understood, the detailed methodology is reviewed and tested to ensure that it appropriately addresses the critical issues. Changes to the methodology are made and tested before the full analysis is conducted.

The Elements of Top-Quality Analysis

Use Methodology. The selected methodology is used as follows:

- Employ methodology to obtain data upon which analytical conclusions can be based.
- Iterate as needed.
- Employ reality checks. A reality or sanity check is using common sense and experience to evaluate the results of an analytical modeling effort or simulation process. Do the results make sense in the context of the analyst's understanding of reality? Can unexpected or surprising results be explained in terms of reality? Are the results consistent? Are the results complete?

Conduct Sensitivity Studies. Results must be tested for sensitivity to changes in inputs and assumptions. Often, this procedure may be the analysis.

Iterate and Review. Iteration involves revisiting all of the aforementioned steps as the process is exercised. The number of iterations will vary depending on the nature of the study, but multiple iterations will probably be required. After an appropriate number of iterations, a preliminary review of the study's initial results should be performed by the customer, management, peers, and other experts.

Interpret and Make Conclusions. If the interpretation of the study's results does not make sense or if the derived conclusions vary with reasonable expectations or past studies, then sensitivity studies may need to be repeated and/or assumptions reexamined, critical factors reidentified, and data validated.

Even when the answers have been obtained and have withstood tests for sensitivity, the analysis is still not finished. It is very important to really understand and explain why these results were obtained. This explanation cannot be obscured by methodology complexities or incomprehensible computer

programs. The analyst must be able to explain everything in plain English and be understood by the customer and people who are not analysts.

Perform Technical Review. Technical reviews occur throughout the process; however, a final technical review refers to a particularly significant review. Potentially final results are reviewed for the first time in their entirety with management, peers, and outside reviewers. The affected program offices must also be included in this review process to ensure that they are aware of the study results. In this iterative review process, assumptions and methodology are again challenged (in a process characterized as argue/think/talk), leading ultimately to the conclusions and recommendations of the study.

Element 5. Product Delivery _____

Most analyses will result in a documented product. The following steps are necessary.

1. Project Initiation
2. Planning
3. Collection and Assembly Processes
4. Analysis Performance
- 5. Product Delivery**
6. Archival Documentation
7. Feedback
8. Process Improvement

Assemble Product(s). Products may include (1) a technical briefing to the customer and (2) the customer's outside brief (a briefing the customer may use to inform his customers). Documentation may take many forms, depending on the customer's needs, and may include any or all of the following: annotated briefing, informal report, letter report, or formal technical report. (The formal technical report may be completed subsequent to delivery of other products.) On occasion, final documentation may even be documented software. Even if the customer does not need a formal report, documentation for archival purposes is required. These reports must meet the customer's requirements in addition to organizational (e.g., CAEP Department) guidelines.

In some cases (e.g., aircraft survivability studies or low observable technology projects), a need may exist to build or modify hardware to perform the analysis. Such hardware may be part of the delivered product.

The final briefing may be presented at several different levels of detail, ranging from the customer's final briefing through a full technical briefing to a flag officer's decision briefing.

The Elements of Top-Quality Analysis

Deliver Product(s) Internally/Improve Products. This final review involves acceptance of product or briefing by the analysis team's organization. This is an opportunity for the reviewer to refine what is to be presented to the customer. This step may require a number of reviews. These reviews will include improving viewgraphs, text, and overall presentation quality to ensure that the product is complete, accurate, and readily understood.

An awareness of how your product relates to other studies or programs is important (e.g., the political aspects of an analysis dealing with the products of a local program office). The people whose project work may be affected by your study need to be aware of the analysis and its results and have the opportunity to be involved in this final review process.

The time the analyst works on presentation skills is important. Individual styles will differ, but practice, an awareness of how you look, and how you are perceived by an audience are critical in communicating the results of a study. The ability to clearly articulate your work is paramount. A technically superb study that is not well briefed may lose much, if not all, of its impact. Internal briefings provide an opportunity to rehearse.

Deliver Products to Customer. Top-quality analysis can be achieved only if the product is understood. This means the product is understood by the customer and other members of the intended audience even though they may not be well versed in that particular technical area. In addition to being understood, the success of the final product depends on other things: good preplanning, ensuring that the customer is suitably involved in the process, and a thorough understanding of the customer's true quality requirements.

The product must be delivered in the time, place, and manner required by the customer. Be aware of the time available to the customer for the final briefing. If 30 minutes is allocated, be sure you can cover the topic in 30 minutes, allowing time for discussion. Be able to shift from a planned hour-long briefing to a 5-minute summary if something goes wrong with the schedule.

Be prepared for antagonistic questions as well as supportive ones (internal briefings or rehearsals are helpful in forecasting what negative questions may arise). Maintain your professionalism in dealing with hostile audiences. You may deflect hostile response by prior coordination with potentially hostile people.

Check with the customer before the product is exported. (Export means briefing the results to people other than the customer or the customer's designees. Export also means formally publishing the results of the study, rendering it retrievable by others, e.g., via Defense Technical Information Center (DTIC) or professional journals.) Top-quality analysis builds the customer's credibility as well as our own, and we must not jeopardize the customer's trust in us by exporting information he or she does not want exported.

Element 6. Archival Documentation

The archival documentation stage refers to documenting the final results in detail for future use or archival purposes.

1. Project Initiation

2. Planning

3. Collection and Assembly
Processes

4. Analysis Performance

5. Product Delivery

6. Archival Documentation

7. Feedback

8. Process Improvement

Documentation Utility. Archival documentation may be for our own needs. (A verbal briefing may be all the customer requires.) In situations where the customer may not want to pay for final formal documentation, archival documentation as an effort intended for our own long-term benefit needs to be considered.

Final Report. The archiving process includes detailed documentation of the study, including all of the aforementioned phases. Archival documentation is for technical purposes (an internal resource for future analyses) and may be formally published. This final documentation should include the delivered product, supporting data, data sources, methodologies, processing tools (including software versions), and lessons learned.

The Elements of Top-Quality Analysis

Element 7. Feedback _____

1. Project Initiation
2. Planning
3. Collection and Assembly Processes
4. Analysis Performance
5. Product Delivery
6. Archival Documentation
- 7. Feedback**
8. Process Improvement

Feedback should be obtained during all steps of the project—not just at the end. However, at the close of the project the customer's final feedback and evaluation are important. This customer feedback can be task-specific or somewhat broader (i.e., What do our customers think about our top-quality analysis intentions?). The customer's perception of quality is a key factor and one we must actively seek.

Obtain Objective Feedback. Obtaining good, objective feedback is an art. For example, when a conscientious and attentive waiter asks if the meal was okay, usually he does not get a negative response. While a few customers, may take pleasure in pointing out shortcomings of the analyst's work, most are considerate of the analyst's feelings and therefore will give good feedback on successful studies, while being less inclined to provide straightforward comments on tasks that failed to satisfy their needs. Part of obtaining reliable, honest feedback from the customer is to let him or her know honest feedback is okay; we really want it and intend to use it.

Avoid Political Entanglements. Useful feedback can be obtained by asking people whom you respect to critique your product. However, be very careful about whom you contact in higher level organizations (e.g., the Pentagon), where feedback can get easily entangled in politics and used against your customer. A useful technique may be to send someone not directly involved in your project to get feedback from your customer (e.g., send someone who worked on the project so detailed dialog can occur, but also send an outsider so the customer can say things without hesitating because of a concern about the feelings of project participants). (The reverse is also true, depending on your relationship with the customer. The customer may be inclined to give straight feedback to you as an analyst and less inclined to get you in trouble with your management.) To get honest, reliable feedback from your customer, you must have a trusting relationship in place and be willing and able to protect this trust.

Recognize Nonverbal Feedback. Feedback can be nonverbal or implicit. An ability to read nonverbal signals, such as discomfort on the part of the customer, is useful. As in any other business, most unhappy customers do not complain to you, they complain to someone else and go elsewhere. Praise of your product by your customer to a third party is one of the best forms of positive feedback, as is a repeat customer.

Ask the Right Questions. Whether or not a feedback interview is structured with prepared questions or impromptu depends on your working relationships with the people being contacts. Regardless of the degree of structure, questions that should be asked include the following:

- How well did the product meet the customer's needs and expectations?
- Did we actually achieve our top-quality aspirations?
- How well did our definition of top quality match the customer's expectations (considering the agreed-upon resource constraints)?
- Was the product perceived as high quality from a technical viewpoint? (Most of this feedback will come from internal reviews.)
- In what areas did we exceed the customer's expectations?

Be willing to listen to truthful feedback, even if unpleasant or presented in a disrespectful way.

The Elements of Top-Quality Analysis

Element 8. Process Improvement

1. Project Initiation
2. Planning
3. Collection and Assembly Processes
4. Analysis Performance
5. Product Delivery
6. Archival Documentation
7. Feedback
- 8. Process Improvement**

Knowledge gained in conducting an analysis project should be captured in order to benefit future analysis projects.

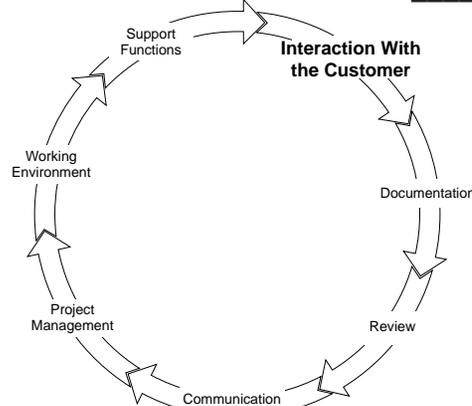
Project-Conclusion Tasks. Top-quality analysis is a continuous process. At the close of each project, methodology should be validated and lessons learned documented and applied to future tasks. Technical reviews, products delivered, and multiple-source feedback generate ideas that feed *process improvement*.

Revisit. Revisit should be a specific event where lessons learned and other ideas for improvement are compiled and recommended for ongoing and future analysis projects.

CONTINUOUS-PROCESS ELEMENTS OF TOP-QUALITY ANALYSIS

The process elements defined in this section are not sequential but interact with each other in a constant fashion. A given process element may dominate the project at some given time but may be performed at less intensive levels through the remainder of the project (e.g., planning is dominant at the outset, but review of the plan will continue throughout and revisions will occur). However, certain process elements will be maintained at a substantial level during all stages of the project.

Interaction With the Customer



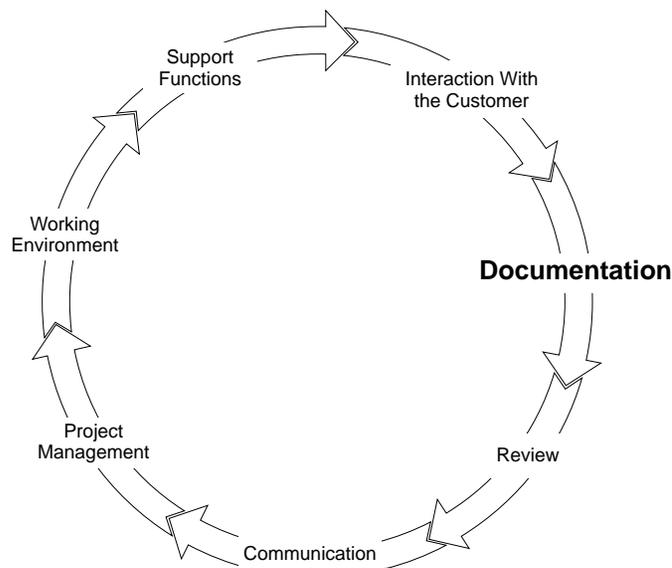
Close interaction with the customer throughout the analysis project is important.

Mutual Support. The customer needs to be heavily involved in the project, functioning as a member of the project team. This involvement is a two-way process. The analysis team supports the customer's need, but the team also requires support from the customer—not only to provide funding but also to open doors, gain access to restricted information, clear the way with other military commands, and carry out other actions where a sponsor level of influence is important.

Customer Cognizance. The customer must be aware of potential problems as well as progress. The analysis team must not delay in informing the customer of a possible delay or cost overrun. (The team may want to delay delivering bad news, hoping that somehow the problem can be solved, but this delay is usually not a good idea and can lead to loss of credibility with the customer.) The customer should never be the recipient of a last-minute surprise, unless it is a good one! To avoid these poor communications, significant interaction between the customer and other members of the team should occur throughout the project.

Documentation

Virtually every stage of the process and every function of the subject need to be documented.



- Document the initial proposal and agreement in detail, so misunderstandings about what is to be done will be minimized. Document the agreed-upon changes to the original tasking.
- Document the project plan in detail. This plan will serve as the road map for all that follows.
- Document the results of reviews and critiques in addition to the responses to these criticisms and recommendations.
- Document all software developed for the project, or work cannot be validated.
- Document all processes developed for designing and exploiting databases.
- Document (i.e., file) informal communication such as E-mail and telephone conversation records.

The Elements of Top-Quality Analysis

Review

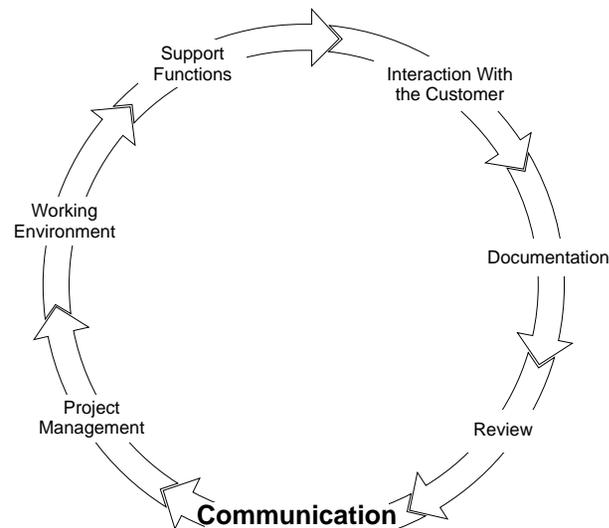


Review is a major and recurring requirement—a continuous process throughout the entire life of the project.

In-Process Reviews. In addition to the formal project planning and technical reviews, the project schedule must allow time specifically for in-process reviews. Resources must be identified to support the review process.

Process Support. The nature and timing of major reviews should be specifically laid out in advance, with assurance that key people will be available at the designated times. If top management is involved in the review process, they must provide a commitment to the process.

Communication



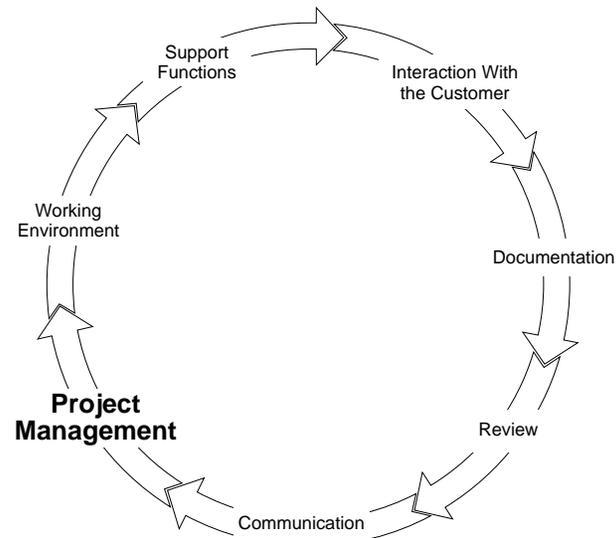
Effective communication—transmitting and receiving—is essential both internally to the team and externally (to the upper management, customer, and other interested or potentially affected activities).

Open Channels. An environment must exist where emergence of potential problems at the working level is not withheld from management because of fear of negative reactions. Appropriate communications with outside entities potentially affected by the analysis are very important—timing and content can be crucial.

Scheduling. Regularly scheduled communication with the customer may be very helpful (e.g., video teleconferences at a specific time each week and regularly scheduled visits to the customer). The very act of establishing regular communications can help in building a relationship of trust and mutual support.

The Elements of Top-Quality Analysis

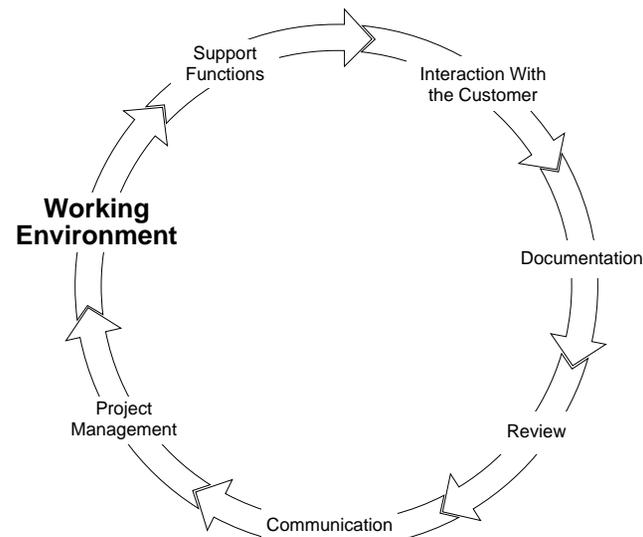
Project Management



Although the cast of characters may change, project management is a continuing function throughout the process and includes the following tasks:

- Facilitating availability of resources
- Team building
- Providing technical guidance
- Overseeing the project
- Monitoring progress of effort relative to planning milestones
- Monitoring financial status
- Evaluating project quality
- Ensuring that reviews are conducted
- Recognizing achievement

Working Environment

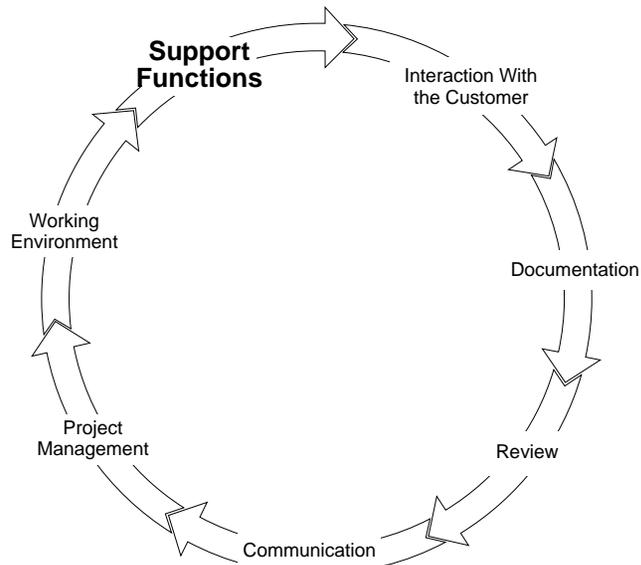


Factors that foster or encourage a positive working environment (e.g., project physical facilities) for all who contribute to creating the product must be identified. A shared responsibility of the team and its management is to continuously strive to maintain this positive environment.

The Elements of Top-Quality Analysis

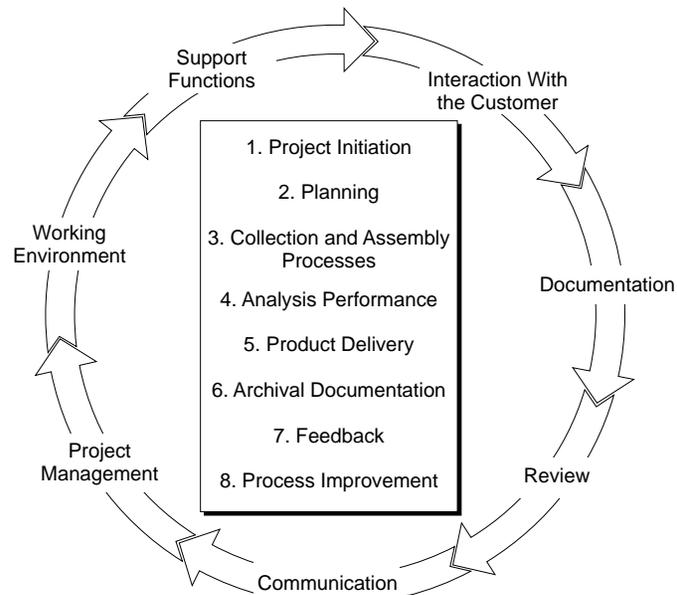
Support Functions

Top-quality analysis is a function of the health of the organization at all levels and specifically requires strong support functions. Examples of things that the analysis team can do to facilitate top-quality support include



- **Avoiding Last-Minute Crunches.** Plan ahead and coordinate with required support. Expecting people to work nights and weekends to compensate for the team's failure to get a support group involved in a timely fashion is unreasonable, unfair, and potentially damaging.
- **Financial Planning.** Keep the financial people aware of negotiations, so extraordinary measures are not required for the project to start on schedule or to ensure that funding may be extended if deemed necessary.
- **Travel Planning.** Plan as far ahead as possible for travel.
- **Involving the Support Team.** Make the support team members a part of the analysis team. Invite these valuable assets to attend meetings to become more familiar with the study, its objectives and language, the technical points being made, and to meet the customer when he or she visits the local area. This type of interaction facilitates their effort to support the analysis by allowing them to understand what you are trying to represent.

SUMMARY



The guidelines for conducting analysis within the CAEP Department are summarized in the diagram that appears throughout this document. The diagram shows the eight major elements and the continuous-process elements that repeat throughout the conduct of an analysis project. Remaining aware of these elements and taking advantage of the “lessons learned” described in this document are key to producing analysis products of the highest quality in the most cost-effective manner possible. Elements cannot be applied to projects in the same manner. Tailoring them to the specific project of the moment is critical. The analyst who successfully does this will be well served.

Approved for public release; distribution is unlimited.