[L12]Quality Management: Organization structure and design

The typical company (Figure 9-4a) operates with a vertical, functional organizational structure based on reporting relationships, budgeting procedures, and specific and detailed job classifications.

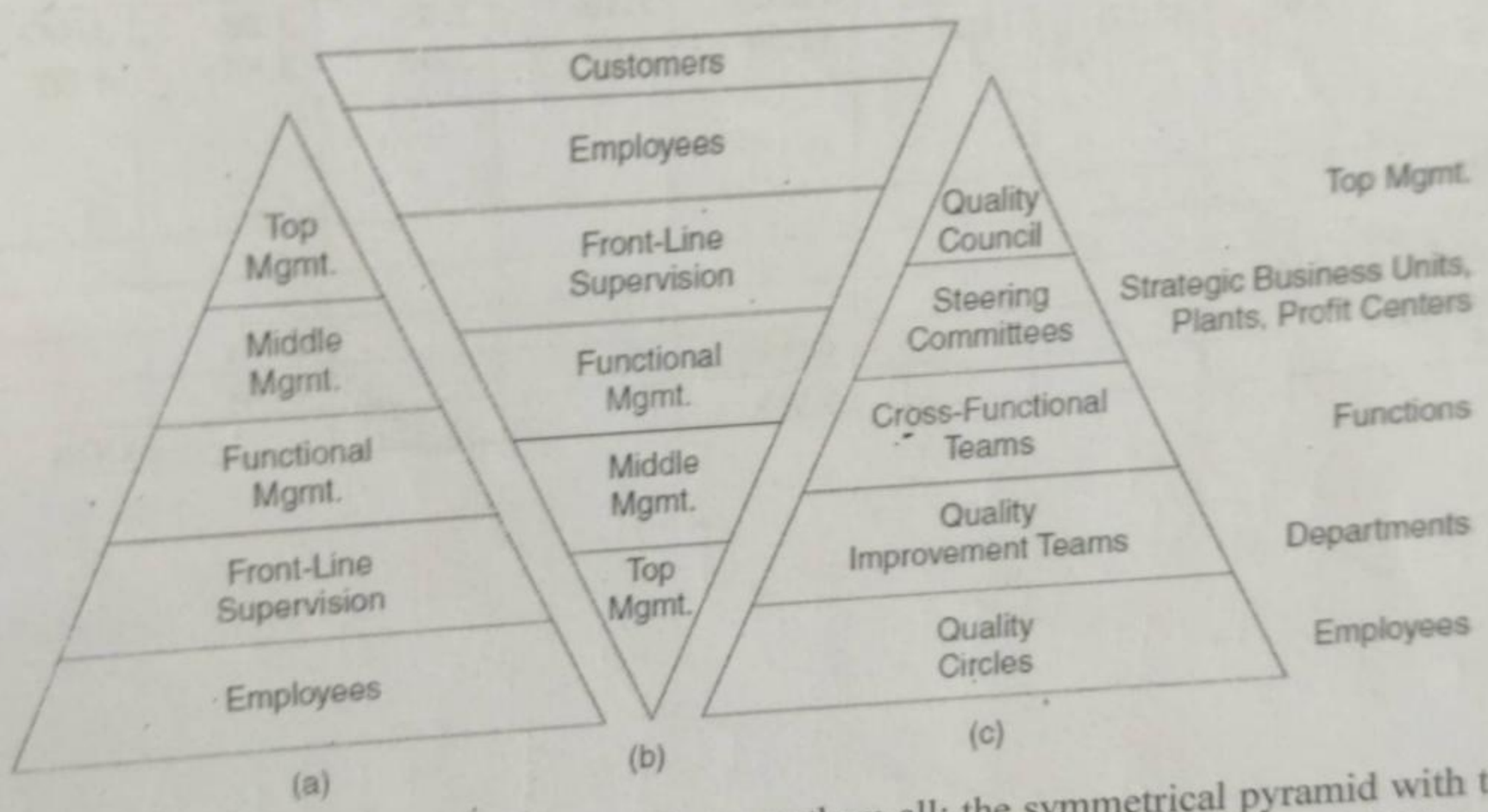
Departmentation is by function, and communication, rewards, and loyalties are functionally oriented. Processes are forced to flow vertically from the top down, creating costly barriers to process flow.

The systems approach to organizing suggests three significant changes, one conceptual and two requiring organizational realignment:

The concept of the inverted organizational chart

A system of intra-company internal quality

Horizontal and vertical integration of functions and activities



If you've seen one organizational chart, you've seen them all: the symmetrical pyramid with the chairman at the top and the cascading of authority to successive levels (14 at General Motors) until the functions are shown near the bottom of the chart. Front-line supervisors are rarely shown and non-supervisory personnel almost never appear.Where are the front-line supervisor and the employees? These are the people who deliver quality to the customer. In the eyes of the customer, they *are* the company. The sports fan cares not for the owner or the manager. The players deliver the quality. And so it is with the flight attendant, the bank teller, the auto mechanic, the salesperson explaining a product, the person answering the telephone…even the college professor.Perhaps it is time to put first things first. To make the transition from traditional to TQM management, it may be desirable to *conceptualize* a new organizational chart.

Invert the existing one (Figure 9-4b) and put the customer at the top, followed by the employees and front-line supervisors. These are the deliverers of quality. This concept does not change the hierarchy and flow of authority, but the boss is no longer the boss in the old-fashioned sense. He or she is now a facilitator, a coach, and an integrator, whose job is to remove barriers that prevent subordinates from doing their jobs. The same role now falls on middle and top management. Quality is now the responsibility of everyone and not just the quality assurance department.

[L13]Quality function deployment:

Quality Function Deployment, or QFD, is a method used to identify critical customer attributes and to create a specific link between customer attributes and design parameters. Matrices are used to organize information to help marketers and design engineers answer three primary questions:

- What attributes are critical to our customers?
- What design parameters are important in driving those customer attributes?
- What should the design parameter targets be for the new design?

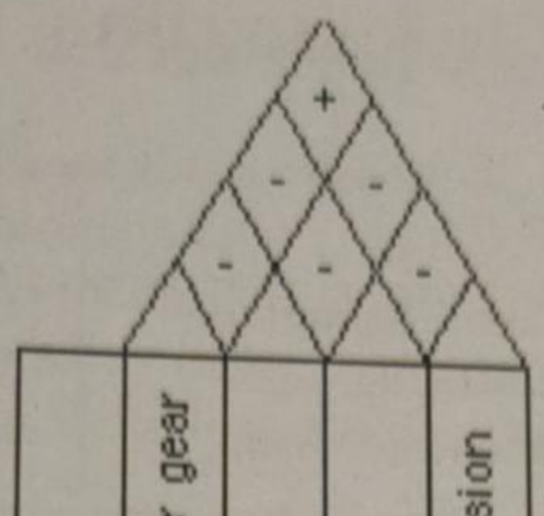
The organizing framework for the QFD process is a planning tool called the "house of quality" (simplified example above). Working as a team, design engineers and marketers first establish critical customer attributes for the product. These attributes become the rows of the central matrix of the house of quality. The team may group attributes into broader categories in order to simplify planning and analysis.

In the example above, six attributes have been singled out for analysis: speed, quiet operation, crisp and accurate sound, cost, size, and reliability. The team now establishes weightings that represent the relative importance of each attribute from the customers' perspective. The complete set of weightings adds up to 100%.

The second step is to establish the critical design parameters that drive system performance (in measurable terms and directly linked to customer attributes). In the example these are: number of teeth, lubricant, tooth thickness, and manufacturing precision.

The third step is to fill in the body of the central matrix. Each cell represents a potential link between a design parameter and a customer attribute. This "relationship matrix" indicates both the direction and strength of the relationship.

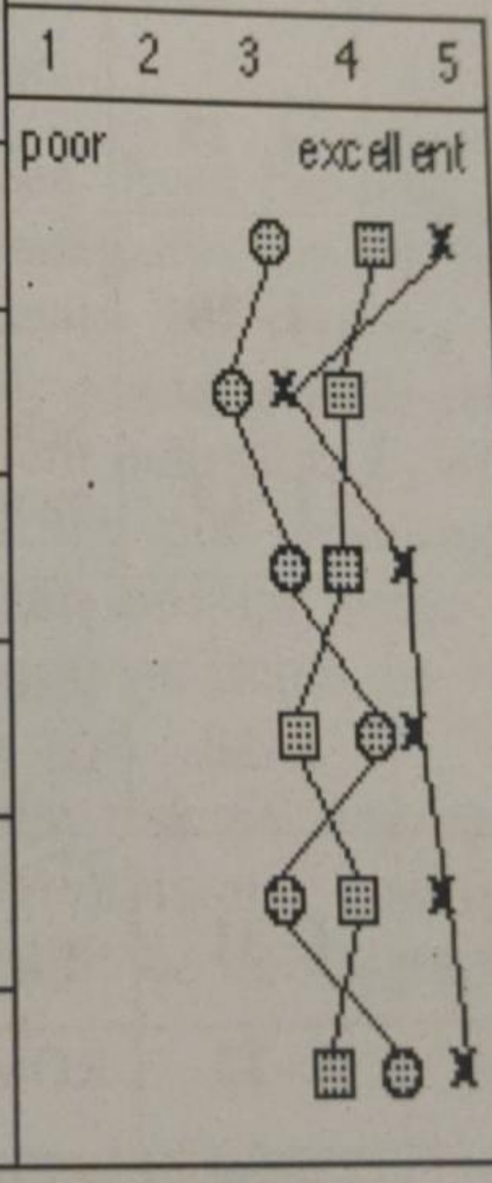
The fourth step focuses on customer perceptions of the company's existing product as compared to its competitors. This may give insight into market problems and opportunities. The fifth and last piece of analysis is the interaction or relationship between design parameters. In the cells of the "roof" matrix is indicated the strength and direction of the interrelationships among design parameters.



Design Parameters	Importance (%)	Number of teeth per gear	Lubricant	Tooth thickness	Manufacturing precision
Speed (low wait time)	25		-		0
Quiet	10	+	++	-	+
Crisp and accurate sound	9				
Low cost	12	--	-	+	-
Compact	10		0	-	+
Reliable	34	-	0	+	++

Customer Requirements

Competitive Data on Customer Perceptions of Current Products



[L14]Decentralization:

Advantages:

It's easy on operating divisions. From the perspective of the organization coming under a new corporate umbrella, a well-performing quality system which isn't in need of many significant changes offers immense relief to the incoming quality team. While this may seem like a simple point, mergers and acquisitions inevitably bring some degree of change to an operating division. Reducing unnecessary changes can help teams focus on what matters most during times of change and reorganization.

Fewer risks associated with making fundamental changes. Imposing fundamental quality systems on new operating divisions can be traumatic to a recently acquired quality team. In instances where these changes are necessary, corporate entities should be aware of the potential consequences, including vacated positions.

Disadvantages:

Opportunities for problems to go, and grow, unnoticed. Even the best quality systems can receive poor inspection outcomes when relentless investigators invest hours or even days searching for problems to satisfy a Form 483. Other times, it's just the opposite. A quality system riddled with holes (perhaps good procedures poorly implemented) could be subject to an inspection from an investigator who ignores serious problem indicators by only reading a couple procedures, looking through some documents, and heading out—resulting in a dangerously misleading clean bill of quality system health. This can prompt some to see the lack of observations as proof of a compliant quality system when in fact, issues are silently growing

Organizations with decentralized quality systems run the risk of finding themselves in this nightmare scenario. In short, corporate offices judging their divisions' quality system compliance by their ability to get through audits by ISO or FDA, can't be confident that problems aren't hiding under the surface.

While it's easy to gravitate toward an "if-it-ain't-broke-don't-fix-it" mentality regarding changes to the quality system, many companies further inform their decisions through inspections led by internal or external quality professionals before final release. While the value of such thorough initial evaluation may be hard to see in the short term, the long-term value can't be overstated in the context of the rapidly changing regulatory landscape.

Now, more than ever, what may seem like an insignificant issue today may grow to become a serious compliance problem tomorrow. An investment in smart prevention now pales in comparison to the costs of correction later.

[L17]Quality cost and optimizing quality cost

Manufacturing a quality product, providing a quality service, or doing a quality job one with a high degree of customer satisfaction – is not enough. The cost of achieving these goals must be carefully managed, so that the long-term effect on the business or organization is a desirable one. These costs are a true measure of the quality effort. A competitive product or service based on a balance between quality and cost factors is the principal goal of responsible management and may be aided by a competent analysis of the costs of quality (COQ).

The analysis of quality related costs is a significant management tool that provides:

- A method of assessing the effectiveness of the management of quality.
- A means of determining problem areas, opportunities, savings and action priorities.

The costs of quality are no different from any other costs. Like the costs of design, sales, production/operations, maintenance and other activities, they can be budgeted, measured and analysed. Having said this, a major difficulty in some sectors is capturing the totality of the costs. Where value-adding processes are fragmented with many parties incurring costs, such as in construction, infrastructure or health care industries, unless costs are to be recovered from another party, it can be difficult to get people interested in recording the costs. Yet a detailed knowledge of these costs is potentially a main driver for improvement and the author and his colleagues have worked recently with different types of organization to develop frameworks that effectively capture the significant costs.

Prevention costs: These are associated with the design, implementation and maintenance of the quality management system. Prevention costs are planned and are incurred before actual operation. Prevention includes:

1. Product or service requirements
2. Quality planning
3. Quality assurance
4. Inspection equipment
5. Training

Appraisal costs: These costs are associated with the supplier's and customer's evaluation of purchased materials, processes, intermediates, products and services to assure conformance with the specified requirements. Appraisal includes:

1. Verification
2. Quality audits
3. Inspection equipment
4. Supply chain and vendor rating

Internal failure costs: These costs occur when the results of work fail to reach designed quality standards and are detected before transfer to the customer takes place. Internal failure includes the following:

1. **Scrap**
2. **Rework or rectification**
3. **Re-inspection**
4. **Downgrading of product(inferior quality product)**

External failure costs: These costs occur when products or services fail to reach design quality standards but are not detected until after transfer to the consumer. External failure includes:

1. Repair and servicing
2. Warranty claims
3. Complaints

COQ = cost of conformance
+ cost of non-conformance

COC : cost of providing product or servicer to the required standards. by a given specified. process in the most effective manner

CONC = failure cost associated with the process. not being operated to the req. or its cost due to variability in process.

Internal failure :- process delay, rework, scrap, retest validation, downtime, loss of capacity

External failure :- customer returns, warrant loss of customer sale, sort & repair at customer, lower quality score

[L18] Human Factor in quality

One study found that a very small percentage of employees could define quality or could relate what their companies were doing to improve it. The problems of managing streams of processes are both methodological and organizational. Peter Drucker concludes that SQC has its greatest impact on the factory's social organization.37 The essence of his argument relates to the way that the use of statistical tools in the production process places information and hence accountability in the hands of the machine operator rather than non-operators such as inspectors, expediters, repair crews, and supervisors. Each operator becomes his or her own inspector. Operators "own" the machines, which allow them to spot malfunctions and correct problems. If Drucker is right, the potential exists for significant improvement in quality, cost, and productivity. However, there is a down side. Strict adherence to rigid methods and procedures means that workers and teams may lose the autonomy they previously enjoyed, only to have it replaced by the regimentation necessitated by process control. By their very nature, SPC and JIT require a focus on the process as a whole, an environment that may be strange to an operator accustomed to the segmented approach previously in effect. It is almost universally accepted that control of any process rests upon measuring against some standard, measure, benchmark, or target. Yet in many organizations, workers and managers operate with two different sets of goals and in two different cultures. It becomes an "us vs. them" split culture. As we move from inspection to process control, it is essential that control measures become the property of the workers.SPC and JIT achieve this. Workers are involved in measures over which they have some control in monitoring continuous improvements. Control of measures alone, however, may not be enough. Understanding of and involvement in the system would enhance job satisfaction, which is a necessary dimension. Moreover, like any process or system, the people with hands-on involvement are a valuable resource for refinement and improvement. Attention to the human resource dimension provides a basis for significant improvements in job development, job satisfaction, training, and morale. Suggested actions to improve the changes include:

_ Like all major change, top management support is essential.

_ Change the focus from production volume to quality, from speed to flow, from execution to task design, from performing to learning.

_ Invest in training, a necessary prerequisite.

[19] Attitude of top management and cooperation of groups

Team Selection and leadership: The most important element of a process team is its members. People with knowledge and experience relevant to the process or solving the problem are clearly required. However, there should be a limit of five to ten members to keep the team small enough to be manageable but allow a good exchange of ideas. Membership should include appropriate people from groups outside the operational and technical areas directly 'responsible' for the process, if their presence is relevant or essential. In the selection of team members it is often useful to start with just one or two people who are clearly concerned directly with the process.

Team Objectives:

At the beginning of any process improvement project it is important that the objective should be clearly defined and agreed. This may be in problem or performance improvement terms and it may take some time to define – but agreement is important.Also at the start of every meeting the objectives should be stated as clearly as possible by the leader. This can take a simple form: 'This meeting is to continue the discussion from last Tuesday on the development of our design manual and its trial and adoption throughout the company. Last week we agreed on the overall structure of the manual and today we will look in detail at the structure of the first section.' Project and/or meeting objectives enable the team members to focus thoughts and efforts on the aims, which may need to be restated if the team becomes distracted by other issues.

Team Meetings :

Meetings need to be seen as a part of a process working towards a longer-term goal– and hence, planning for each meeting and maintaining the continuity between meetings is important. An agenda should be prepared by the leader and distributed to each team member before every meeting. It should include the following information:

- Meeting place, time and how long it will be.
- A list of members (and co-opted members) expected to attend.
- Any preparatory assignments for individual members or groups.
- Any supporting material to be discussed at the meeting.

To make sure that the meeting process is used to maximum advantage it is important that the team leader manages the meeting process; there are several important aspects to this. First of all bear in mind the overall meeting plan (including an approximate timeframe), then for each topic that is addressed:

- maintain the participation of everyone
- maintain focus on the topic being considered
- maintain momentum, keep the process moving forward
- achieve closure, before moving on, capture where the group is up to and where and how it will proceed.

Team Assignment:

It is never possible to solve problems by meetings alone. What must come out of those meetings is a series of action plans that assign specific tasks to team members. This is the responsibility of the team leader. Agreement must be reached regarding the responsibilities for individual assignments, together with the time scale, and this must be made clear in the minutes. Task

assignments must be decided while the team is together and not by separate individuals in after-meeting discussions. Make sure that task assignments are realistic to the time frame and resources available. This may need the allocation of additional resources and the team leader may need to negotiate for this with senior management. The use of RACI – who's *R*esponsible, *A*ccountable, *and C*ommunicated with, *I*nvolved – provides a good structure and discipline for meeting outcomes.

Team Dynamics:

In any team activity the interactions between the members are vital to success. If solutions to problems are to be found, the meetings and ensuing assignments should assist and harness the creative thinking process. This is easier said than done, because many people have either not learned or been encouraged to be innovative. The team leader clearly has a role here to:

- Create a 'climate' for creativity.
- Encourage all team members to speak out and contribute their own ideas or build on others.
- Allow differing points of view and ideas to emerge.
- Remove barriers to idea generation, e.g. incorrect pre-conceptions that are usually destroyed by asking 'Why?'
- Support all team members in their attempts to become creative.

In addition to the team leader's responsibilities, the members should:

a) Prepare themselves well for meetings, by collecting appropriate data or information *(facts)* pertaining to a particular problem.
b) Share ideas and opinions.
c) Encourage other points of view.
d) Listen 'openly' for alternative approaches to a problem or issue.
e) Help the team determine the best solutions.
f) Reserve judgement until all the arguments have been heard *and* fully understood.
g) Accept individual responsibility for assignments and group responsibility for the efforts of the team.

Team results and reviews

A process approach to improvement and problem solving is most effective when the results of the work are communicated and acted upon. Regular feedback to the teams, via their leaders, will assist them to focus on objectives, and review progress. Reviews also help to deal with certain problems that may arise in teamwork. For example, certain members may be concerned more with their own personal objectives than those of the team. This may result in some manipulation of the problem solving process to achieve different goals, resulting in the team splitting apart through selfinterest. If recognized, the review can correct this effect and demand greater openness and honesty. A different type of problem is the failure of certain members to contribute and take their share of individual and group responsibility. Allowing other people to do their work results in an uneven distribution of effort, and leads to bitterness. The review should make sure that all members have assigned and specific tasks, and perhaps lead other documentation of duties in the minutes. A team roster may even help. If some members of a team are not contributing and cannot be induced to do so, consideration should be given to their replacement. However this can become a more complex issue, if the team leader does not manage team processes well and people believe they are wasting their time. There may be a high level of frustration that could lead to some members withdrawing support.

[20]Operators attitude

They are the frontline soldiers in the war against rising costs and manufacturing imperfections.

Operators need lots of information to do their jobs—to make sure the products they make are the best they can be. They are the Swiss Army knives of manufacturing. They need to:

- know standard operating procedures
- understand engineering drawings
- be up-to-date on compliance regulations
- be conversant in all tests/checks and schedules
- be an expert with their machine(s)
- know safety regulations

They also need to know how to deal with all the people who are pinging them every day: supervisors, quality managers, inspectors, maintenance folks, and engineers, just to name a few. Being an operator is a very challenging job, and we need to help make operators' lives just a little bit easier on the shop floor. That's where where organization's SPC system can make a huge difference.

As quality professionals, we must be aware of the pressures and time constraints that operators are faced with, and we must find ways to support their quality activities—such as data collection. We need to make those tasks as easy as possible for operators. And we must help them see how the information gained from these activities can help them make better products while making their challenging jobs a little easier.

We can also help operators by automating notifications, such as when data collection or compliance checks are due. Providing automatic reminders takes the guesswork out of when to gather data. It means that they don't have to keep checking a clock on the wall or continually glancing at their wristwatch. And it means that there is little possibility of forgetting a data check or violating critical compliance requirements.

Furthermore, the right SPC system should automatically alert an operator when the data they have collected indicates a significant change or shift in machine performance. These automated alerts can help operators prevent out-of-specification events that can shut down production lines and cause huge hits to the bottom line.

[19]Responsibility Assignment

In today's environment of lean budgets, fast-tracking projects, and an increasing emphasis on total quality, it is critical that project managers understand the key success factors of a successful project completion or system implementation. These success factors are universal and can be applied to almost any project, including systems or process design, development, or implementation. Assembling the right individuals for the project team and managing them appropriately to use their best talents are two of the most important critical success factors. The right individuals understand the details of the project and have insight and experience in accomplishing the required tasks. Managing them appropriately, using empowerment strategies and good communications skills, will ensure that the project team behaves highly effectively, contributing directly to project success

A Responsibility Assignment Matrix (RAM) describes the participation of various organizations, people, and their roles in completing tasks or deliverables for a project. A RAM is also called a Responsible, Accountable, Consulted, and Informed (RACI) matrix. The PMBOK Guide 4th Edition defines RACI as a RAM that is used to illustrate the connections between work packages or activities and project team members. On larger projects, RAMs can be developed at various levels.

- **Responsible (R):** Those who do the work to achieve the task. There is typically one role with a participation type of Responsible, although others can be delegated to assist in the work required.
- **Accountable (A):** The one ultimately accountable for the correct and thorough completion of the deliverable or task, and the one to whom Responsible is accountable. In other words, an Accountable must sign off (Approve) on work that Responsible provides. There must be only one Accountable specified for each task or deliverable.
- **Consulted (C):** Those whose opinions are sought; and with whom there is two-way communication.
- **Informed (I):** Those who are kept up-to-date on progress, often only on completion of the task or deliverable; and with whom there is just one-way communication.

A RAM is used in project management as a communication tool to ensure that work tasks are designated a responsible agent. A RAM can define what a project team is responsible for within each component of the Work Breakdown Structure (WBS). It could also be used within a working group to designate roles, responsibilities, and levels of authority for specific activities. The matrix format shows all activities associated with one person and all people associated with one activity. This ensures that there is only one person accountable for any one task to avoid confusion. A RAM is displayed as a chart that illustrates the interaction between work packages that need to be done and project team members. Typically, the list of objectives is on the left-hand column with the project team member names across the top. Each work package will be assigned to the appropriate project team member. The chart aids in communication amongst the project team members.

Deliverable / People		Project manager	Task leader	Staffer A	Group director	Purchasing
WBS code	Title					
2.3.	**Questionnaire design**	A	S, A	P		
3.3.	**Respondents**		P			
4.4.	**Pretest**		P	S		
6.5.	**Final questionnaire printing**	A	P		A	A

P = Primary responsibility S = Secondary responsibility A = Approval

[L21]Control Charts with examples

Invented by Walter A. Shewhart while he was working for Bell Labs in the '20s, control charts have been used in a variety of industries as part of a process improvement methodology. Shewhart understood that, no matter how well a process was designed, there will always be variation within that process—and the effect can become negative if the variation keeps you from meeting deadlines or quotas. You will need to take action to correct variations that have a negative effect on your business, and that's where a control chart can be beneficial for your company.

A control chart—sometimes called a Shewhart chart, a statistical process control chart, or an SPC chart—is one of several graphical tools typically used in quality control analysis to understand how a process changes over time.

The main elements of a control chart include:

- A visual time series graph that illustrates data points collected at specific time intervals.
- A horizontal control line to more easily visualize variations and trends.
- Horizontal lines, representing upper and lower control limits, placed at equal distances above and below the control line. These upper and lower limits are calculated from the data that is recorded on the time series graph over a specified period of time.

Control charts can help you:

- Understand the variations that are always present in processes. Variations within your control limits indicate that the process is working. Variations that spike outside of your control limits indicate problems that need to be corrected.
- See when something is going wrong or may go wrong. These problem indicators let you know that corrective action needs to be taken.
- Notice patterns within plotted points. The patterns indicate possible causes, which can help you find possible solutions.
- Predict future performance.
- Generate new ideas for improving quality based on your analysis.