From the 6Ms to the 6Qs

In our box of Quality Tools we might find 5Ss, 6Ms and 7 Wastes and use the 6 Ms on an Ishikawa or Fishbone Diagram to discover the root causes of a problem. We can use the same tool as Ishikawa originally intended to determine the factors upon which the achievement of quality depends but instead of using 6Ms David Hoyle Hon FCQI CQP gives us 6Qs and with it a tool for managing processes more effectively.

The pursuit of quality

Quality is a result, of that there should be no doubt; it's certainly not an activity but the type of result is often elusive. In Fig 1 the pursuit of quality is expressed as the gap between the required result and the achieved result.

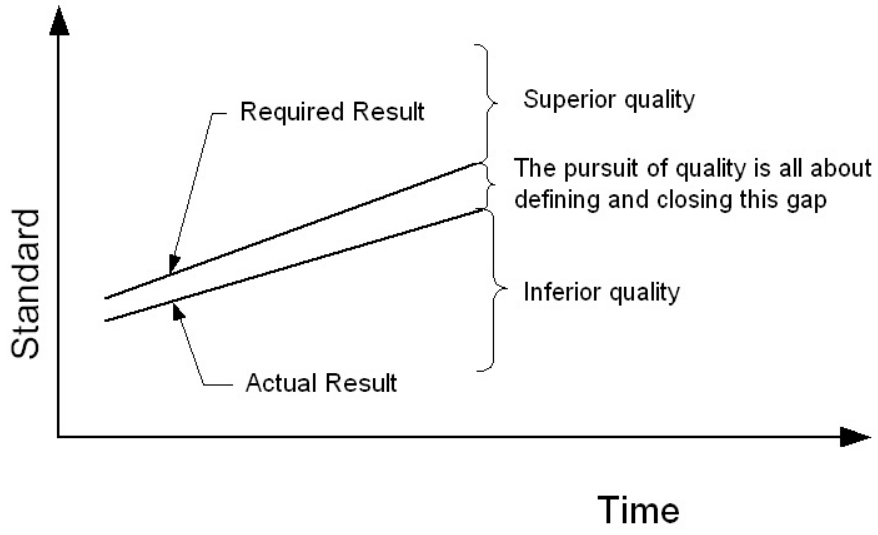

Figure 1 The meaning of quality

The required result can be expressed in many different ways depending on the context. They might be expressed as needs, requirements or expectations or indeed an objective to be achieved. We can classify these as standards that change over time. What was once an acceptable standard may no longer be good enough. The actual results are the performance level or standard reached. The difference between the two is the performance gap and therefore the pursuit of quality is all about defining and closing this gap.

Nature of results

The OED defines a result as "the effect, consequence, issue, or outcome of some action, process, design etc". It also defines an output as "that which is produced in an industry or process" and defines a product as "an object produced by a particular action or process" We can deduce that a product is an output rather than an outcome. A product would not appear to be an effect or a consequence but something that results from a deliberate action which can be either intended or unintended. We can therefore construct a relationship between the terms in order to describe the nature of results as shown in the box opposite.

Results

Outputs (Immediate effect)

- Intended outputs (Products & Services)
- Unintended outputs (Waste)

Outcomes (Long term effect)

- Intended benefits (Value)
- Unintended consequences (Impacts)

It is therefore more helpful to focus on results than the concept of quality which means different things to different people.

Effects have causes

In the 1960s Karou Ishikawa thought up the "Cause and Effect Diagram" as a tool for identifying the factors that need to be controlled to achieve quality characteristics. The diagram as depicted by Ishikawa [1] is shown in Fig 2

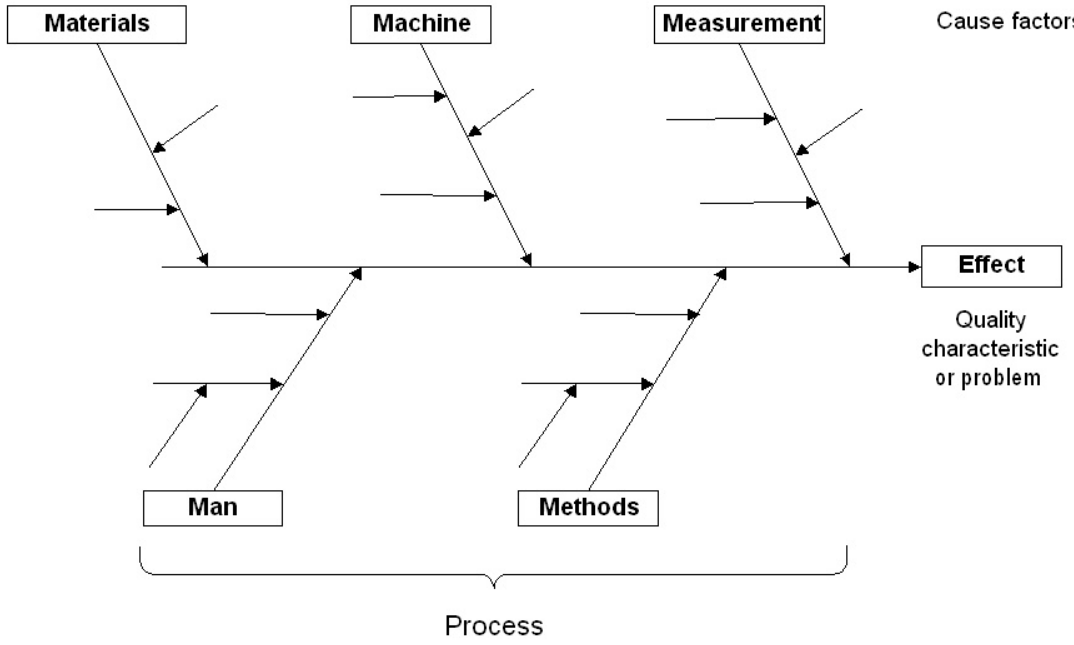

Figure 2 Ishikawa's Cause and effect diagram

The diagram is often used as a tool for solving problems with the cause factors being referred to as the 5Ms. Later, a sixth M was added using the French word 'Milieu' for Environment. These cause factors or variables are simply the vital few factors that influence the effect as in reality there could be an infinite number of such factors. The labels on the ends of the lines are the most common causes of the effect and are responses to the question "What makes this happen?" On the arrows feeding the cause are other causes in that group that arise from repeating the same question. Ishikawa astutely observes that the cause factors actually represent the process that creates the effect and therefore not unreasonably defines a process as 'a collection of cause factors'.

A different perspective ~ the 6Qs

While Ishikawa's 5Ms and later 6Ms are indeed significant cause factors, we can take a different perspective and use the word results instead of effects to change our perception of the tool and use it as a planning aid rather than a problem solving aid which was Ishikawa's original intent. However we will use 6Qs instead of 6Ms, with the Q standing for 'Question' These questions have been adapted from those initially published by Hoyle and Thompson in 2000 [2] and enable us to identify the primary factors upon which achievement of the required results depend. In order to determine the secondary factors we ask, "What are the factors upon which effective (primary factor) depend

The first Q ~ What are we trying to do?

Probably the most important factor in achieving results is in knowing what you are trying to do. Let us refer to this as the Objective. This may be known by many different labels,

- Aim
- Desire
- Ambition
- Goal
- Aspiration
- Intent

- Mission
- Requirement
- Vision

Clearly if we don't know what we are trying to do, any result will be acceptable. But even if we think we know what we are trying to do; there are several factors upon which effective objectives depend as shown in Figure 2.

Alignment: Our own objectives need to align with those of the Department in which we work, and that Department's objectives aligned with the organization's objectives and the organization's objectives aligned with those of society. Deming's expressed alignment with the phrase "constancy of purpose" [(2)]. A contemporary example is where sales plummet in an organization supplying 4x4 autos because the needs which they were designed to satisfy no longer align with the needs of society.

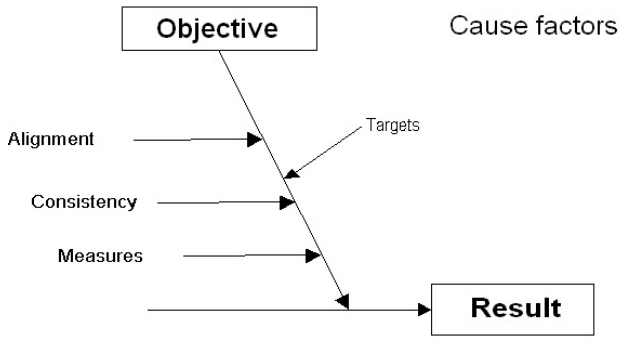

Figure 3 Factors affecting the effectiveness of objectives

Consistency: Everyone might have aligned objectives but it's important that those working together are united behind a common objective with a consistent interpretation so that are all driving the same directing expecting the same results from their efforts.

Measures: Objectives are no good without criteria for measuring when they are being achieved. However, the right measures have to be in place otherwise the achieved results as measured will not be consistent with the required results and they might encourage managers to cheat. E.g. If we measure health care by how long a patient is on a waiting list for an operation, hospital administrators are tempted to delay putting patients on a waiting list thus defeating the national objective of getting sick people back to work as quickly as possible.

Targets: We use measures for helping us look at the right things like response time, but need targets to tell whether the achieved result is good or bad. Sometimes the targets are overoptimistic and unachievable and on other occasions they are expressed inadequately. E.g The national ambulance service measures response time to an emergency call and has a target of responding to 75% of Cat A calls within 8 minutes. But if the ambulance arrives without the right equipment on board and as a result the patient dies when they would otherwise be saved, it has failed to achieve the objective regardless of it meeting the target.

The second Q – How will we make it happen?

An objective without activity accomplishes nothing, equally activities without an objective serves no purpose so the two go hand in hand and therefore answering our second question is vital for success. But making things happen depends on carrying out different types of activity each with a specific purpose as shown in Figure 3.

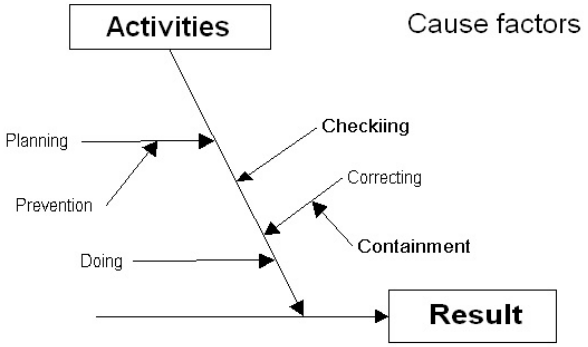

Figure 4 Factors affecting the conduct of activities

Planning: Fail to plan, plan to fail, therefore without planning; the objectives are unlikely to be achieved except by chance.

Prevention: No plans are robust unless their

architects have made provision minimising the risks. Asking "what if…." and then putting in place provisions to eliminate the possibility of failure, reduce it or control it before, during or after the event.

Doing: It should go without saying that having made plans they should be implemented, but the greatest cause of failure in any endeavour is not that there was no plan, but that it was not followed. So, doing what you say you will do is vital for success.

Checking: The plan should make provision for checking that it is feasible and that the processes are capable of delivering outputs of the quantity, quality and timeliness required. A failure to check progress and output without obtaining the necessary assurances is negligent.

Correcting: Checking outputs does not change them therefore if they are incorrect; action needs to be taken on the output and perhaps on the process that produced it to prevent further errors being generated.

Containment: Sometimes, correcting processes is not simple and temporary measures have to be taken to limit the impact of process weaknesses pending process redesign. Failure to take such action may divert resources away from other activities and adversely impact results.

The third Q – What competences do we need?

All plans need to be resourced in order to be implemented and foremost among these resources are the people who will manage and perform the activities specified. Results depend not only on having sufficient numbers of people but also on the competences of these people, for if they are not equipped with the right competences, throwing more people at a problem will not solve it. There are several factors upon which provision of effective human resources depends.

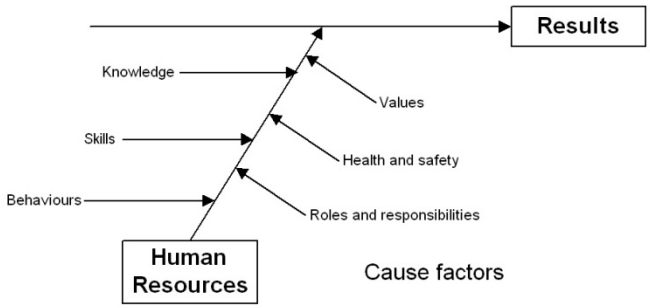

Figure 5 Factors affecting the provision of human resources

Knowledge: People not only need the right knowledge but the ability to apply it when circumstances demand. Thus a person who has merely passed an exam may not be able to use their knowledge to deliver the right results.

Skills: Training is intended to deliver skills but often it only delivers an experience. As with knowledge, acquired skills are of no use if the incumbent cannot use them to deliver the right results.

Behaviours: Regardless of skill and knowledge, a person's behaviour under operating conditions is often crucial to the results achieved. E.g. an arrogant and aggressive person is unlikely to win friends and influence people even though he might have a college degree and have been trained.

Values: There are some core values the organization stands for that translate into beliefs and produce acceptable behaviours. These values might be thought of as its moral compass. Display the wrong set of values and the written policies and exhortations will create the wrong environment for making workers productive.

Heath and safety: Harnessing the best people will not lead to success unless they are protected from the hazards of the workplace.

Roles and responsibilities: Creating and maintaining an organization in which the roles and responsibilities are clearly defined, communicated, understood and professionally executed by all is crucial to effective management. Conditions that create uncertainty, conflict, gaps or overlap will inevitably jeopardise success.

The fourth Q – What capability do we need?

In addition to competent people, organization will need a range of physical resources to equip them with the capability to deliver the required results. There are several factors upon which provision of effective physical resources depends.

Machines: Machines extend the capability of personnel who depend on them to achieve the results required. Neglect the machines and you reduce your capability and adversely affect results.

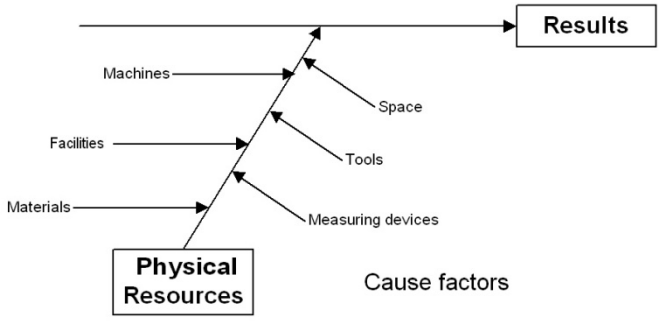

Figure 6 Factors affecting the provision of physical resources

Facilities: Some organization need no more than an office, others need acres of buildings and process plant to achieve their objectives. Success will depend on those facilities at the customer interface being capable of delivering a desirable customer experience.

Materials: The quality of the end product depends upon the quality of its constituent parts and materials. Integrity in the supply chain depends upon the parties involved honouring their commitment and having the capability to delivery quality product on time.

Space: Too little space and we work inefficiently, items get damaged and mislaid and we take risks. Success will therefore depend on having the right amount of space to work efficiently and safely.

Tools: Having the right tools in the right condition at the right time for the right job is important for success. Making do with inadequate tools reduces ones capability and jeopardises success.

Measuring devices: Accuracy and precision in measurement is crucial for success because there is no advantage in shipping product that is nearly right, you need to be as certain as you can be that it is right.

The fifth Q ~ How are we going to fund it?

Financial resources are the blood of an organization. Without funds none of the plans made can be implemented. Money is needed to pay the salaries, buy the materials, and build the facilities to produce the outputs that will deliver the required results. There are several factors upon which provision of effective financial resources depends as shown in Figure 7.

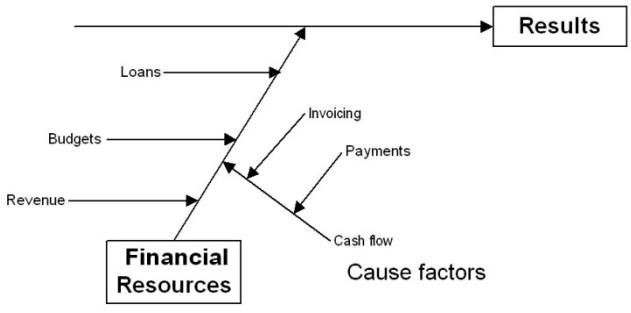

Figure 7 Factors affecting the provision of financial resources

Loans: As is evident from the current banking crisis, organizations are having

difficulty convincing their bankers to fund their ventures which is adversely affecting the success of any enterprise regardless of how sound the business proposition might be or how capable the organization is at achieving results.

Budgets: Having drawn up a plan for achieving an objective, one generally produces a budget that defines the financial resources required. When bidding for work, budgets are often underestimates and when bidding for funds they are overestimates – that's just human nature. However, when there are more pressing priorities budgets can be cut forcing planned activities to be curtailed putting the success of the project at risk.

Revenue: The revenue that a project will produce for the organization is crucial to its success. If the revenue falls below the level needed to cover costs, the success of the project is put in jeopardy and thus ways have to be found to achieve the required results at a lower cost.

Cash flow: If the cash is not flowing into the organization at the rate required to pay the bills the organization may have no option but to seek loans or cut non-essential expenditure. However, there are two determinants of cash flow; invoicing and payments.

Invoicing: Cash flow is not aided if invoices are not submitted and paid on time. The former is within the organization's control and the latter can now be expedited by banks but often the reason for non-payment is a customer that also has cash flow problems with their customers. Ultimately work might be put on hold until the cash begins to flow again, clearly indicating how crucial invoicing is to success.

Payments: Payments are the other side of invoicing. Some short-sighted financial controllers resist paying bills on time to ease their cash flow thus misaligning their objectives, but it can backfire when suppliers refuse to make further deliveries. In such cases, success is once again jeopardised.

The sixth Q ~ How will we know we are doing the right things right in the best way?

Without a compass, managers will only have their instinct and anecdote to tell them where they are going. It is therefore very important for managers to undertake regular and systematic measurements and reviews of the processes employed to deliver the required results. There are several factors upon which effective reviews depends as shown in Figure 8.

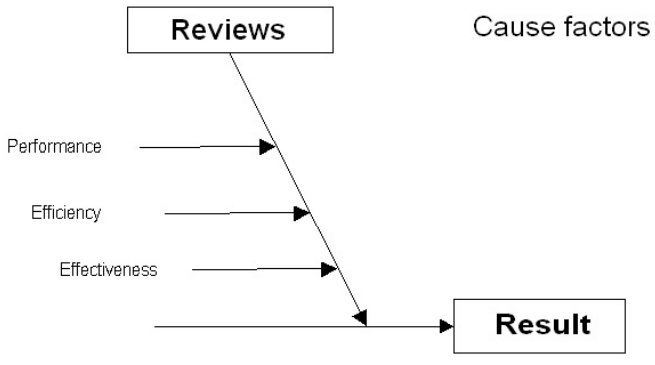

Figure 1 Factors affecting the conduct of reviews

Performance: Doing things right is about performing as planned, meeting the objectives as measured and on target. Having reliable data on every critical aspect of performance is crucial to the success of any endeavour.

Efficiency: Doing things in the best way is about doing things efficiently, using the most appropriate machine, tool, technique, solution or approach to do a particular job and not wasting time and other resources unnecessarily. So even if the objectives are being achieved there may be better ways of achieving them. Success in the long term depends upon efficient ways of working.

Effectiveness: Doing the right things is about doing things effectively, choosing the right objectives, the right measures, the right people, the right time, the right place, the right method etc. Depending

on when you start a journey or how long it is from when you last checked, by the time you have sufficient information to determine where you are going, you might find it's in the wrong direction; the objectives, measures and targets may no longer be relevant. As observed by Ishikaawa, standards and regulations are imperfect – they must be reviewed and revised constantly [(1)]. Sustained success depends upon recognising the need to change course when the circumstances upon which plans have been based change.

Summary

In summary we have made some key observations:

- The pursuit of quality is about closing the gap between the required results and the achieved results.
- Results are far more than the intended output of a process, they comprise
    - Outputs
        - Intended outputs
        - Unintended outputs
    - Outcomes
        - Benefits
        - Impacts
- There are many factors that affect our ability to achieve results but the principle ones can be placed in 6 distinct groups as indicated in Figure 9.

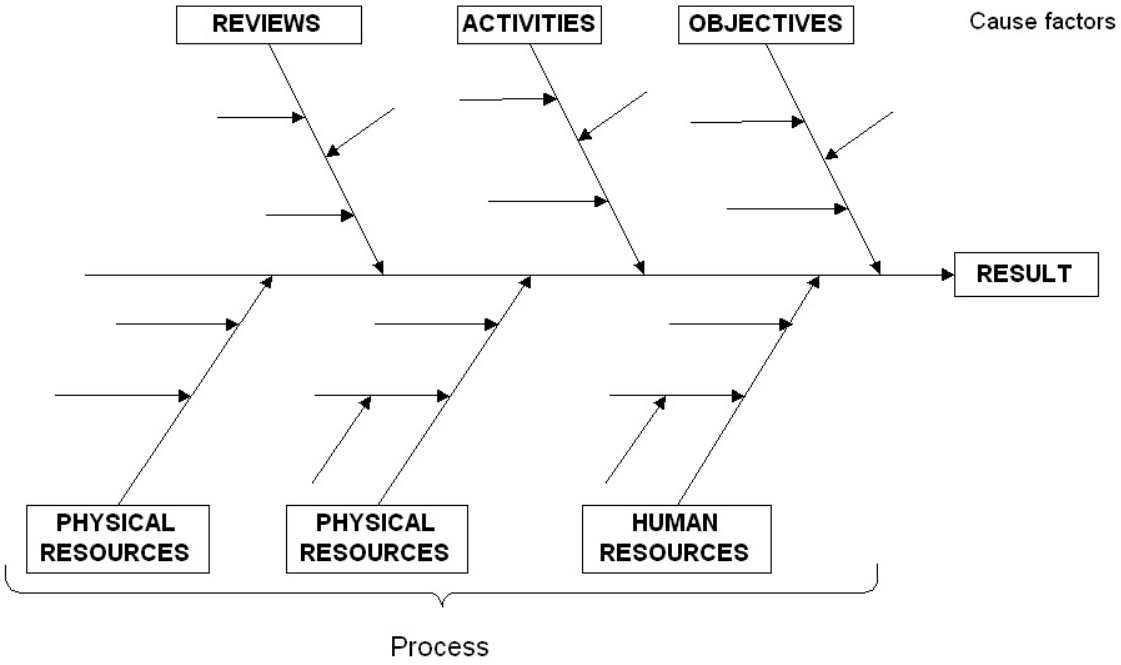

Figure 9 Key factors upon which successful results depend

- This collection of cause factors constitute the process
- These cause factors have to be under control for success to be assured
- To determine what is needed for success at each level we ask 6 questions:
    1. What are we trying to do?
    2. How will we make it happen?
    3. What competences do we need?
    4. What capability do we need?
    5. How are we going to fund it?
    6. How will we know we are doing the right things right in the best way?

Conclusion

The 6Ms used in the classic Cause and Effect Diagram are very useful in helping diagnose the cause of problems and can be used in product planning but the language is that of manufacturing. However, the visual effect of the diagram has great merit in showing the relationship between cause and effect and thus can be a powerful tool for identifying the factors that influence any results. By avoiding the language of manufacturing and using the language of the boardroom, we can create a tool for focussing the attention of management onto the key questions that will reveal what is needed for success. The questions can be asked at any level in the organization and for any level, people need to know the answers as they relate to their job, whether it be cleaning the floor or managing the enterprise.

References

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3. **Deming, Edwards.** *Out of the Crisis.* Cambridge : The MIT Press, 2000.