4. Process design (mapping and understanding processes)

Why process map?

Having created the system and identified the processes that make up the system the next stage is to understand them in more detail and particularly their cross-functional nature. In designing and effectively implementing a management system we need to understand the processes, measure them and finally improve them, based on the performance determined. This comes from the knowledge that nothing can be improved if it is not measured and nothing can be effectively measured unless it is firstly understood.

Process mapping is a technique that allows us to visually understand the process, who is involved and how the inputs into the process are translated into outcomes or deliverables. In Understanding ISO 9001:2000 and Process-based Management Systems, we discussed ISO 9001:2000 and the hierarchy of understanding that is used when designing management systems to separate the ‘what’ from the ‘how’. Processes are mapped at the ‘what’ level not the ‘how’ level ie what is to be achieved not how it is actually done. This is important because all too often business processes are mapped with too much detail with the result that they loose clarity and with it understanding. It is the understanding that is important at this stage – the detail can follow.

Processes can be mapped for many reasons:

- training and development;
- simply to understand what the process involves;
- to aid communication and awareness of ‘position’ in the process;
- to identify gaps and non-value adding steps or activities;
• to show who is involved, what they do and when;
• to demonstrate to all Managers and staff that processes deliver results not departments/sections ie cross-functional teamwork and understanding;
• to create the important link between the process itself and its critical performance measurements;
• to measure the effect of resources and people on performance;
• to identify business improvements;
• to meet the key requirements of ISO 9001:2000.

We mustn’t get confused here between process mapping and process modelling. Mapping comes before modelling ie to do process modelling you really need to understand the principles of process mapping first. Process mapping is concerned with understanding the process, who is involved and how inputs are turned into outputs. Process modelling is concerned with understanding and measuring the various impacts, such as resource use, budgets and time on particular activities in that process and through these manage the process to optimize its performance. Mapping provides clarity of the activity. Modelling provides clarity of efficiency and numerical understanding.

So what is a process map?

A process map describes, in pictorial form, how inputs are turned into outputs (or outcomes) through a series of joined-up activities (see Figure 4.1).

![Figure 4.1 Basic process map](image)

Popularized by Peter Checkland, this approach holds true for all processes and, indeed all systems, and it is the start point for mapping any process.

In mapping an individual process we need to begin by understanding where the process fits into the system and what the inputs and outputs/outcomes are. Understanding its position in the system allows us to more accurately define the inputs and outputs and identify what the purpose of the process is.
Understanding the purpose is important, as this will help shape and define the measures you will use to control and manage the process at a later date. This purpose should have been initially defined in the process identification session outlined in chapter 3.

If we take a working example of a management system we can explore how an individual process could be mapped. The management system shown in Figure 4.2 is, made up of core and support processes defining its ‘plan-do-check-act’ nature.

![Figure 4.2 A typical management system](image)

If we then take the winning business process we could define the purpose of the process, its inputs and outputs as shown in Figure 4.3.

Having defined the inputs and outputs and the purpose of the process the next stage is to determine what method to use to map the process. Strictly speaking you could write a process in any form, be that text-based, video etc and ISO 9001:2000 does not determine what method you should use. Convention, however, dictates that processes are mapped. There are two types of process map – one without swim lanes (see Figure 4.4) and one with swim lanes (see Figure 4.5). Don't worry about not being able to read the content – we will consider content later in the book.
Creating a Process-based Management System

Figure 4.3 Converting inputs into outputs via a process

Both methods are acceptable and both describe the flow of activity (the ). The major difference is that Figure 4.5 uses ‘swim lanes’ and Figure 4.4 does not. The main advantage in using swim lanes is that it becomes clearer and easier to see what is going on inside the process and to identify the correct cross-functionality to deliver the results required.

You will also see from both examples that there are also other conventions being applied to both maps.

Process maps flow from left to right

As a convention, people in the Western world generally read from left to right. The process maps or definitions also move from left to right rather than from top to bottom. Flowcharts that move from top to bottom are generally reserved for procedure rather than process definitions. This approach tends to make it clearer that there is a distinction between processes, which are managed cross-functionally, and procedures or work instructions, which are managed within a single team.
Figure 4.4 Process map not using swim lanes
Figure 4.5 Process map using swim lanes
**Use symbols**

There are international standards on symbols and their meanings to help map a process. Symbols are used to aid understanding and help describe the ‘picture’. In both Figure 4.4 and Figure 4.5 symbols have been used and the number of different types kept to a minimum (see Figure 4.6).

![Figure 4.6 Process mapping symbols](image)

This does not mean that you cannot use other symbols if needed or want to – it is just that many organizations prefer to keep the maps simple and easy to understand. Adding complexity can reduce the effectiveness of the maps as not everyone will necessarily understand what different symbols mean.

**Use active verbs to describe process activities**

Each activity or step in the process needs some form of notation to help describe what is happening. This doesn't need to be a lot of detail but sufficient to make it clear what is happening. Use active verbs to start each phrase and, if possible, define the desired outcome of the activity, i.e. what is being achieved. As an example we could define part of a process as in Figure 4.7.

We could also define part of the process as in Figure 4.8, which does not have outcomes defined and therefore loses clarity and could lead to misinterpretation.
Define critical activities and cross-functional interfaces

A part of any process map or definition is to define the cross-functional interfaces that occur quite naturally within the process. If you are using swim lanes this is of course easy to demonstrate. Each lane defines the function carrying out the task. Whether or not this is a person, depicted by a job title or a department, each lane defines who is responsible for carrying out the task.

If you are not using swim lanes then the responsibility for each task/decision needs to be shown so that it is clear who is doing what, and this is often shown printed alongside each activity.

Sometimes, when mapping a process, you may find that the activities tend to fall into one department or section or are the responsibility of one person. If this occurs then you are probably writing a procedure or a functional/
departmental activity. This is a sign that the correct processes have not been identified when the system was designed, and there is a real danger that you are mapping departments or functions rather than processes which by their nature are cross-functional.

**Figure 4.8 Process activities without outcomes**

**Map using up to three levels of consistent detail**

There have been many books and guidance documents written about process mapping and the conventions to follow. Often these will seek to explain how many ‘boxes’ or ‘steps’ should be shown on each process map. The key thing here is not the number of steps but how easily the map is communicated and
understood by the people who need to use and work with it. These maps should be intuitive to use and navigate and should be understandable in no longer than about two minutes. What is appropriate for one organization, its managers and staff may not be appropriate for another; there are no simple answers, except the two-minute ‘rule’.

To illustrate this point an organization could decide that all the process maps need to be viewed via a PC based system, over the internet or intranet rather than being paper based. They could then decide that they want staff to be able to see the processes without scrolling vertically or horizontally. The constraint of the screen would therefore mean that only four to six steps would be in view at any one time, necessitating the use of sub-processes to supplement the information. This could therefore look something similar to what is shown in Figure 4.9.

![Figure 4.9 Processes and sub-processes](image_url)

Although this may break all the normal conventions associated with process mapping it does meet other critical requirements, namely that the maps are:
• designed with users and the organization in mind;
• produced in a manner that can be communicated easily within the organization;
• created so that those who need to use them can easily understand them.

Another organization may decide that scrolling vertically is acceptable but not scrolling horizontally. What is important is to define each map to a single level of detail – ideally no map should include both overview activities and very detailed ones. Generally, this requires mapping at three levels – system level (which we discussed in chapter 2), process level (the subject of this chapter) and procedure or work instruction level (see chapter 5). If there are no other constraints then a sensible map should be capable of being displayed on one sheet of A4 paper, so aim for between 8 and 15 steps and you will have a business process adequately defined. Any lower-level detail required can then be attached to each step, as either a sub-process or procedure, as required.

Using sub-processes in this way helps to achieve the appropriate level of consistency. Sometimes a process may be large or complicated, necessitating the need to break it down into manageable ‘chunks’ of activity or sub-processes. Just because you need sub-processes for some processes does not mean you need sub-processes for all processes – it just depends on the process involved, and the risks that you are managing.

The principle of designing and mapping a sub-process is exactly the same as outlined above. They are cross-functional and describe what is done and not the how the activity is performed. If they are not cross-functional, then you are probably looking at a departmental or team procedure.

The number of levels you need is based upon how complicated the process actually is. Aiming for a maximum of three levels is sufficient for most organizations and provides a parameter to aim for. Finally, remember, once you find yourself mapping the ‘how you do something’ rather than the ‘what you do’ then you know that you have moved to a level too ‘low’ ie there is too much detail and you have moved into procedures.

**Apply the 80:20 rule**

Based on the well-known Pareto principle that 80 per cent of the impact is caused by 20 per cent of events this can be used to help map the process. Often it is not possible, or indeed sensible, to map every possible eventuality, what is important is that we map the critical steps in the process to demonstrate how process
deliverables or outcomes are achieved. Adding every eventuality can ‘cloud’ or distract from the bigger picture and make the process definition difficult to understand and follow. Remember that you are trying to communicate, not to show how much you know!

**Use supporting information to show the ‘How’**

Once the process map has been defined the next design phase is to attach/align any supporting information needed to show ‘how’ a particular step or activity is carried out. The main principle is to take each step in a process and determine whether or not supporting information is needed to clarify a task or action or add any further information that the person taking that action needs. This will vary from organization to organization and from person to person and needs to take into account any regulatory issues to be complied with. The decision as to whether or not supporting information, including the need for procedures and work instructions, is needed is often based on the risk of something going wrong if they are not in place. Supporting information could be as shown in Figure 4.10.

![Figure 4.10 Supporting information](image)

In this example the activity in the process is completed using a range of supporting information and documents. Of course a situation may arise where
there isn’t any supporting information, which is equally valid providing you know why additional information is not required.

From our experience the main mistake system designers make is that the supporting information covers more than one activity in the process. When this occurs there is a danger that the designer ends up, in effect, rewriting the process but at a procedural level. This can create confusion and unnecessary duplication and should be avoided.

**How do we map a process in reality?**

Initially processes are best mapped by those involved in the process itself. It is very common to find that no one particular person has a complete and detailed understanding of a process. Involving people in the design increases the chance of getting the process definition (the map) as accurate as possible the first time. Mapping processes should be a team activity if you want to maximize the effect.

One of the biggest dangers in mapping a process is that you will go into too much detail too soon. Remember, you are mapping business processes not low-level detail, the ‘what’ not the ‘how’, so a consistent level of mapping is important. Often a facilitator is also involved who understands the principles of mapping and can:

- provide training on the principles of process mapping;
- help in dealing with conflicts or disagreements;
- manage the ‘pace’ of the meeting to ensure the objective is achieved;
- act as ‘scribe’, leading the team as required allowing the process team to concentrate on the task in hand;
- most importantly, keep the team operating at the ‘what’ level;
- and help the team reach consensus on contentious issues and points.

**What does the future hold for process mapping?**

Process mapping as a technique has been used for a long time to help understand processes and how cross-functional teams work together to achieve outcomes. In that time the principles have not really changed and with the introduction of ISO 9001:2000 the approach has been widely adopted as the method for defining business processes.

Using this approach when defining processes is important because as the management system matures and evolves so the importance of the process maps become more important. This can be seen from the following examples.
• Process modelling, which uses the basic maps that have been created and adds more information to these such as the cost and time taken for each activity, or perhaps the percentage success of each decision. Such information allows the process manager or owner to use the data to make improvements to the process that will optimize its performance.

• Corporate governance, which is concerned with the impact and ability of senior management to manage their organization in the appropriate manner to protect and enhance the interests of all stakeholders. At the centre of this is the ability of management to manage their organization by optimizing process performance taking into account all factors that would influence success. Just think about it. Would you invest in an organization that did not have a clear understanding of how it actually worked, improved and changed and how it was managed?

• Process improvement, the key to which is understanding the process. It forms the starting point of process improvement, from which the cause of a problem or issue is identified and the subsequent solution developed and actioned. It is really a case of going back to the point that was made earlier – in order to implement improvements effectively you need to understand and measure the process before you can improve the process.

• Benchmarking, which is a management tool used to ‘test’ one process against another – perhaps in another organization in the same industry sector or perhaps against a well-known market leader. Although often difficult to achieve a complete comparison in reality, the aim is to identify where individual or parts of processes can be improved based on the results achieved. What makes results and processes difficult to compare in different organizations is that the influences on process performance tend to vary from one organization to another. Examples of causes include culture, constraints, market conditions, competence of people etc. Even if you can eliminate these, however, you still need to be able to compare like-for-like processes, in terms of similar inputs and outputs, if benchmarking is to be worthwhile.

• Auditing the management of processes, which is an essential part of the system itself is the subject of Process Management Auditing for ISO 9001:2000. Its aim is to ‘test’ the management and flow of the process. From this you can identify areas of improvement where the use of, for example, resources or data is causing the process to be sub-optimal or preventing the process from performing effectively. Audit findings are provided to senior management from which decisions on improvement activity can be prioritized, agreed and implemented.

Process mapping and ISO 9001:2000

Process mapping is a technique – an approach to helping you understand and define the processes that run your organization. As far as ISO 9001:2000 is
concerned, the processes need to cover all parts and clauses. Remember the standard covers activities and activities are covered in processes:

Table 4.1 Aspects of the standard

<table>
<thead>
<tr>
<th>Aspect of the standard</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top management</td>
<td>Activities of all managers at all levels are included as steps in the appropriate process. As processes are cross-functional they quite naturally cover the necessary management activity and decision-making</td>
</tr>
<tr>
<td>The clauses themselves</td>
<td>Each of the four main clauses i.e. 5, 6, 7 and 8 are covered by the appropriate process or combination of processes. The clauses describe activities and activities are defined within processes. Very rarely will you find that one process directly relates to one clause only. It is quite natural in terms of how a business runs to cover aspects of individual clauses in one or more process</td>
</tr>
<tr>
<td>Roles and responsibilities</td>
<td>These are defined by the using either a swim lane style of process design or by allocating job titles or roles to particular activities. You can use roles to describe activities, for example: senior management, board, project team or specific job titles such as Operations Manager, HR Assistant, Operator. A combination of both is often useful and easier rather than worrying about one or the other – especially where the same process is applied across the whole of the organization e.g managing people</td>
</tr>
<tr>
<td>The mandatory procedures</td>
<td>The six mandatory procedures required by the standard are included as support documents such as described above and should be positioned accordingly. Just because they are mandatory should not make them more or less important than your other procedures</td>
</tr>
</tbody>
</table>