

Process Definition Overview

Glenn Booker

rbooker2@csc.com

Computer Sciences Corporation
Federal Sector
Defense Group
Supply Chain Solutions
JCALS Quality Management Organization

August 28, 2001

ABSTRACT

This document describes how to prepare a swimlane diagram to describe a business or engineering process, and link that diagram to a process table for additional relevant information. Ensuring process compliance to various process quality models, such as the Capability Maturity Models and ISO 9000, is also addressed.

Table of Contents

INTRODUCTION.....	1
SCOPE and ASSUMPTIONS.....	1
DEFINITIONS.....	2
Acronyms.....	2
External vs. Internal Process Definition Teams.....	3
OVERVIEW.....	3
DETAILED DESCRIPTION.....	4
1. Define Tasks.....	4
2. Assign Brief Name.....	5
3. Arrange Tasks Chronologically.....	7
4. Identify Organization.....	11
5. Create Swimlane Diagram.....	14
6. Verify Decisions.....	17
7. Identify Work Products.....	18
8. Verify Process Model.....	19
9. Make Process Table.....	21
CONCLUSION.....	22

INTRODUCTION

Many organizations seek a better understanding of their business and engineering processes. Some common motivations for this include:

- To capture innovative, obscure, and/or frequently used activities
- To help clarify the boundaries of activities, such as roles and responsibilities
- To avoid redundant or missed work (“missed” in the sense of: “I thought you did it, and you thought I did it – uh oh, *nobody* did it!”)
- To provide a clear way for new employees to understand “how we do things here”
- To demonstrate meeting the standards established by various process quality models (e.g. the [Capability Maturity Models](#), [ISO 9000](#), [Malcolm Baldrige](#), etc.)
- To establish a clear basis for demonstrating continuous process improvement

One way to understand processes more clearly is to depict them graphically. This can provide a quickly understood picture of the activities involved, and who does them. Once the graphical representation is defined correctly, additional details can be added to refine the process description even further.

This document describes how to develop a graphical representation of a process in the form of a *swimlane diagram* and expand on that diagram with additional relevant process information in tabular form (a table of supporting information for that process, or *process table*).

SCOPE and ASSUMPTIONS

It is assumed that “business and engineering processes” refers to the activities performed by people to accomplish some sort of business or technical function (e.g. develop software, inspect manufactured parts, perform configuration management, train new employees, conduct a peer review, etc.).

This document does not address processes of the chemical engineering variety, in the sense of the large scale production of chemical compounds – that’s a very different type of process definition!

It is assumed that the results of process definition (here, a swimlane diagram and a process table) will later become part of a larger document (e.g. a process description) to describe the process in question.

While it is implied throughout this document that the reader is documenting a process which is already in use, the same steps can be used to document a new or proposed process.

There are many other ways to describe processes (e.g. Flowchart, Timeline, Input/Output chart, and Data Flow Diagram, to name a few). The method presented here helps focus attention on the type of work to be done, who does it, and what kind of information is needed to do the work.

DEFINITIONS

An “**activity**” and a “**task**” are used interchangeably in this document. Either refers to some specific work to be done by one or more people. Each bubble in a swimlane diagram is often referred to as a “task”.

By “**process**” we mean a set of activities which involves substantial interaction among two or more organizations. If a single organization performs most or all of the activities, the description of those activities is generally considered a “**procedure**.”

“**Process definition**” refers to generating a swimlane diagram and process table, as described in this document.

In contrast, a “**process description**” is a document which includes the results of the process definition and also describes the process in more detail, such as who owns it, where to find the related procedures, how the process is measured, and so on.

A “**swimlane diagram**” is a figure to represent the sequence of tasks and decisions in a process. Each task is represented by a bubble with the task’s brief name in it. The horizontal dimension of the swimlane diagram is time. The vertical dimension consists of bands or lanes, where each lane is an organization (CM) or specific role (QA Manager). The tasks described by each bubble are performed by the organizations (lanes) that bubble occupies.

A “**process table**” is a table which helps elaborate on a swimlane diagram. The diagram and the table are linked by the numbers and names of tasks and decisions. So if the swimlane diagram has a task named “5. Prepare Metrics Report”, then the process table will have an entry labeled “5. Prepare Metrics Report”, and the process table will describe in more detail what is meant by the phrase “Prepare Metrics Report”.

The “**end users**” of a process are the organizations who perform the process. End users should be heavily involved in process definition, since they are often the final authority on how a process works.

Acronyms

CM	Configuration Management
CMM	Capability Maturity Model
IRS	Internal Revenue Service
ISO	International Organization for Standardization
JCALs	Joint Computer-aided Acquisition and Logistic Support
KPA	Key Process Area
PM	Project (or Program) Management
QA	Quality Assurance
TQM	Total Quality Management

External vs. Internal Process Definition Teams

Process definition may be performed by either an “external team” or an “internal team.”

An *external team*, such as a Process Improvement Team or Software Engineering Process Group, goes from group to group within a larger organization and helps define their activities. Hence an external team does not have much expertise in the activities being defined, and will require more frequent review of their work by the end users. However an external team will generally produce processes which are very consistent in format, style, and level of detail.

Process definition may instead (or also) be done by an *internal team* - any organization whose people define their own processes. Hence an internal team is generally also the end user of the process. This is typically done where the organization has had everyone trained in the basics of process definition. It usually results in faster definition of each process, but requires more effort to make sure that all processes are defined consistently.

The term “team” may be used loosely in this context – either kind of process definition team (whether external or internal) may be as small as one person. The method for process definition described in this document may be used by both external and internal teams.

OVERVIEW

Process definition consists of nine activities. These nine activities are performed iteratively for each process to be defined, until the process definition team agrees the final product is correct and complete. The activities in brief are:

1. Define Tasks - define the major tasks to be performed within this process
2. Assign Brief Name – assign a brief name to each task
3. Arrange Tasks Chronologically – determine in what order the tasks occur, including which tasks occur at the same time
4. Identify Organization - identify what organization or role performs each task
5. Create Swimlane Diagram - put tasks on a swimlane diagram
6. Verify Decisions – verify that all decisions and inspections are included, then number each task and decision
7. Identify Work Products – identify major work products, both inputs and outputs, for each task
8. Verify Process Model (optional) - verify that process quality model objectives are met
9. Make Process Table - make a table to describe each task in more detail

Throughout this process, the results should be verified periodically by the end users and other stakeholders in the process. The number of reviews needed, and where they fall in the above sequence, needs to be determined by the process definition team. In general, external process definition teams will require more frequent reviews than internal teams.

DETAILED DESCRIPTION

Each of the nine steps in process definition is now described in detail.

Example: Throughout this description, a process definition example is followed: “Doing Your Taxes.” The example is described in a nearly stream-of-consciousness manner, to help show how it evolved. It is written from the point of view of a taxpayer documenting their process for filing individual Federal income tax.

1. Define Tasks

Start process definition by brainstorming about all of the kinds of activities which are associated with the process. Try not to edit the ideas as you get them – just make a list and sort it out later.

If you find yourself stuck on things (e.g. documents, databases, hardware, etc.) and can’t think of activities, ask what you do to those things (write, edit, populate, design, test, clean, etc.). That should get you started on activities.

Keep in mind that the list you create here probably won’t be complete, but it should be enough to get started and provide enough structure to help you figure out the other tasks later.

Example: For the “Doing Your Taxes” example, Table 1 shows the results of brainstorming on the subject of doing tax returns.

Table 1. Example of Tasks

Get check from Uncle Sam and spend it real fast See if I can find a good accountant Buried in mindless paperwork Fill out forms until my eyes bleed Look in checkbook for deductions Now that it’s all over, collapse! Rush to the Post Office
--

2. Assign Brief Name

Now we can look at the tasks defined so far, and start to refine the task list.

- Any activity that takes place during this process is worth keeping for now.
- This step can help identify scope issues for your process – which activities are part of this process, and which aren't? If you aren't sure, it's safest to leave questionable steps in the process, and later ask end users or other experts whether they really belong there.
- Similarly, this activity can help identify assumed entry and exit conditions for this process - what events are assumed to have happened before starting this process, and which events take place after it?
- This step will also help recognize when another step might have been left out of the initial task list. Reviewing the task list will often remind the process definition team of other related tasks.

Each activity, or task, needs a *brief name* so we can refer to it easily in the swimlane diagram. The brief name should be kept to about five words or less (so it fits in the bubble!), and starts with an action verb. An action verb is the kind of verb you use to order someone to do something, like “Clean your room!” or “Get out of my way!”.

Keep in mind that each activity may later be spelled out in more detail in a separate procedure, but for now it's summarized in a brief name called "Compile Build" or "Analyze Risk Impact" or whatever the case might be. To help remember the other details of each task's scope, it's a good idea to start writing a more detailed Description for each task at this point.

Notice that brief names do *not* need to mention *who* is performing the task. The swimlane diagram defines roles graphically, so it would be redundant to use a brief name like “CM Compiles Build”. We can just use the brief name “Compile Build” and later put it in a lane called “CM”. This is a key advantage of the swimlane diagram over other graphic process tools, such as a flowchart – the swimlane makes it easier to understand how each organization contributes to the process.

Brief names should be unique within a process, so that there is only one possible meaning of a given brief name. This is particularly important because one task may occur as a result of several different events in a process. For example, it is important to be clear that a task called “Review QA Plan” means one specific set of activities, even though that task name may appear three times in different places in one process.

Example: Table 2 shows how the previous task list was cleaned up, refined, and assigned brief names. Comments in parentheses help explain the rationale behind what was done.

Notice that task descriptions tend to get more generalized from the initial thoughts, which are often very specific - such as going from the specific “Rush to the Post Office” to the more general “Submit Return,” which allows for the possibility of filing electronically.

Table 2. Defining Brief Names

Original Table 1 Entry	Brief Name	Description (and Comments)
Get check from Uncle Sam and spend it real fast	Spend Refund	Cash or deposit refund check and spend it. (Is this out of scope for this process? Keep it for now.)
See if I can find a good accountant	(none)	(Ignore as a task, but it points out our implied assumption that we have already selected an accountant if we're going to use one.)
Buried in mindless paperwork	(none)	(Ignore – not an activity)
Fill out forms until my eyes bleed	Fill out Forms	Complete tax forms. (Could be done by us, or by our accountant.)
Look in checkbook for deductions	List Deductions	Use checkbook to make a list of deductions. (This reminded us that we need to have been identifying deductions before we could make a list of them, hence another task is also needed.)
	Identify Deductions	Over the course of the year, note transactions in the checkbook which have tax consequences (taxes paid, donations, deductible interest, etc.). Also, save receipts from things which will be deductible.
Now that it's all over, collapse!	(none)	(Ignore – not a relevant activity. But it could remind us of the need to clean up after we're done)
	Clean Up	File away your copy of the return in a safe place for future reference.
Rush to the Post Office	Submit Return	Submit return, either in paper or electronic form.

3. Arrange Tasks Chronologically

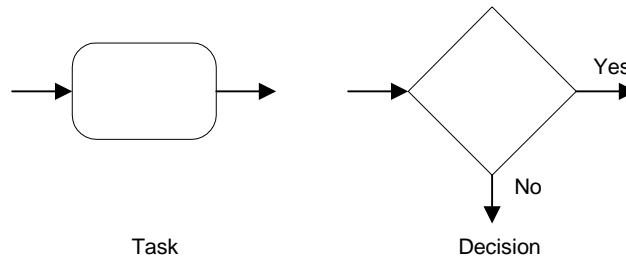
Now that the task list has been refined and has had brief names assigned, we can pay attention to the order in which these events take place. To do this we need the first two shapes for our swimlane diagram, the task (balloon) and the decision (diamond).

The shapes shown in this document are from the TQM Diagram Flowchart template in Microsoft Visio. Naturally, these are not the only shapes (or software) which can be used for these purposes. Any shapes can be used, as long as you're consistent across the organization.

Figure 1 shows the balloon and diamond shapes used in the swimlane diagram. The balloon is used for tasks, and the diamond is used for decisions.

The outputs from the diamond can point up and/or down, depending on what makes the diagram look tidiest. The decision diamond can show a Boolean decision (Yes/No, True/False, Accepted/Rejected) or select from a brief list of options. For example, a decision diamond could be "Determine Priority?", and give three different options for choices of "Low", "Medium", and "High."

Figure 1. Task and Decision Shapes

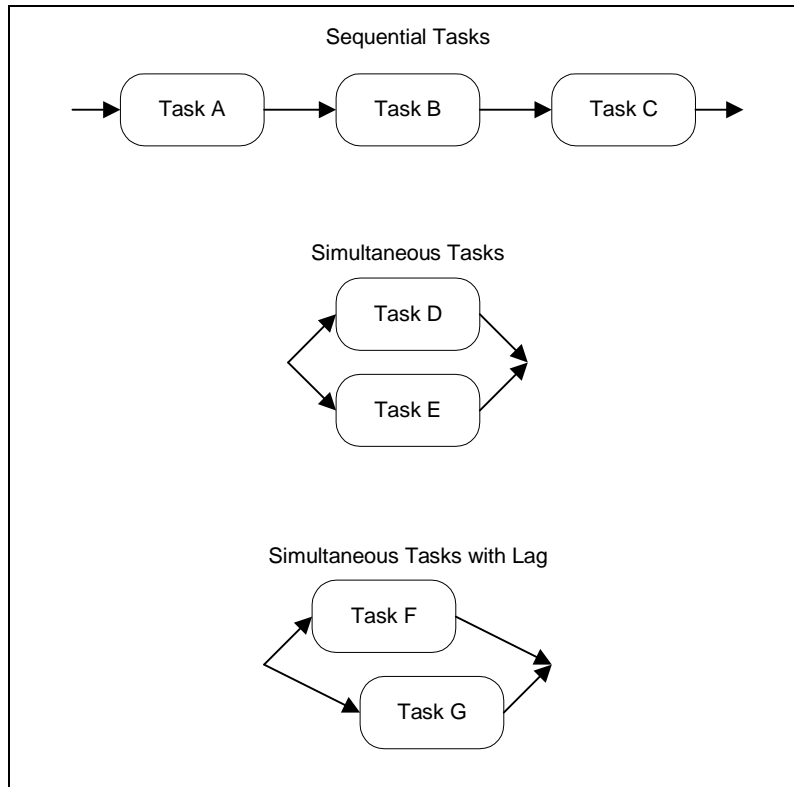


Tasks are generally either sequential or simultaneous, as shown in Figure 2. Sequential tasks take place one after another, e.g. do task A, then do task B, then do task C. Simultaneous tasks take place at the same time, e.g. do tasks D and E together. Simultaneous tasks can also be defined in more complex ways, such as:

- Start one task, then when that is partially completed, start a second task. This is a "lag" in the start of the second task. In Figure 2, Task G starts some time after Task F starts. The amount of lag should not be inferred from a swimlane diagram. The exact amount of lag can be described in the process table, or in the procedures to describe each task.
- Start two tasks so that they finish at the same time. This is hard to show in a swimlane diagram, since the time scale isn't linear, so this kind of distinction needs to be noted in the task Description in the process table.

One way to put tasks in order easily is to write each brief name on a different Post-It note (or something similar). Then rearrange the notes until the process definition team agrees it's correct, making additional notes about areas which are unclear (if any).

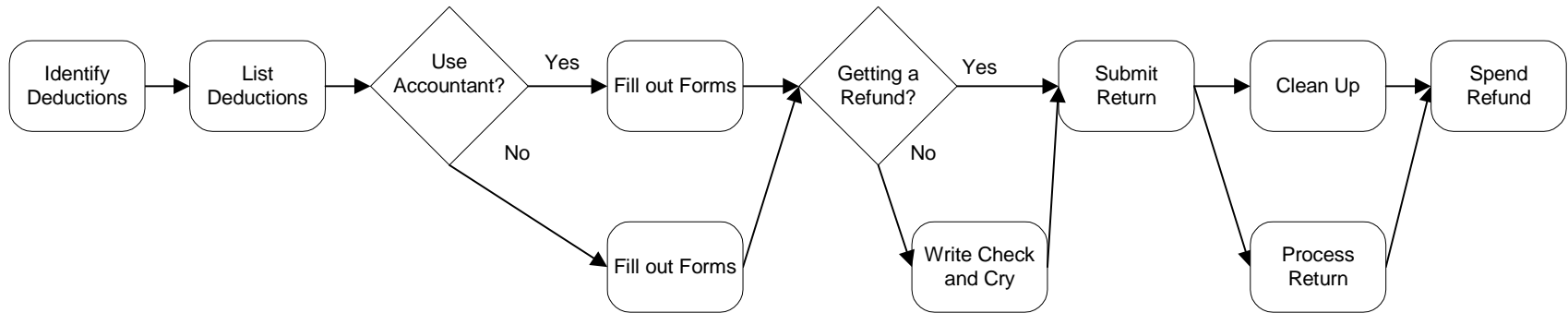
Figure 2. Sequential versus Simultaneous Tasks



Example: Figure 3 shows the results of putting the example’s tasks in chronological order. Table 3 gives the new list of tasks, based on the follows things learned in this example:

- One issue is whether the taxpayer is hiring an accountant to do their taxes, or doing them themselves. Since this might change from year to year, plan on allowing for either possibility. This results in the new task entry, a decision called “Use Accountant?”.
- The example also needs a task to bridge between submitting the return, and getting a refund. This results in a new task, “Process Return”. Notice that tasks can be identified which are not controlled or performed by the team who is performing the process definition.
- The task list assumed the taxpayer always gets a refund, so another decision is needed to ask if they are “Getting a Refund?”. If not, then we have a task to “Write Check and Cry.” Notice that even a task’s brief name can be full of hidden assumptions and opinions!
- This process definition example doesn’t include filing a state income tax return, and doesn’t include the possibility of getting audited by the IRS. These scope assumptions would need to be documented in the process description.

Figure 3. Task Sequence Diagram



- The tasks “Clean Up” and “Process Return” are happening at about the same time, so they are shown as simultaneous even though “Clean Up” might take a few minutes, while “Process Return” could take days or weeks.

Table 3. Revised Task List

Brief Name	Description (and Comments)
Identify Deductions	Over the course of the year, note transactions in the checkbook which have tax consequences (taxes paid, donations, deductible interest, etc.).
List Deductions	Use checkbook to make a list of deductions. Find receipts as needed to prove deductions really exist.
Use Accountant?	Determine whether to use an accountant to do our taxes.
Fill out Forms	Complete tax forms.
Getting a Refund?	This is a decision based on whether we’re getting a refund, or owe more money
Write Check and Cry	If we owe money, we need to write a check to Uncle Sam.
Submit Return	Submit return, in paper and/or electronic form.
Process Return	Uncle Sam processes the return
Clean Up	File away your copy of the return in a safe place for future reference.
Spend Refund	Cash or deposit refund check (if the taxpayer got one)

4. Identify Organization

The next step is to identify what organization performs each task, or makes each decision, in this process. This will determine the vertical position of each shape on the swimlane diagram.

Each "organization" in the swimlane diagram can represent one or more groups of people, either inside or outside of your organization:

- A group of people ("CM", "QA", "Software Development Group", etc.)
- A single person (identified by their role, such as "QA Manager", "Project Manager", etc., rather than by their personal name)
- Multiple groups of people who all act the same in this process ("Integration and Testing", "End Users, PM Office, or Congress", "Remote User", "Any Manager", etc.).

The last option helps simplify the chart if several groups of people all act the same with respect to this process, such as the "types of people who might submit a change request for your system."

To help ensure consistency across processes, the process definition team should use organization names and role titles from a single authoritative source. For example, the Project Management Plan might be used as the authority on the correct name for each organization and role.

Example: First we need to define the possible roles and organizations, as shown in Table 4. Then in Table 5 we take the task list from Table 3 and indicate which organization will perform each task.

Table 4. List of Organizations

Organization	Description
Taxpayer	The person for whom personal federal income tax needs to be submitted. Might include two people in the case of a joint return, but otherwise is only one person.
IRS	The Internal Revenue Service, here in their capacity to process the taxpayer's return and (hopefully) write a refund check.
Accountant	A person hired by the taxpayer to fill out and submit their tax forms.

Table 5. Task List with Organizations

Brief Name	Organization	Description (and Comments)
Identify Deductions	Taxpayer	Over the course of the year, note transactions in the checkbook which have tax consequences (taxes paid, donations, deductible interest, etc.).
List Deductions	Taxpayer	Use checkbook to make a list of deductions. Find receipts as needed to prove deductions really exist.
Use Accountant?	Taxpayer	Determine whether to use an accountant to do our taxes.
Fill out Forms	Taxpayer or Accountant	Complete tax forms.
Getting a Refund?	Taxpayer or Accountant, and IRS	This is a decision based on whether the taxpayer is expecting a refund, or owes more money. The same decision is also made later on by the IRS.
Write Check and Cry	Taxpayer	If we owe money, we need to write a check to Uncle Sam.
Submit Return	Taxpayer or Accountant	Submit return, in paper and/or electronic form.
Process Return	IRS	Uncle Sam processes the return and, if appropriate, issues a refund check.
Clean Up	Taxpayer	File away your copy of the return in a safe place for future reference.
Receive Refund	Taxpayer	Receive refund check (if applicable)

Note that some tasks in Table 5 are performed by two possible organizations. For example, Submit Return might be done by the accountant, or by the taxpayer if they don't use an accountant. The "or" in that statement implies that there will need to be two copies of the task in the swimlane diagram – one for each possible role to perform that task.

Also in Table 5, notice that the last task, "Spend Refund", was changed to "Receive Refund". It's more to the point of this process that the tax return process is completed once a refund check has been received by the taxpayer – it's not relevant what the taxpayer does with that check (e.g. spend it, invest it, make origami, etc.).

Hmmm, that "Taxpayer or Accountant" category going to make the swimlane diagram get messy real fast. How about if we create a new organization called "Tax Preparer", which is defined as "either the taxpayer or the accountant, depending on whether an accountant was hired"? This would get rid of a lot of duplicate task bubbles, and eliminate the "Use Accountant?" decision.

Tables 6 and 7 show the revised list of organizations, and the revised list of tasks, based on creating the new organization called "Tax Preparer."

Table 6. Revised List of Organizations

Organization	Description
Taxpayer	The person for whom personal federal income tax needs to be submitted. Might include two people in the case of a joint return, but otherwise is only one person.
IRS	The Internal Revenue Service, here in their capacity to process the taxpayer's return and (hopefully) write a refund check.
Tax Preparer	If the taxpayer hires an accountant to fill out and submit their tax forms, then the accountant is the tax preparer. Otherwise the tax preparer is the taxpayer.

Table 7. Revised Task List with Organizations

Brief Name	Organization	Description (and Comments)
Identify Deductions	Taxpayer	Over the course of the year, note transactions in the checkbook which have tax consequences (taxes paid, donations, deductible interest, etc.).
List Deductions	Taxpayer	Use checkbook to make a list of deductions. Find receipts as needed to prove deductions really exist.
Fill out Forms	Tax Preparer	Complete tax forms.
Getting a Refund?	Tax Preparer, and IRS	This is a decision initially based on whether the taxpayer is expecting a refund, or owes more money. The same decision is also made later on by the IRS.
Write Check and Cry	Taxpayer	If we owe money, we need to write a check to Uncle Sam.
Submit Return	Tax Preparer	Submit return, in paper and/or electronic form.
Process Return	IRS	Uncle Sam processes the return and, if appropriate, issues a refund check.
Clean Up	Taxpayer	File away your copy of the return in a safe place for future reference.
Receive Refund	Taxpayer	Receive refund check (if applicable)

5. Create Swimlane Diagram

Now we define the process as a series of tasks, where each task is represented by a bubble on the swimlane diagram.

The horizontal scale on the swimlane is time, so that tasks which are stacked above or below each other are happening at the same time. The time scale isn't linear, so a task which takes five minutes to perform may be as big as one which takes a week. Time determines the relative horizontal position of each task on the swimlane diagram.

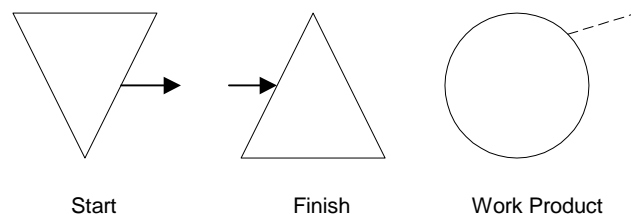
The relative position of organizations on the diagram can be hierarchical (managers always at the top), or just be conveniently chosen to make the diagram as visually clear as possible. Again, pick your convention and use it consistently across all processes. If using the convenience method, then the organization at the top of the page is the first organization involved in this process, and usually the next organization down is whoever the first organization hands off their work products to, and so on down the chart. Task bubbles may be reshaped to cross several organizations' lanes, if needed.

A swimlane diagram may extend across multiple sheets or pages. If possible, keep the list of organizations consistent from one page to the next – this makes it easier to follow the chart. A page might hold 6 or 7 organizations in the format shown. In extreme cases, you might have to introduce new organizations on a new page, and get rid of ones which are no longer involved in the process. Of course, if your process involves that many organizations, you might want to consider breaking the process into more than one document.

The first and last steps in the process may be given special shapes, or they can just use normal task bubbles. Pick your convention, and again, keep it consistent. Here we use special start and finish shapes to help make it clear when the process begins and ends.

In order to make the swimlane diagram, we need to introduce the other kinds of shapes. Figure 4 introduces two different triangle shapes for the beginning and ending steps in the process, and the round shape used later for work products.

Figure 4. Start, Finish, and Work Product Shapes

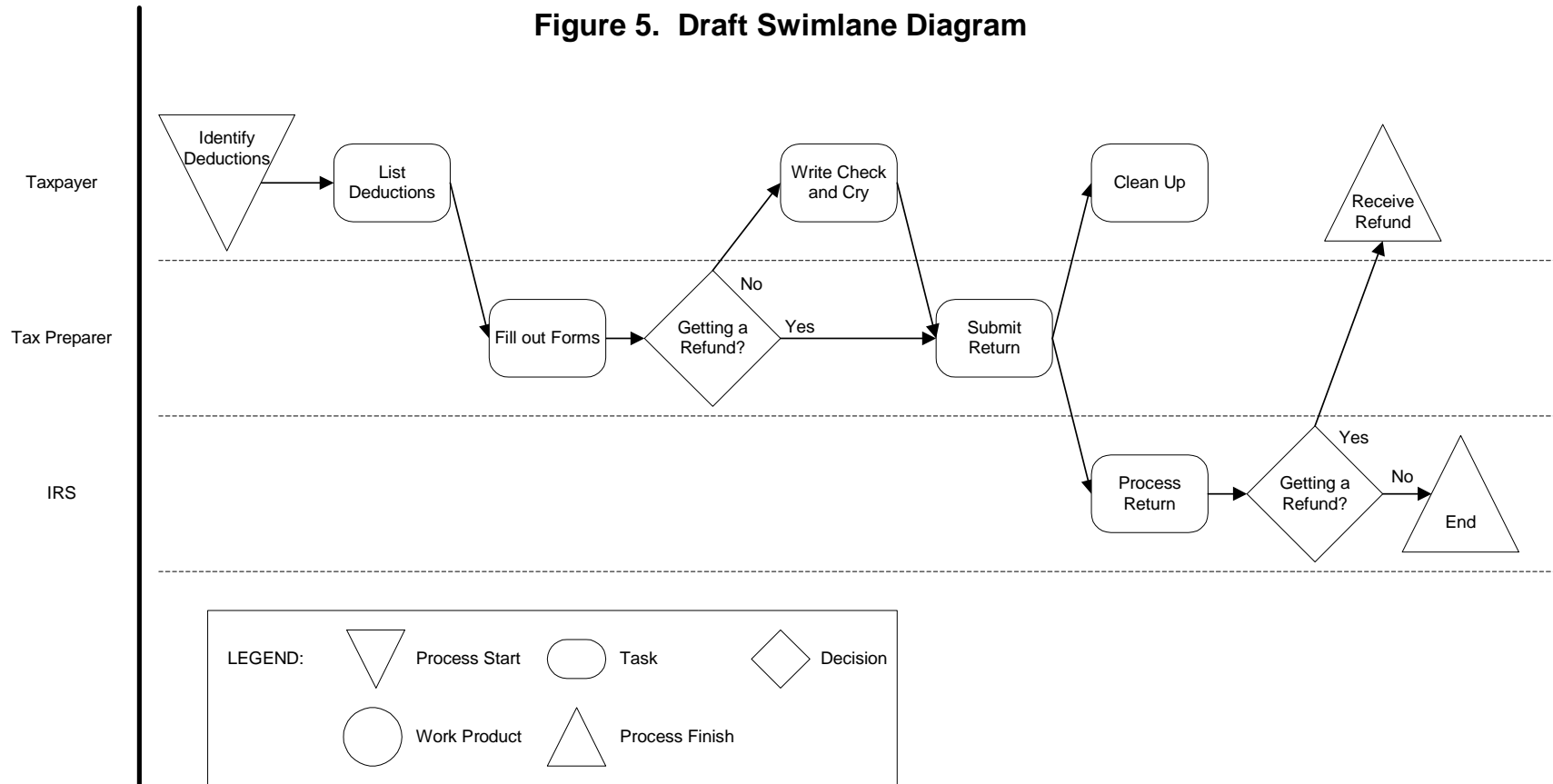


Keep in mind that the start and finish of this process probably relate to other processes in your overall value chain. Make sure that processes only overlap on one point, so the same activity isn't described differently in two places!

Example: Now that we have the full vocabulary of shapes at our disposal, we can generate the swimlane diagram for the example, as shown in Figure 5. Notice that the creation of the Tax Preparer organization greatly simplified the first outline of the process which was seen in Figure 3.

After the decision "Getting a Refund?", a Finish shape labeled "End" was added to reflect what happens if the decision "No" was reached. There is no actual process step; the End triangle is just there for completeness to show the end of the process.

Figure 5. Draft Swimlane Diagram



6. Verify Decisions

Process decisions are represented by a diamond shaped symbol. Decisions in a swimlane diagram should be re-examined for completeness, since they are easy to overlook. Commonly forgotten decisions include quality assurance checks and decisions whether to proceed:

- Were test results acceptable?
- Are we ready to go to the next life cycle phase?
- Did this work product undergo peer review?

Once you're happy with the process' tasks and decisions, *every task and decision is numbered for later cross reference*. Task numbering is generally sequential (1, 2, 3, ...), going from left to right. When there's a decision, number one outcome of the decision all the way to completion before starting to number the other option (e.g. finish numbering what happens if you choose "yes", before you start numbering what happens if you choose "no"). Task numbering may be changed later if tasks are added to or deleted from the swimlane diagram.

Unless otherwise stated in the process table, the reader of the process should be able to assume that the next task in the process is the one with the next number in front of its brief name (e.g. after step 5 you assume to go to step 6, unless told otherwise). The Description of each step should identify when this is not the case; hence all decisions need to identify where different options lead (such as "If 'Yes', go to step 5, otherwise go to step 8").

If a decision results in the process flow going off of the current page of the swimlane diagram, you can point to a text box which says "Go to step 9" or something similar, to avoid having lines trail off of the page.

Example: The two decisions in this process both seem necessary, but perhaps they should really be distinct events instead of two organizations making the same decision. After all, the taxpayer can only guess whether they expect to get a refund, whereas the IRS will determine if they really do get a refund.

Hence change the first decision's brief name to "Expect a Refund?" and leave the second decision as "Getting a Refund?". Notice in the final swimlane diagram, Figure 6, that short digressions from the main path are numbered before continuing down the main path.

7. Identify Work Products

Identify major inputs and outputs for each task and decision, and add them to the swimlane diagram as work products to help emphasize what key information is needed to support this process. Typical work products might include documents, lists, electronic files, database records, forms, or any other means to provide data, such as:

- Build Contents List
- Risk Data
- Problem Report
- Customer Information
- Software Requirements document
- Entity-relationship diagram
- And so on...

Work products are *not* the procedures used to perform the tasks, unless the task is specifically to create or edit those procedures. Note that a database is not a work product, it is a tool which might be used to perform a task. Specific parts of a database, such as new records, may be work products. For example, the task “Enter New Customer Data” might have a work product of “New Customer Data”.

It is largely a judgement call which work products are significant enough to put in the swimlane diagram. Only the most important work products should be added to the swimlane diagram, to avoid clutter. Additional work products may be listed in the process table. Work products are connected to their tasks or decisions by a thin dashed line, to avoid confusion with process flow lines. The vertical position of work products in the diagram doesn't matter.

Whether a task uses a particular work product as an input or output is not generally obvious from the swimlane diagram. This is another area where the detailed description in the process table helps clarify the exact intent.

Example: The main work products for this example are the list of deductions, and the tax forms. The IRS undoubtedly has a database for managing tax returns, but since the taxpayer doesn't control or use that system, entering data into it isn't directly relevant to this process.

One could argue that steps 3 and 4 of this example process involve the “tax forms,” whereas steps 6 through 9 involve the “tax return” – a slightly different work product. This shows that defining processes does not have a unique correct answer. In this case, we'll assume that the tax forms include the tax return itself and refer to “tax forms” as the work product for all of those steps.

8. Verify Process Model

Review the swimlane diagram in the context of your organization's process model (if any).

For CMM compliance, check each of the applicable Key Process Areas (KPA's) against your process, and see if you are missing tasks or decisions to help fulfill those KPA's. This could include asking yourself questions like this:

- How is this process planned and tracked?
Do we have adequate resources to perform this process?
- Does this process involve subcontractors?
- Does this process interact with the configuration management system?
How are the products of this process controlled?
- What steps in this process help ensure a quality product?
What kind of inspections, reviews, or tests support this process?
Is there a mechanism to make sure this process is performed the way it's supposed to be performed?
- Are people adequately trained in how to perform this process?
- How is this process measured?
Do we understand how long it takes to perform this process?
Do we need to document how often this process is performed?
Do we need tasks to measure the products of this process?
- Does this process use peer review?
- What happens when this process doesn't perform as expected?
- What happens if this process produces a defective product?
- Can we consistently predict the performance of using this process?
- How can we improve on this process?
- How can this process prevent errors?

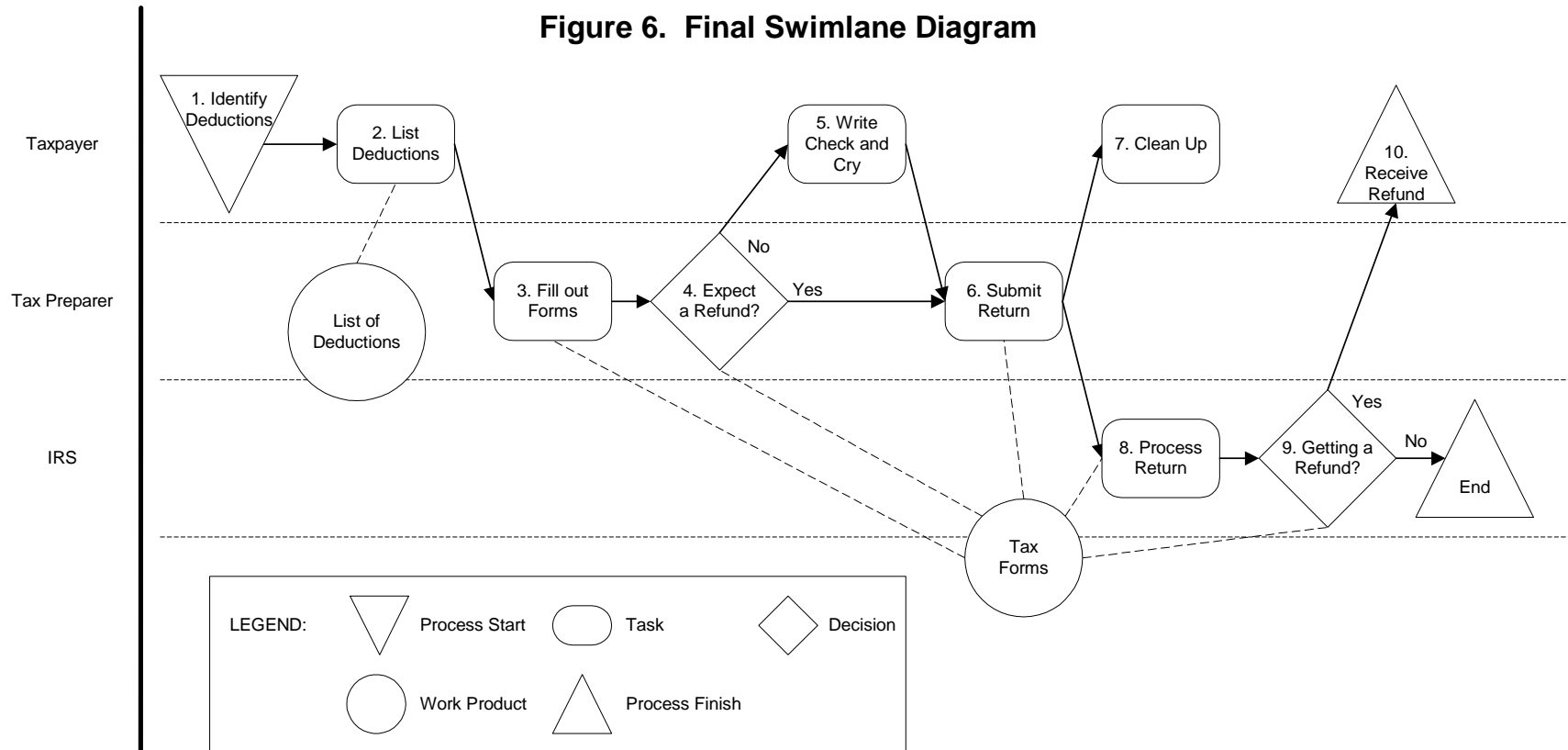
For ISO 9000 compliance, similar questions might also extend into financial, manufacturing, and other areas, such as:

- Is there management review of this process?
- How does the customer affect this process?
- Is customer satisfaction a relevant concern to this process?
- Does this process purchase anything? If so, how is that purchasing activity controlled and verified?
- Does this process involve any measuring equipment? If so, how is that equipment controlled and calibrated?

Other process models may impose other kinds of constraints and considerations.

Example: The example used in this document isn't trying to comply with a process model, so this step doesn't apply to it. The final swimlane diagram for this example is shown in Figure 6.

Figure 6. Final Swimlane Diagram



9. Make Process Table

Make a process table to accompany the swimlane diagram. At a minimum, the process table cites each task and decision by number, repeats the brief name, and provides a detailed Description.

The process table can also be used to provide more information about each task or decision.

- **Procedures:** cite the relevant procedures which should be used to perform each task or make each decision (if any). This allows a process to point to lower level documents for further clarification of what needs to be done.
- **Tools:** cite unusual software and/or hardware tools which are needed for performing that task or decision (e.g. SourceSafe, DOORS, Oracle, Rational Rose, SPSS, etc.). This helps identify what tasks will be affected when tools are upgraded. The definition of what is “unusual” could be “any tool which isn’t part of the standard desktop environment,” where the “standard desktop environment” could be explicitly defined by your organization’s system administrators.
- **Other Documents:** cite other documents (work products) which are relevant (e.g. templates, forms, etc.).

Example: A process table might be like that seen in Table 8, which was based on Table 7.

Table 8. Process Table

Task number and brief name	Description	Procedures	Tools	Other Documents
1. Identify Deductions	Over the course of the year, note transactions in the checkbook which have tax consequences (taxes paid, donations, deductible interest, etc.).			Checkbook, Receipts
2. List Deductions	Use checkbook to make a list of deductions. Find receipts as needed to prove deductions really exist.			List of deductions
3. Fill out Forms	Complete tax forms.	Tax form instructions		Tax forms
4. Getting a Refund?	This is a decision initially based on whether the taxpayer is expecting a refund, or owes more money. If a refund is expected, go to step 6, otherwise go to step 5.	Tax form instructions	Calculator	Tax forms
5. Write Check and Cry	If we owe money, we need to write a check to Uncle Sam.			Checkbook
6. Submit Return	Submit return, either in paper or electronic form.		e-File (optional)	Tax forms
7. Clean Up	File away your copy of the return in a safe place for future reference.			
8. Process Return	Uncle Sam processes the return and, if appropriate, issues a refund check.		IRS tax database	Tax forms
9. Getting a Refund?	The same decision is also made later on by the IRS. If a refund is given, go to step 10, otherwise the process ends here.	Tax form instructions	IRS tax database	Tax forms
10. Receive Refund	Receive refund check (if applicable)		US Mail or electronic transfer	Refund Check

CONCLUSION

This document has presented a nine-step method for preparing a swimlane diagram and process table to describe the tasks involved in a business or engineering process. Additional information was presented to help meet process quality model objectives, such as those from the CMM or ISO 9000. A sample process was defined, “Doing Your Taxes.”