Chapter Overview

In this chapter, I introduce a set of principles and guidelines that will help you improve "flow" in knowledge work. I'm going to use information from an actual client engagement to illustrate how these principles may be applied in a knowledge work setting. To preserve anonymity, all I'll say is that the client was a large Dod organization whose name rhymes with "wavy."

I'll show you the results of the engagement, and then I'll "walk you through" each of the principles and guidelines so that you may better understand how they were applied.

I've using the "working definitions" I provided in Chapter 2 for the following concepts:

- Work Boundaries, Components, Features, Properties
- Workflow
- Flow

There is a lot of information in this chapter. The main takeaways are:

1. Measures of flow and waste should be used to assess workflow performance
2. A key feature of knowledge work is that the workflow often exhibits a serial pattern
3. Within a workflow with a serial pattern, there are specific forms of waste and barriers to flow which occur frequently
4. When applied, the 7 principles and associated guidelines will help you improve flow and reduce waste wherever you find that pattern of knowledge work

Background of the Engagement

Purpose of the Engagement

1. Use lean thinking principles to improve a knowledge work process
2. Build skills so that the improvement team members would be able to apply what they learn immediately
3. Demonstrate "proof of concept." This was the first attempt to use lean thinking at Headquarters, so leadership had a keen interest in the results.

The process selected for improvement was called, the "funding document process."

How Work is Organized

There are two organizations involved: Headquarters and Field.

At Headquarters work is organized into Program Executive Offices (PEO), and functional competencies, such as Finance, Contracts, Engineering, Comptroller, Accounting.

The work done by a PEO is associated with one or more individual Programs. Program Managers organize the work by project teams.

Competencies do work that supports the work of the programs and projects. The individuals who do this work often support several programs and many projects.

Project teams and functional competencies also accomplish the work done in the field.

The funding document workflow that the team examined focused on project level work, and involved both project leader and functional competency roles, both at HQ and the Field.

Here is an overview of what happens:

Headquarters (HQ):

1. Project leader creates a plan, budget, and schedule to perform work.
2. Budget estimates from all projects are compiled and become an input (part of the overall Dod budget request) to the U.S. Congress.
3. Congress appropriates money for the Department of Defense, i.e. the annual defense budget is passed and signed by the President.
4. The amount appropriated may be less, more, or the same as the funds requested.
5. The appropriated amount (lump sum) is sent to HQ; HQ allocates portions to each Program Executive Office and subsequently to individual projects.
6. Project leader now knows what their budget is.
7. Before money may be spent, and the work to be done by the field may begin, several criteria must be met:

    a. Funds (money) must be traceable to line items in the approved Congressional Appropriation.
    b. There were 8 different categories of funds i.e. “colors of money.” Each category may be used for a specific type of work only. There are 3 conditions related to the purpose, timing, and amount of funds that must be met to spend the funds. For example, you can’t use funds designated for facilities to pay salaries; you must use the funds during the same fiscal year for which it is budgeted, and you can’t “spend more” than the budgeted amount, even if the work is not completed. In practice these 3 conditions are verified by the (HQ) Comptroller, since by regulation, only the Comptroller role may “accept” or “transfer” funds.

c. Project leader must link the *right* funds to the *right* work, and then be able to track and monitor the work to be performed and the use of funds against the project plan, budget, and schedule.

Field:

d. Money received from HQ must also match the planned purpose, amount, and timeframe. Same as 7b, but now these conditions are to be verified by the (field) Comptroller.
e. Must be ready and able to perform the planned work in the same timeframe per the HQ project plan, budget and schedule.
f. Must be able to track and report funds use and work progress/results within their field planning, budgeting mechanisms and also to the HQ Project.

What is a Funding Document?

The funding document is the mechanism used to create and document the linkages and verifications (7a-f); it is also used to transfer or receive funds (from one Comptroller to another). The annual volume of funding document transactions (for all HQ initiated work) is in the thousands. The dollar volume was approximately $8 Billion.

Commercial Equivalent

The commercial business equivalent to the above would involve annual operating budgets, a project portfolio, and project managers who contract (via a statement of work, sales order, work order, or purchase order) with another part of the business (or use outside services) to perform some portion of the project deliverables.
The project managers would track and monitor the work and cost in accordance with the project plan, schedule, and budget. The entity (supplier or vendor) doing the work would provide periodic work progress reports and use invoices or some other mechanism to bill for the work. The linkage to be made is between the invoice, PO, and project plan, budget, and statement of work.

Improvement Project Team

The team (18 people in total) consisted of 2 natural workgroups, each composed of several functions and roles both from HQ and the field, plus 2 senior leaders from the HQ Comptroller and HQ Financial Management functions, respectively. Each natural workgroup was made up of people from the functional competencies.

Improvement Goal

Reduce "funding document" lead time (ideally to 2 days or less)

Results

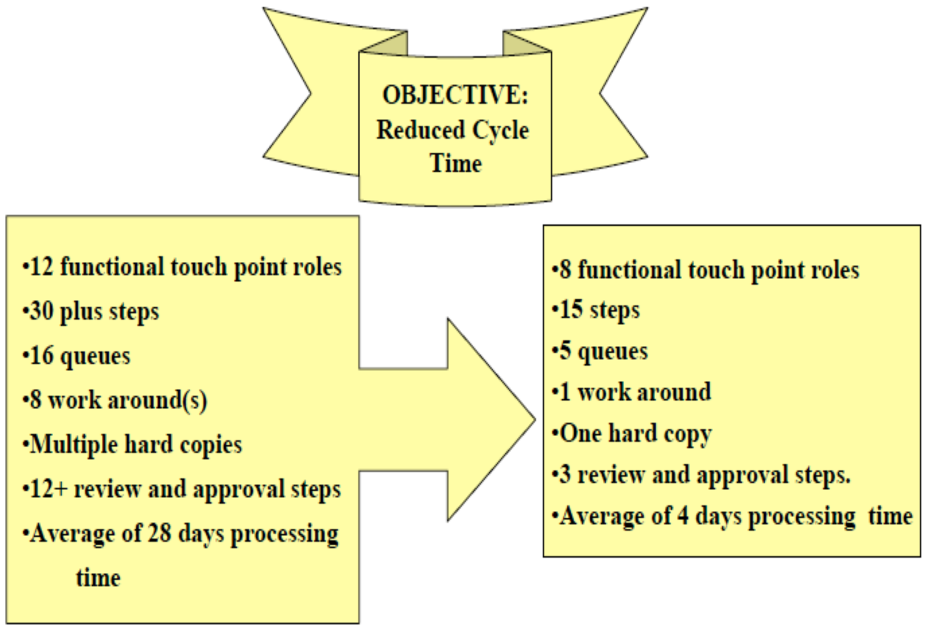
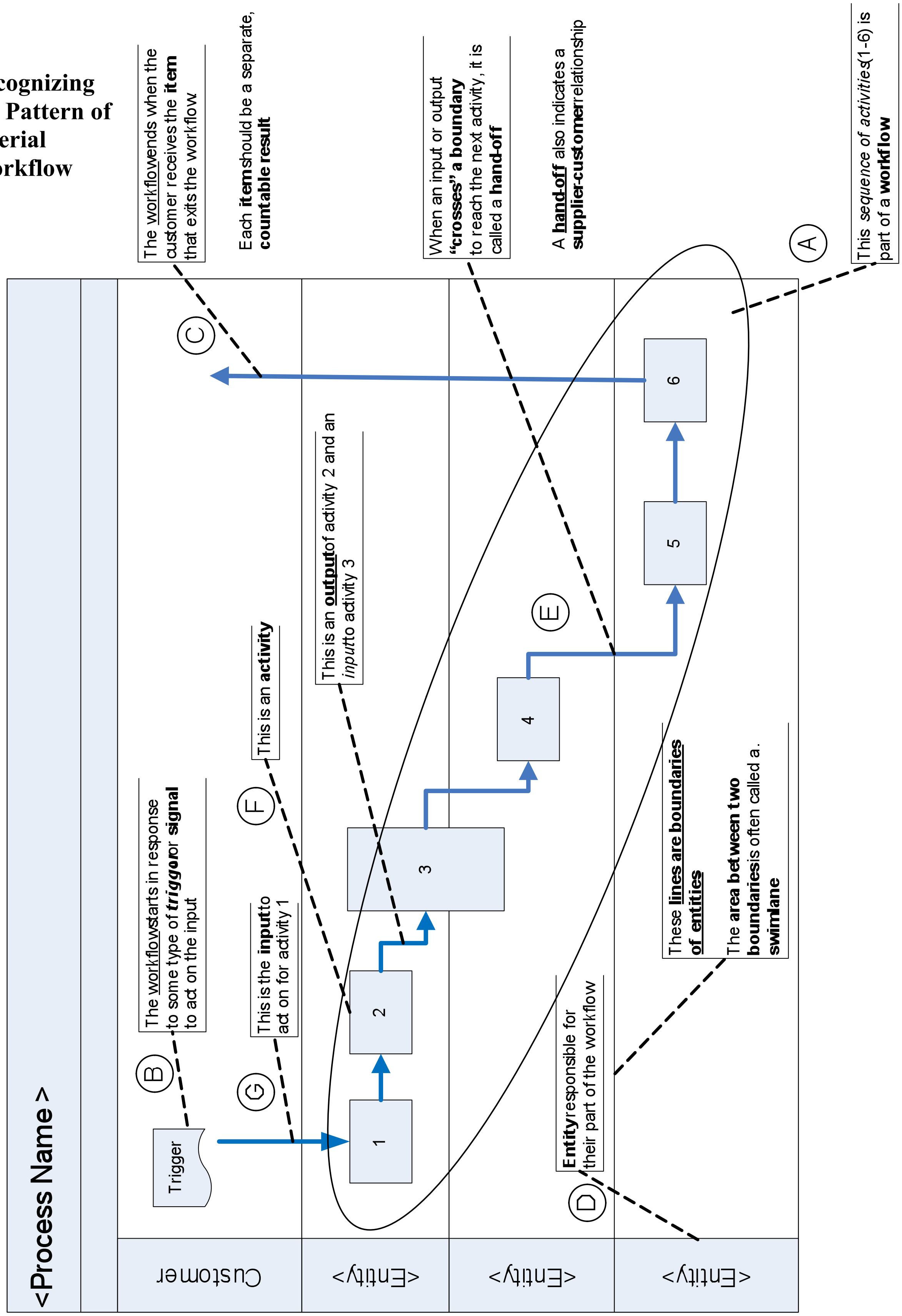


Figure 7.1 Summary Results

NOTE: The client created the above visual (Figure 7.1) with no input from me. It uses the term "cycle time." In the case of this engagement, I would suggest that "lead time" is the measure that best reflects the total end to end elapsed time from "start to finish" (all 30 activities plus queue time, etc.). "Cycle time" is typically a measure used for a single activity. I've noticed that in knowledge work especially, these two terms are used interchangeably though they describe two distinct measures of elapsed time. See Table 7.1 Selected Measures of Flow for more on this.

Recognizing the Pattern of a Serial Workflow



Workflow Features

Here are some features of this workflow.

1. The workflow exhibits a "serial" pattern, i.e. one activity after another in a linear sequence. This is often the case when the original input was a paper form that was routed for inputs, reviews, or approval.
2. The workflow starts when a "trigger" of some type occurs. It *ends* with *a countable result* or *item* that exits the workflow and becomes an input to a "downstream" or external customer.
3. The workflow involves two distinct organizations and several functions, disciplines, and roles within each.
4. Throughout the workflow, there are many handoffs that involve many different roles.
5. There are many reviews or approvals that take place throughout the workflow.
6. The main results or items from the workflow are a "go/no go" decision(s), and action(s) to notify customers and other stakeholders directly affected. "Go/no go" means a set of readiness criteria to be met in order to proceed. (7a-f, p2)
7. A set of information inputs associated with each criterion is required to make the decision; completeness and accuracy of the information inputs is a key consideration. Additionally there are legal and regulatory requirements associated with one of the criteria that must be met.
8. The information inputs come from different roles, functions, disciplines, and IT systems.
9. Some portions of the decision may only be made by a specific role according to current regulations.
10. This workflow is pervasive (it as a "routine" that is performed many times by every project; there may be hundreds of projects underway throughout the enterprise)

These 10 features describe the workflow as a whole. I believe these are typical of most knowledge workflows that exhibit a serial workflow pattern; furthermore I think the serial pattern occurs more than other workflow patterns such as collaborative, or parallel.

For the funding document example, as I mentioned in #4 above, there were many handoffs (12 or more out of approximately 30 total activities.)

Serial workflows always have handoffs. When you find them, you should take a closer look at each one.

A Closer Look at a Handoff

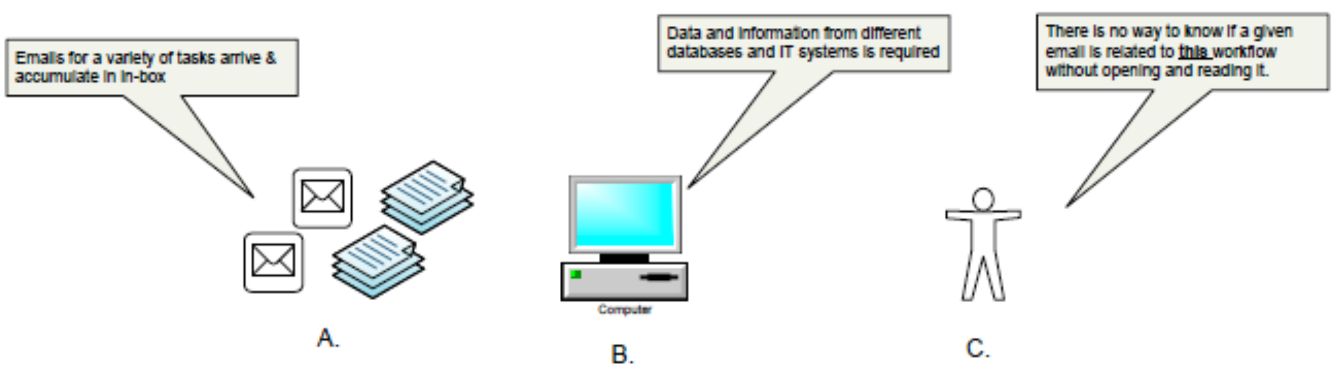


Figure 7.3 A Closer Look at a Handoff

What happens at a handoff?

Lots. Every handoff is a supplier-customer relationship, usually between different roles. Here are several features of 3 work components that are usually present in every handoff. I'll have more to say on these components and features as we walk through the principles:

A. Information inputs
B. IT systems
C. The person who performs each role

A. Information Inputs

1. In knowledge work, the main inputs are often information and know-how (expertise).
2. The work that each input represents varies, and often varies widely. Inputs may arrive one at a time or in batches. The inputs aren't labeled in a way that would help distinguish one type of work task from any other, or, the amount of work each input represents. (They all show up as incoming emails; usually the email is communicating information *about the input* rather than serving as the input).
3. Like most knowledge workers, there are always many emails in the inbox. So, every time a handoff occurs (a new email arrives) in the current workflow, a delay occurs as well. Only 1 item can be worked on a time, so the other items wait. Items also wait for the person to open and read each email in order to know what type of work it represents. This is the equivalent to work in process inventory in a manufacturing plant.
4. Delays also occur when there is no easily recognized "trigger" which signals the performer to act on an input that is specific to **this** workflow. Emails and the work each represents are "undifferentiated;" they all come to a single inbox though they represent work that is a part of several distinct workflows.

B. IT Systems

1. IT systems are frequently the main "tools" used by knowledge workers.
2. Access to the available information, and the IT systems that contain that information is often based on the role and functional department of the performer.
3. No single role has access to the complete set of inputs needed to support the decision to be made.
4. Likewise, no single IT system contains the complete set of inputs required to support the decision.

C. The person who performs each role

1. The person who performs each role generally has many other additional work responsibilities. This work is not the main responsibility of any of the roles; only a portion of a person's time is available for this task.

2. The people who perform each role are physically dispersed; they are located on different floors, different buildings, different cities, time zones, etc. The same is true for the functional department, (finance, accounting, comptroller, program management) each role represents.

3. Each person does his or her work in a "cube-farm."

4. Within the cube-farm, people are clustered by role and functional department (a group of budget analysts may sit together in an accounting "space")

I believe the work features I've described thus far are representative; they are typical of knowledge-intensive work. If you encounter or experience these in your workplace, you are certainly not alone.

But there is hope.

I've devoted the rest of the chapter to a set of principles and guidelines that will help you improve the flow of knowledge work. I've developed and made use of these over many years.

They work.

I'll describe how the team applied each of the 7 principles and what they learned when they did so. I'll also walk you through each of the guidelines.

7 Principles for Improving Flow

1. Improve flow from the outside-in
2. Measure what matters to the customer
3. Make the end-to-end (flow) visible
4. Identify and remove barriers to flow
5. Connect and align value added work fragments
6. Organize around the end to end flow
7. Manage the flow visually

Principle 1: Improve Flow from the "Outside In"

Guidelines:

1. Identify the item or work product that exits the workflow
2. Make sure the item is specific, and is a countable result
3. Determine who is the customer for that item or work product
4. Find out what the customer values about that item
5. Learn from the customer what the "nature of demand" is for the item

Items flow. Start with the work item or work product you provide to the (downstream) customer and trace its path upstream, or from the outside in. This focuses your improvement effort on changes to work that customers see or experience, and that create value. From the customer's perspective, any other work doesn't really matter.

Funding Document Example

1. Identify the item or work product that exits the workflow

The item initially was the funding document. But what matters most is the resultant decision and subsequent actions that the funding document facilitates. If you think only of the funding document as a discrete form, it limits the solution space you consider when re-designing the work in some way.

2. Make sure the item is specific, and is a countable result

By specific, I mean uniquely identifiable. Often there is a class or category that first comes to mind, such as reports, or financial reports. Items within this category might be a profit& loss statement, a balance sheet, or an accounts receivable aging analysis, etc.

One of the reasons this is so important is that the workflow that produces each item is distinct. You need to be able to observe the actual flow of the item. More on this later.

It turns out that "funding documents" is a class. Who knew?

The team focused on one type of funding document. It is used with work that is performed by another part of the "wavy." Each one of these can be counted.

3. Determine who is the customer for that item or work product.

At the outset, there was confusion about who the customer was. This is quite common in knowledge work by the way. Virtually everyone thought the customer was the "warfighter." The warfighter is the most downstream, external customer. But, they can't do much damage to the enemy with a *funding document. The warfighter eventually receives a very different item. One better suited to their mission.*

For this type of funding document, there were two customers. One was the HQ project leader that initiated the funding request; the item they received was notification that funding was "in-place."

The second customer was the downstream (Field) project leader who was being asked to do the work. They item they received was notification that funds for this work were available and had been accepted by the field Comptroller. This meant work could start in the field.

Note that for both customers, the team discovered that the item was the notification. This generally took the form of an email in the current workflow.

4. Find out what the customer values about that item.

Since the customers had just now been defined, we had to go talk to them to find out what they valued about this item. No one had asked the project leaders this question before, the answer turned out to be "turnaround time." So then we asked what they thought was a good turnaround time. The answer was a couple of days. This information was translated into "lead time of 2 days" and became the goal of the first project during the engagement.

5. Learn from the customer what the "nature of demand[1]" is for the *item*.

This guideline helps you understand the level of performance the workflow must meet and to determine what the workload will be to do so. For example:

- Volume= how many
- Frequency=how often
- Timing=when
- How predictable is the demand?

All of the above by type of item (assuming it is one of a class or category)

I did not ask the team to do this initially as part of the "what do you value " question.

However, during the course of the engagement the team started analyzing historical information and also went back to the project leaders to try to better understand demand. No one had asked the project leaders these questions before, but once the team asked, the

[1] See Freedom from Command and Control, by John Seddon to learn more.

project leaders also wanted to know the answers if and when the team could figure this out.

This brings us to conveniently to the next principle.

Principle 2: Measure What Matters to the Customer

Follow these guidelines:

1. Use measures related to the flow of the item
2. Measure the characteristics of flow that relate directly to what the customer values
3. Whenever possible incorporate measures into the daily work, i.e real time integrated in the workflow
4. Only collect data that you actually use
5. Use flow-centric measurement data as “real-time performance indicators;” like you do the gauges on the dashboard while you are driving

Funding Document Example

1. Use measures related to the flow of the item.

Often in knowledge-intensive work, there are few measures in place that <u>relate to flow</u> (See table 8.1 that follows).

Table 7.1 Selected Measures of Flow

Name of Measure	Related Work Property	Definition
Lead time (LT)	Flow; Resource utilization: Value + Waste (cumulative from all activities end to end)	Elapsed time for a work item to progress or flow through all the activities that take place between the *two external boundaries* i.e. of a *defined amount of work* such as a workflow, process, or value stream
Cycle time (CT)	Flow; Resource utilization: Value + Waste (at a single activity)	Elapsed time that a resource is applied during an activity to create the output from that activity. In knowledge work, this measure is not well- understood, and is often confused with lead time. Here is an example. The elapsed time the computer is used often differs from that of the time spent the person using the computer to create value. You wait while the computer boots up, opens an application or refreshes a screen, then you begin the value creating activity.
Value-creating time (VCT)	Resource utilization: value	Elapsed time *used to create value*, i.e., transform a resource in a way that customers value

Name of Measure	Related Work Property	Definition
Complete & Accurate (%C&A)	Quality (of a single supplier-customer handoff, i.e., output crosses interface)	Perception of customer that the information they receive contains everything they require and that the information is also correct. This is a great measure for monitoring handoffs between upstream and downstream work done by different people.
First-pass yield (FPY) or rolled throughput yield (RTY)	Quality (through all the activities within a workflow)	"Yield" (Y) is a measure of % defect-free items (outputs) at an individual activity. 'First-Pass Yield" is cumulative; i.e., a measure of the % defect–free outputs through *all* the activities $Y_1 \times Y_2 \times Y_n = FPY$
Throughput volume/time period	Resource utilization: productivity	# items completed per unit of time (sec, hr, day, month, etc.)

Prior to this project, I'm pretty sure that the funding document workflow had not been systematically examined or assessed using any of the measures listed above. So there was no existing data related to flow that we could use to help us determine our baseline performance. Initially we had no idea how difficult it may be to achieve a 2-day lead time; we didn't know what the lead time was currently. We did not know the capability of the current workflow. Nor did we have existing data on the nature of customer demand.

You should expect the same situation. The lack of measures and data that relate to "flow" is quite common in knowledge work.

What do you do?

You make an estimate, start to collect it, or very often, you do both.

The team was very resourceful. They did both. They learned that on average the current lead time was estimated at 28 days. How? They took a sample of actual recently completed funding documents and reverse-engineered the end-to-end transaction for each of them. Many, but not all of the steps of the workflow were done using IT systems; some of these systems included time stamp information, for example. Emails had dates as well.

You use what you have as best you can initially.

For example the team used simple counts of the following, as well.

Some Baseline Count Data	Some Implications
12 roles	At least 12 handoffs (see queues below), many opportunities for errors and rework loops
31 steps	At least 6 were 100% rework
16 queues	16 sources of delays, each with it's own duration (Think emails in inboxes)
12 + review and approval steps	10 or so more delays; this type of step is usually non-value creating; 38% of the total steps are probably waste
Multiple hard copies	A form of waste, also reduces amount of time available to do value-creating work
8 work-arounds	Most were symptoms of unmet IT system requirements

Even without data for many measures, the team recognized that *if they could find a way to eliminate queues and review and approval steps*, the reduction in lead time would be dramatic.

It may seem counter-intuitive, but once the team began to think through what the measures would tell them (had they existed); they became very energized. They really wanted to find ways to meet the target of 2 days.

2. Measure the characteristics of flow that relate directly to what the customer values.

Recall the customer decided that "turn-around" time was important. Project leaders defined this as "from the time I initiate the request, to the time I receive notification back that the funding is in place."

The team recognized that a good measure for "start to finish" is lead-time. They also learned that "start" began when the customer initiated the request, *rather than when they first began working on that request. Likewise, finish meant when the customer received the notification, not when they sent it.*

I've already mentioned that in the current workflow there were no measures of flow. Consequently, the best opportunity for the team to apply the next 3 guidelines would be as part of a "future state" workflow design.

3. Whenever possible incorporate measures into the work itself.

By incorporate, I mean "build-in" or integrate in the workflow, such that doing the work also generates the measures around that work.

This is often addressed in the design of the workflow itself, and in knowledge work that usually means designing the IT system so that it provides this data with no additional burden on those doing the work.

4. Only collect data that you actually use.

The idea is to use the *knowledge* you may gain from a measure to maintain or improve flow, not to record and report it to someone else. The "you" in this case refers to those in the natural workgroup who do this work.

2. Use flow-centric measurement data as "real-time performance indicators"

Like the gauges on the dashboard while you are driving, measures of flow are most useful in real time; that is while the work is flowing. At the risk of oversimplifying, you want your measures to tell you, "the flow is operating as it should," or "something is wrong."

Principle 3: Make the End-to-End Flow Visible

I recommend that each member of the natural work group apply the following guidelines *individually,* then work together as a team to create one workflow model that reflects what they observed.

Guidelines:

1. Trace the *actual* path of the item, from the initial trigger to the point in the workflow where the customer receives the item
2. Identify the main resources involved along the path
3. Observe an item as it flows along the path; watch while the work is being done
4. Select or define a method to literally make the flow visible in the context of the workflow in which it occurs
5. Determine how this workflow relates to the organization's primary workflow (order to delivery)

Funding Document Example

1. Trace the *actual* path of the item, from the initial trigger to the point in the workflow where the customer receives the item.

(Don't forget, work from the *outside in* when you do this.)

One of the distinguishing features of "flow" in knowledge work is that it's *not visible, i.e.* much of the work takes place in people's heads and in their computers. Furthermore, the people that do this work generally don't know what occurs before, or after their "part" of each workflow they support.

So, a key intent of this guideline is to "surface" *all* the "parts" so they may be viewed in the context of the whole flow:

- establish the starting and ending boundaries
- identify the "trigger," or what is it that starts the workflow
- identify the series of activities and the sequence of those activities

The reason I suggest that you have each member of the natural workgroup do this, is so that each person throughout the workflow may better understand the "part/whole" context for the work they do, and especially what happens immediately before and after "their" activity. This makes the supplier-customer relationships visible and much stronger to each person.

The team was made up of members that made up two distinct natural workgroups. Each workgroup performed the "same" workflow, so once they made the flow visible for their own workflow, they also had the chance to compare one another's as well. They learned they had some of the same steps, some differed, and that they used different methods for some of the same steps.

2. Identify the main resources involved along the path

The "path" involves *a set of resources* that are transformed, "acted upon," and applied during each of the activities. The goal of this guideline is to "inventory" the set of resources required to do the work; while discussing the next principle I'll explain other considerations associated with resources.

I created a worksheet for team members to use to help them gather and structure this information, so they could compare and discuss what they found.

3. Observe an item as it flows along the path; watch while the work is being done

Keep in mind that you really aren't trying to document how-to level detail; you're trying to *characterize or describe a day in the life of the resources used* throughout the workflow. For example, as you watch a particular activity where data is accessed from an IT system, you learn that to get to the data elements needed, you must go through 9 different screens, each screen takes about 30 seconds to refresh, and that you have to go through the first 8 to get to the 9th which is where the two data elements appear.

There is no need at this point to try and understand what is on any of the 9 screens.

It would be great if you could do this in real-time, but sometimes that may difficult to do.

Time to improvise.

One alternative is to ask them to show you what happens, that is, to demonstrate the activity for you on an actual item as if they were teaching someone new to this task. A second alternative is to ask for a walk-through of the activity, without actually doing it. The least useful approach would be to interview someone away from the location where they do the work. It's better than nothing, but you don't get a chance to see them interact with the other resources they use; such as the IT system(s), other equipment such as printers, or faxes.

When the team did their observations, they discovered the queues, and where each occurred. They also found and described "work-arounds," steps where multiple hard copies were made, along with why hard copies were being made. They made notes about the physical layout of equipment, file cabinets, printers, fax machines, as well. They noted what they saw on the worksheet I provided them.

4. Select or define a method to make the flow and the main resources involved visible in the context of the workflow architecture.

When you do this for the "as-is" or "current state" of the workflow, you create some type of explicit workflow model, such as a swimlane diagram or value-stream map. When you do this for the "to-be" or "future state," you may end up physically rearranging the workflow and resources so that the path is shorter and more direct, all required resources (and only those required) are available, and the people doing the work have a clear line of sight to each other and of the flow of the item.

The team created a cross-functional process map (swimlane diagram) to depict the flow and to illustrate the locations where the flow slowed down, stopped, waited, was moved and where it "looped-back" to an earlier activity.

NOTE: One of the challenges here will be avoiding unnecessary detail *on the process m*ap. At this point, you want to focus on <u>depicting flow</u> <u>and resources</u> not what goes on during each activity.

5. Determine how this workflow relates to the organization's primary workflow (order to delivery)

It turns out that this workflow is part of the HQ primary workflow.

Let's recap. So far I've described some key features of serial workflows and what goes on during a handoff. Then I covered 3 principles and their associated guidelines, along with examples of how they were applied.

The first principle helps you identify the make up of a specific workflow, the item it produces, the customer who receives the item, what the customer values about the item they receive, and what the nature of customer demand is for that item.

The second principle provides a set of measures that you can use to measure <u>characteristics of flow that matter to the customer</u>.

The third principle uses some type of model to make the architecture and the main components visible, depicts the item flow, and what happens along the path the item follows throughout the workflow.

Up to this point, we've focused on and established the boundaries of the workflow *as a whole*.

You'll now focus your attention on the components and assess how the main resources are deployed, how they currently operate, how connected they are with each other and what impact this has on flow.

All of this sets the stage for the next principle.

Principle 4: Identify and Remove Barriers to Flow

Guidelines:

1. Identify the types of waste and any "barriers to flow" present
2. Locate the point(s) in the workflow where these occur
3. Determine cause(s) of the waste and why the barrier to flow exists
4. Develop and implement an integrated set of countermeasures that address the causes and remove the barriers

To get the most out the guidelines, there are 3 key concepts to understand:

- Waste
- Barrier to flow
- Countermeasure

What is Waste?

Any activity that consumes resources, but does not create or add value is considered waste.

Types of Waste in Knowledge-Intensive Work

The table below defines and gives examples for each of the types of waste that typically occur in knowledge-intensive work.

Type of Waste	Definition	Knowledge-Intensive Work Example
Overproducing	More or sooner than is really needed right now by the customer	Purchasing or creating anything before it is needed
Inventory	Any form of batch processing, or work-in- process	Work held in in-boxes, storage of office supplies, partially completed tasks or documents, files, online or electronic storage
Waiting	Delays	Time spent pending review or approval. Time watching logon, screen refresh, or retrieval or manipulation of information
Extra Processing	Time spent doing unnecessary steps	Re-keying or reformatting data; extra copies or unneeded reports, multiple drafts or versions of presentations, briefings, budgets, plans, etc.
Correction	Any form of defects or re-work	Missing (incomplete), or incorrect data or information
Excess Motion	Movement of people	Retrieving anything essential to the task at hand that is "out of reach," such as, data, information, files, centralized in-boxes, bookshelves, office supplies, instructions, printers, fax or copy machines
Transportation	Movement of work between locations, offices, floors, buildings, systems, and people	Email attachments, documents or files routed for multiple approvals or reviews; expertise or information needed is dispersed rather than co-located or aggregated

What is a "Barrier to Flow?"

I use the term “barrier to flow” to refer to any work component (activities, artifacts, resources) with features or which interacts with other components *under current conditions* to hinder flow. Current conditions would include: how the resources are deployed, how they operate currently, and how effective the connections are between interdependent resources or components with respect to the flow of an item. I abbreviate resource deployment, operation, and connections as DOC.

Remember, *items* flow. Interactions among components create the item. Each item has its own workflow, and the path the item follows links and involves a distinct set of resources (components) throughout that workflow.

Barriers to flow are not absolute categorizations; they are situational. So, the same component with one set of features may help flow, but with different features (the same component) may hinder flow.

This Component..	**With These Features, *Helps* Flow**	**With These Features, Hinders Flow**
Activity	It’s value-creating (VCT)	Not value-creating, i.e. waste
Workflow Design	Visible item flow	Item flow not visible
	Short, unidirectional “path”	Long, multidirectional “path” with “loopbacks”
	No handoffs, collaborative pattern	Many handoffs, serial pattern
Resources	All required resources are available when needed	*Any* required resource is not available when needed
People (interdependent natural workgroup)	Co-located	Dispersed in multiple locations
Equipment, or files	Located in easy reach	Located down the hall

The approach I used to help the team identify barriers to flow was to prepare them to “assess the workflow by *enabler*” (see table 7.2) This approach is a subset of what Alec Sharp refers to as a “structured assessment,” in the 2nd edition of the book, “Workflow Modeling,” by Alec Sharp and Patrick McDermott. Alec defines an enabler as a “factor that can be adjusted to impact process performance.”

I used a “learn-do” approach with the full team so that they could conduct the assessment.

Learn-do consisted of reading assignments, short lecture to emphasize key points, and facilitated discussions on all six enablers. I used material from several sections of the first edition of Alec’s book as the foundation of much of the learning content; I added content associated with lean thinking practices to most of the enablers and used lean thinking terminology for the measures as well.

Then, I split the team into subgroups, one for each enabler. Each subgroup assessed the workflow for their assigned enabler, documented their findings, and posted those findings on the conference room walls so that the full team could easily read the results from all the sub-groups. To assist each subgroup, I created worksheets for each enabler to help structure the assessment and data collection, and to emphasize features of work components I felt were relevant based on my own observations. I provided real-time coaching for their assigned enabler as questions emerged.

Table 7.2 List and Definition of Enabler's Used to Assess the Workflow

Enabler	Definition	Examples
Workflow Design	How the work, "*works*"; design of how the inputs become the item the combination of work features the architecture of work (components) associated with a specific item	Anything that "holds the work" people, organization, information system, machinery, in-box, etc.
Information Systems	Information Technology (IT)	Systems, information, computers, voice & data networks, etc.
Motivation & Measurement	how people, organizations, and processes are measured and assessed-and the associated consequences	Explicit and implicit reward systems
Human Resources	People development & deployment	Organization/Job design, recruitment, training, staffing
Policies & Rules	Operating principles, guidelines established by the enterprise to guide or constrain business processes; laws and regulations	"Invoices will be paid monthly, in the order received;" "the corporate income tax rate is 35%"
Facilities	Workplace design & physical infrastructure	Physical Layout of equipment, furnishings, machinery; ambient lighting, air quality, noise, energy resources-electricity, water

None of the enablers are inherently wasteful. Rather each enable will manifest itself in some way that is specific to the flow of the item throughout the end-to-end workflow. Your challenge is to *assess each with respect to the impact it has on flow*. In general, features of work may help or hinder flow. Think of components as "variables" that interact collectively to cause flow. You are seeking to understand the impact each of the variables has on flow, both individually and collectively.

Funding Document Example:

1. Identify the types of waste or other barriers to flow present in the workflow

Waste Types Found:

Right after the team learned the 7 types of waste, I asked them, "how many types of waste can you find in the current workflow?" They paused; some then began counting out loud. Several then quickly said, "All 7 of them."

I'm so proud.

How many are present in your favorite workflow or process?

In particular the team identified the delays, waiting, and extra processing associated with multiple review and approval steps, along with the queues that occurred at every handoff, as the main contributors to the 28 day lead time. Additionally they recognized that their respective physical locations led to excess motion, and movement of work; which also contributed to lead time, albeit to a lesser extent. Since the due dates and complexity of each funding document varied, they felt it was likely that some overproducing occurred as well. Finally, they identified "loopbacks" where rework occurred.

OK. All 7 types of waste were present. That may or may not be a big deal. If waste contributes to lead time, and there is a lot of waste present, it is a big deal.

How can we make this determination?

It turns out that the Boston Consulting Group (BCG) has determined a rule we could use to estimate waste the amount of waste present.

"The 0.05 to 5 Rule"

In 1990, the Boston Consulting Group determined the following:

"Across a spectrum of businesses, the amount of time required to execute a service or an order, manufacture and deliver a product is far less than the actual time the service or product spends in the value-delivery system"

"The 0.05 to 5 rule highlights the poor 'time productivity' of most organizations since most products and many services are actually receiving value for only 0.05 to 5 percent of the time they are in the value-delivery systems of their companies.[2]"

If up to 99.95% of time spent is waste, this represents a significant opportunity for improvement. Learning to see the waste that is hidden in plain sight is a valuable skill.

This rule tells us we should expect to find a high percentage of waste. But this is only a rule of thumb, right?

Funding Document Example

Those of you more fluent in "lean-speak" may be more familiar with the terms "value-creating time" and "lead time." The "0.05 to 5 rule" is the amount of value-creating time expressed as a percentage of total lead time.

How does waste contribute to lead time? It <u>increases</u> it.

Lead Time (LT)=Value-Creating Time (VCT) + Non VCT (waste)

I did not ask the team to make this calculation during the engagement.

Here is a quick back of the envelope calculation to determine what portion of the 28 day lead time may be waste.

During one of the pilots of the value-creating activities only, the lowest time was 20 minutes.
Let's assume all 20 minutes consisted of value-creating time.

12,600 min – 20 min = 12,580 min of non-VCT

[2] Competing Against Time, p 76, George Stalk. Jr and Thomas Hout, The Free Press, 1990

Expressed as a percentage, VCT = .15% (up to 99.85% of time spent in the current workflow may be waste)

VCT = 20 minutes
LT = 12,600 minutes (28 days x 450 minutes per day)
20/12,600 = .15%

Those BCG guys may be on to something.

Funding Document Example

1. Identify the types of waste or other barriers to flow present in the workflow

Barriers to Flow Identified:

I think of the 6 enablers shown in Table 7.2 as categories of work components. This set of component categories is where you'll find many of the usual "barrier to flow" suspects. For each enabler (component), I've listed features that cause waste or hinder flow that I've found occur frequently. I'll also discuss some of the 95 "findings" that the subgroups identified during their assessment.

Problematic Components and Features of Knowledge Work

Workflow Design

What is it about the current workflow design that causes waste or acts as a barrier to flow? For example, is the flow continuous, or is there something in the design of the workflow that causes the flow of an item to slow down or stop, or for items to accumulate?

In my experience, most end-to-end workflows have not been consciously designed for all the required resources to operate as a single coherent whole. One of the reasons for this is that we tend to think of "*work*" as part of a job, rather than a portion of a workflow.

Work viewed in this manner leads us to link or associate tasks to jobs *rather than workflows and items*. It also treats resources as costs to be reduced, rather than components to be deployed, operated, and connected in such a way as to match item flow to customer demand.

Some features of workflow design that act as barriers to flow include:

1. There are many handoffs aka touch points or touches (in general, each new handoff involves a new "in-basket" where items wait until acted upon)
2. The path the item follows is complex
3. The path the item follows is not visible, so no one knows or can see what the status or progress of a specific item is at a glance
4. One or more required resources is not available when needed
5. The timing of upstream and downstream activities are out of sync with one another (one way the handoffs mentioned above slow down or stop flow)

Funding Document Example

"One size fits all"

This enabler had many findings. <u>In addition</u> to the 5 features shown above, the team recognized the current workflow as a "one size fits all" process. What that means is that every <u>category</u> of funding document (recall that they were focusing on 1 of 4 types in this engagement) and items ranging from the very simple to the very complex all went through the same workflow.

Serial workflow; too many roles involved

The major decision to be made involved a set of serial, discrete tasks that were dispersed and distributed among many roles; furthermore the decision was made at the end of the sequence currently. This sequence and the roles that were allowed to access the data involved were "hard-wired" into the existing IT system. The team determined that most of the value-creating tasks were independent of each other and that the needed data was available much earlier in the sequence.

Information Systems

Some features of information systems that act as barriers to flow include:

1. Some of the data needed lies outside IT systems
2. Some of the data needed reside in several IT systems, none of which can "share" that data
3. Data exists, but not in the form needed (you must compile the "pieces" and then manipulate the "whole" in some way)
4. The same data often has to be re-entered (especially across different functional departments (sales, order entry, accounting, purchasing)
5. Some types of data are only available periodically; you need it before the next period occurs
6. It takes multiple screens to get to the data you really need
7. Access to data is determined by role

Funding Document Example

The team found this enabler to also be a major source of findings. More importantly, they learned that any potential change to IT would be added to the current backlog of six months. Most of the findings in the list below are variations of those I listed above.

- "Awkward" user interfaces (screens and fields do not relate explicitly to the decision to be made).
- Available information often was in a form that did not speed throughput
- Information that was available electronically was located in many different places
- 100% of the information that was needed was not always available (in or out of systems)
- Timing was out of sync with downstream actions

Motivation & Measurement

Some features of motivation & measurement that act as barriers to flow include:

1. Existing measures tell you nothing about item flow
2. Existing measures drive the wrong behavior(s)
3. Rewards are tied to measures that do not relate to flow
4. Measures relate to features of work that are not under the control of the people whose work is being measured

Funding Document Example

The team felt that "motivation" was part of the human resources enabler; at any rate they had no findings.

The team identified the absence of measures related to flow as their finding.

Human Resources

Some features of human resources that act as barriers to flow include:

1. Priorities, schedule, goals, measures are set "locally" and thus they are not aligned or synchronized throughout the workflow
2. Criteria for what constitutes excellent quality at the source are missing or ambiguous

Funding Document Example

This enabler was another main source of findings. I've previously commented on the first bullet shown below. This is a very common characteristic of the approach to staffing knowledge work.

- Shared vs. dedicated resources
- Priorities set individually (by each role, not item due date for example)
- Priorities across roles and throughout the workflow are out of alignment
- Decision requirements and criteria for excellence were not explicit; they also were ambiguous
- Decision requirements spread across many roles
- Little feedback or guidance was provided (to any role); same errors would occur

With respect to priorities, the team recognized that each person in the workflow had their own way of deciding in what priority they worked on a given item, and that the priorities were not coordinated or synchronized across the set of roles. (I used the term "locally" to describe this situation in the 1st barrier to flow above). This approach will always result in delays, and it is due in large part to the way the jobs were originally designed. It is such common practice among knowledge workers that it is accepted as simply "the way we do our work."

When the team discussed what the term "review and approve" meant in actual practice, they realized that no one had a list of the criteria they were using currently or should use, *yet this activity took place at least 12 times*. Among other things this meant that no one past the 1st review and approve step could tell whether an item had previously been reviewed and approved; so each role felt as if they were the last line of defense in guarding taxpayer money and did it again *just to be sure.* People learned to do the activity informally from whoever did it before them; there was no training to do this. There were no examples of items that met the criteria, or didn't meet the criteria, with explanations why.

The team also noted that no feedback was provided or available to help prevent recurring errors.

Policies & Rules

Some features of policies and rules that act as barriers to flow include:

1. What "everybody knows" is not written down anyplace, so if the task is done infrequently, or "the person who does this is on vacation," or someone new in the job, must discover how to do this work all over again
2. There are strongly or widely held beliefs and assumptions treated as rules, when in fact no such "rule" exists
3. A rule exists ("it's always been that way as long as I can remember"); but conditions now make the rule unnecessary or even counterproductive
4. Rules exist (and so do the work arounds and exceptions to the rule)
5. Regulatory or legal requirements become work restrictions that specify a given task may only be done by an explicitly designated role, specialty, or functional discipline.

Funding Document Example

The team verified that there was a regulation that specified, “only the comptroller role may accept or transfer funds.”

Facilities

Some features of facilities that act as barriers to flow include:

1. Resources are dispersed, separated, or un-connected from one another (people who need to collaborate; IT systems that should share data)
2. Required resources are not located at the point of use
3. There is no line of sight (the physical layout obstructs or hides the path, or the view of the item’s progress along that path, nor does it facilitate visual control of the item flow)
4. Items are undifferentiated when they arrive (there is no way to know item priority, due date, complexity, or the effort required; every item comes to the same “in-box”)
5. Absence of visual cues or other triggers that signal the need for “attention now.”

Funding Document Example

- Each person had a separate cubicle in which to do his or her work
- Similar jobs were clustered together
- Few visual indicators

Though all 5 barriers to flow listed above were present, the facilities subgroup focused mainly on two aspects of facilities: physical layout and visual management. In practical terms this translated into the recognition that the current use of facilities hindered flow.

2. Locate the point(s) in the workflow where these (waste and barriers to flow) occur

The team had some of this information already documented on the worksheets they used, and in the workflow model they created, as part of making the end –to- end flow visible. They identified where in the sequence the review and approve activities and queues occurred throughout the workflow.

3. Determine cause(s) of the waste and why the barrier to flow exists

The team did not spend much time on causal analysis; we all agreed that the time would be better spent designing a different workflow with more desirable features and less components. Which they did and you'll read about very soon.

4. Develop and implement an integrated set of countermeasures that address the causes and remove the barriers

What is a Countermeasure?

I'm using countermeasure to mean the response you choose (action you take) to address each "barrier to flow." So a countermeasure is a specific adjustment to the problematic features of the components that currently hinder flow. A countermeasure for equipment that is "out of reach," is to get that equipment in reach. You may move the equipment, move the person, or both.

Often, there is a set of work features from each of the enablers that collectively cause waste and hinder flow. Your countermeasures should reflect this interdependency, and they should be implemented as *an integrated set*, i.e. adjustments that are consciously designed to complement and reinforce each other to multiple features that hinder flow, such as workflow design, IT, layout, job design, goals, measures, priorities, policies & rules, etc,

In addition I recommend that you include a time dimension as you consider countermeasures. If you visualize a series of time-boxed iterations, such as 30,60,90 days, you are more likely to make progress sooner and formulate more pragmatic alternatives.

Often you hear the term "future state" or "to-be" process. This often translates into a single, one time solution to be rolled out. Of far greater use and benefit is thinking of the future state as a set of incremental changes that evolve over time to achieve flow targets. In this case, the *initial* future state might be a lead time of 2 days for 2 program offices.

The team came up with a set of adjustments that addressed findings in workflow design, IT, human resources, measures, and facilities. They decided it was impractical to try to get the Dod to change the regulation regarding comptrollers. They used the incremental change approach, i.e. frequent small pilots.

Principle 5: Connect and Align Value-Creating Work Activities

Typically, it takes a set of jobs from multiple functions to accomplish the tasks associated with producing a given item in knowledge-intensive work.

Each job is made up of activities, some of which turn out to be value-creating and some that are non value-creating *when viewed in the context of the appropriate workflow* to which they belong. Though several jobs are involved, the *amount of work* each *activity* contributes to the workflow may be relatively small. Grouping and connecting the value-creating work activities into logical subsets and sequences often provides potential alternative to organize work and resources.

The alternatives may or may not match current job definitions or department responsibilities.

In my experience, the set of jobs that make up knowledge workflow have not been consciously defined or designed around their desired contribution to flow as an organizing principle. Each job is designed independent of the others.

Design the workflow and the work within, before you design jobs.

Guidelines:

1. Locate each value-creating activity
2. Separate the work from the people and systems that currently do it
3. Analyze the work content
4. Examine alternatives to do the work
5. Assess the feasibility and implications of structuring the work and organizing the required resources in this way

Funding Document Example

1. Locate each value-creating activity

The team decided that the value-creating activities were associated with 4 roles (recall the current workflow involved 12 roles).

2. Separate the value-creating work from the people and systems that currently do it

By separate, I mean "group" the work the activities represent, regardless of whether a person does the activity, or whether IT is used to do the activity. The team learned that very little of the *value-creating* work was actually done by IT. Mostly, IT was used to route information in a serial fashion to each of the 12 roles. This is pure waste.

3. Analyze the work content

Analyze the work to determine if any of the value creating work activities must be done sequentially (interdependent activities) or whether an activity is independent of others, or a combination. Determine how much effort the work represents, how specialized it is, and which part of the work is best suited for people, and which is better performed by IT.

The team was able to achieve a dramatic reduction in lead time when they realized that most of this work was actually collaborative, and could be done by getting the 4 roles together at the same time to make the decision needed in real-time. This discovery alone eliminated most of the handoffs, reviews, and queues.

4. Examine alternatives to do the work

The team settled on an alternative whose main features were collaborative, real-time, face to face, using 4 people (one for each functional discipline they deemed necessary). Another alternative might use fewer, but cross-trained people since the amount of work was a couple of person-hours. A third alternative would be a scheduled conference call among the 4 people needed.

5. Assess the feasibility and implications of structuring the work and organizing the required resources in this way

The team concluded that the first alternative in #4 above was very feasible. From a technical standpoint, there were no issues. Costs were very low and primarily in the form of providing time to pilot the approach.

I discuss how they gained leadership support in the next principle.

What I've described above focuses mainly on changes to the workflow design enabler. The team also thought through implications on the rest of the enablers so they would align and reinforce the new workflow design. I cover these as part of the "organize around flow" principle next.

Principle 6: Organize Around the End-To-End Flow

Guidelines:

1. Assign operational accountability and responsibility for the workflow as a whole
2. Deploy, operate, and connect the required resources so they optimize flow with respect to customer demand

Funding Document Example

1. Assign operational accountability and responsibility for the workflow as a whole

One of key ingredients of the team's success was the close involvement of leaders from three functional departments (2 of which participated along with the natural workgroups). I believe that due this direct involvement, the leaders had a deeper understanding of the significance and implications of the findings, and were able to experience directly the energy and enthusiasm of the other team members. This in turn helped them become strong advocates and effective champions when it became time to implement countermeasures.

Sometimes a new role of value steam manager or process owner is needed. This role owns the design of the set of work components required throughout the workflow.

In this case, the operational accountability and responsibility was shared; the two leaders reached an agreement first; they in turn presented a united front to the third. One of the most important objectives for these leaders was to make sure that the work session results became operational results. Another objective was to make sure that the natural work group members with implementation responsibility had the time, resources, and political support to run pilot experiments prior to a formal deployment.

2. Deploy, operate, and connect the required resources so they optimize flow with respect to customer demand

This particular workflow had high demand beginning roughly 2 months before October; it dropped significantly about 2 months after October. This is due to the Congressional Appropriation Cycle; when Dod's annual budget for the government's fiscal year starts. The seasonal nature of the demand was a key influence; the level of resources required is very different during the peak period.

The team was able to secure a conference that they dedicated to this workflow. The space was laid out so that the people needed could come together as a group to make the decision. IT system access and monitors along with other equipment (faxes, phone, and video-conference capability for locations too far to meet face to face) was installed in the conference room. The available time was scheduled so that a time period could be reserved. Time periods were communicated to customers so they could arrange their schedules in advance to prepare for the event. The work to be done before, during, and after the event was written down and standardized. Training (with examples) was created based upon the standardized work. Members of the natural work group facilitated the training with their customers and other stakeholders in advance of the event; ideally, it was the kickoff for the decision making cycle which culminated in the event.

Principle 7: Manage the Flow Visually

This principle typically makes timely information on status, progress, problems, and performance results visible to everyone within the flow as part of their daily work. It helps focus attention not only on maintaining the rhythm of regular flow operation, but also on establishing explicitly defined contingencies (i.e., a fast, known, and certain response) for removing barriers to flow when they occur.

Ideally, everyone within the flow should be able to self-monitor whether the rate, quality, and quantity of their work is optimized to meet the end-of-flow performance targets.

Everyone should also to be able to distinguish between normal and abnormal operations quickly (real-time feedback) so that defective work is not sent downstream and help can be dispatched when and where it is needed to get things back to normal right away.

Guidelines:

1. Explore ways that each member of the natural work group may view the real-time flow
2. Make it easy for each member to spot normal vs. abnormal operating conditions, in real time
3. Provide information on item status, progress, problems, and performance measures to everyone throughout the workflow in real-time

Funding Document Example

1. Explore ways that each member of the natural work group may view the real-time flow

The flow occurred in real-time during the face-to-face event, so all participants were easily able to see what they had to do during the event. The event-scheduling calendar was posted on one of the conference room walls. This made it clear to everyone if another event was about to occur in that room, so time awareness was high.

2. Make it easy for each member to spot normal vs. abnormal operating conditions, in real time

Everyone was provided with the same written checklist and criteria with which to make the decision. The decision was now made jointly upfront in a much shorter sequence. When the decision was reached, the parties signed a worksheet that accompanied the inputs used.

3. Provide information on item status, progress, problems, and performance measures to everyone throughout the workflow in real-time

All of this was done outside the IT system; the results were entered along with the signatures. The routing by role sequence was still hard-wired in the system, but it didn't matter. There was nothing to review and approve and the participants who previously were notified by email at the end of the long sequence were the ones that now came together upfront to make the decision. Data on both cycle time and lead time was being collected and reviewed.

What could be simpler?

Please feel free to contact me by email at I have a question on the 7 principles or through my website at http://www.thebottomlinegroup.com