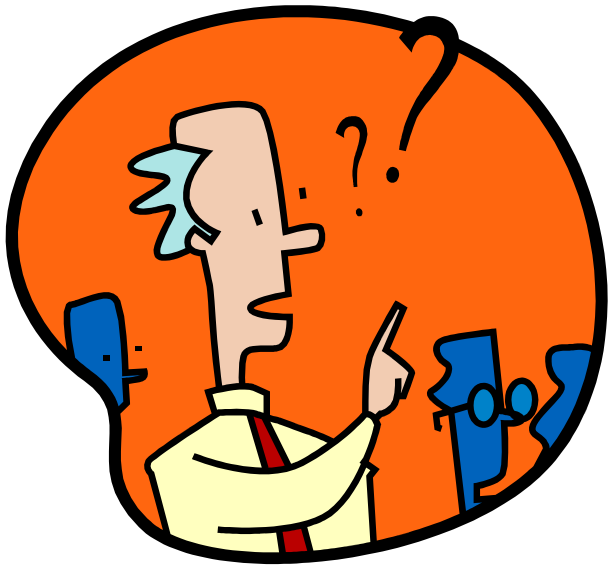
The Mapping Tree

Hierarchical Tool Selection and Use

Session Objectives

- **Discuss the hierarchical linkage and transparency of mapping using this methodology.**
- **Understand how and when to apply each mapping tool and its application in the Lean tool set.**
- **Understand how mapping helps to reveal Value and Non-Value Added actions as well as Constraints in the process.**

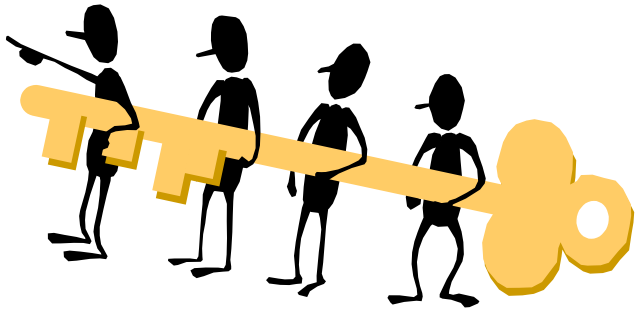
Why Do We Care?



<u>"Hierarchical Mapping"is necessary because:</u>

- **Hierarchical mapping is critical in maintaining the organization's strategic plan during a Lean deployment.**
- **Hierarchical mapping is critical in achieving greater "Value to the Customer", in revealing of wastes and improving processes.**
- **Until we know all of the "players in the process", we cannot begin to understand the process, its "Value to the Customer" and the impact on the strategic plan.**

Keys To Success



- Always use your team of experts for mapping exercises.
- Mapping in “silos” is a “design for failure”.
- Always follow a hierarchical procedure for mapping to root cause.
- Always begin at the high level first, then capture detailed maps as needed.

Why use the Mapping Tree methodology ?

- Before any improvement exercise is undertaken, a clear definition of “what to work on” must be developed.
- Without utilizing a mapping hierarchy, any attempt to attack a process for improvement effort would be just a “shot in the dark”.
- We need a methodology that will link the lowest level effort to the high level organizational objectives, and do it transparently.
- The hierarchical approach of the Mapping Tree helps to ensure that the lowest task efforts remain focused on the Customer requirements and support the Strategic Objectives.

The Mapping Tree

SIPOC-R

Value Stream Mapping

Gap Mapping

Process Mapping

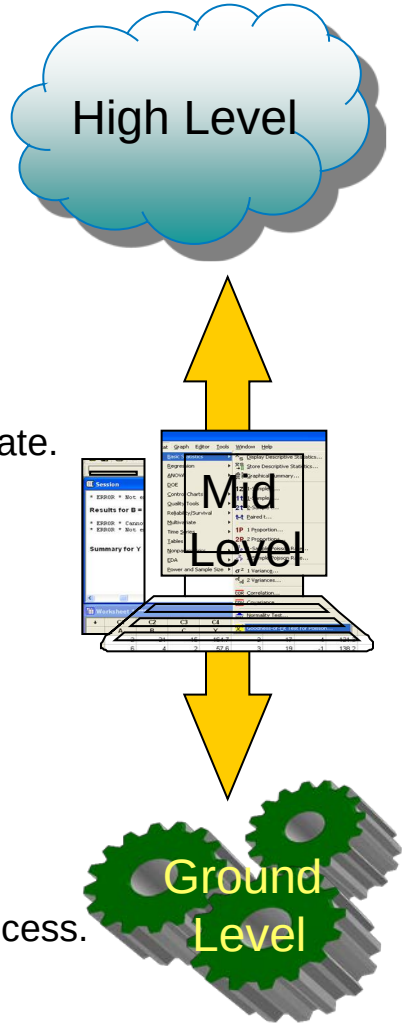
Swim Lane Mapping

KPIV/KPOV Mapping

Root Cause Analysis

Mapping Hierarchy

- **SIPOC-R**
  - A high level map showing the relationships between suppliers and customers.
  - A perfect tool for scoping projects.
- **Value Stream Maps**
  - A map created specifically to provide a lean vision of current state and future state process flow.
- **Gap Mapping**
  - Designed for analyzing the “Gaps” between the current state and the future state.
  - Used to focus resources on true “value added” root cause issues.
- **Process Mapping**
  - A block diagram in “flowchart” standard to show the flow through a process
  - Helps to readily identify the steps in a process, at a lower level.
- **Swim Lanes**
  - A block diagram built specifically to show hand-offs, decisions and loops.
  - Great for reducing process complexity.
  - Can operate at high levels or detailed level.
- **KPIV/KPOV Mapping**
  - Block/Flow Chart Map with Key Process Inputs and Outputs listed at each process.
  - Used to drill down for Root Cause Analysis.



The Mapping Tree

SIPOC-R

The highest order tool in the Mapping Tree is the SIPOC-R. This tool helps to identify the various “Critical-to Business”, “Critical-to-Quality” and “Critical-to-Customer” requirements. From this map we get a better understanding of all the working components of our processes.

ing

KPIV/KPOV Mapping

Root Cause Analysis

SIPOC-R

The SIPOC-R diagram helps visualize the six key components of a process.

A SIPOC-R identifies and builds consensus for Critical to Quality process outputs (CTQ's).

A SIPOC-R quickly and easily captures the high level details of the current or "as is" state of the process.

SIPOC					
Process:					
SUPPLIERS	**INPUTS**	**PROCESS**	**OUTPUTS**	**CUSTOMERS**	**REQUIREMENTS**

6 Key components to a Business Process

***Suppliers** – Provide information or materials to a process*

***Inputs** – Information or physical items*

***Process** – Any activity that changes an input*

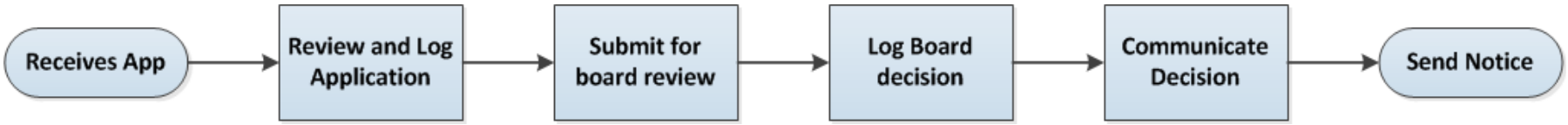
***Outputs** – Physical products, information or services*

***Customers** – Specify requirements, define value, and receive the finished output*

***Requirements** – Identify specific customer requirements for CTQ's*

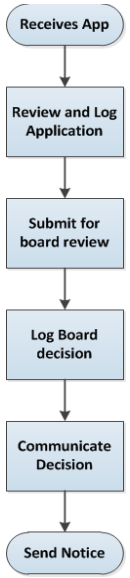
Case Example

Mary White works for the Department of Permits. It is Mary's job to facilitate the processing of permit applications following the process map below:



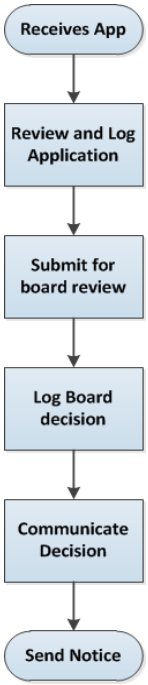
Building a SIPOC-R

1. Start in the middle and create the “high level” process map (limit to 6-7 steps)
2. Document what is delivered to whom and any measureable requirements (**O, C & R**). Brainstorm and prioritize the critical customers.

SIPOC					
Process: Permit Application, Review and Grant					
SUPPLIERS	**INPUTS**	**PROCESS**	**OUTPUTS**	**CUSTOMERS**	**REQUIREMENTS**
			Rec'd App	Applicant	1 Week
			Logged App	Review Board	2 Days
			Board Decision	IT	Real Time
			Logged Decision		
			Comm Dec		
			Sent Notice/Form		

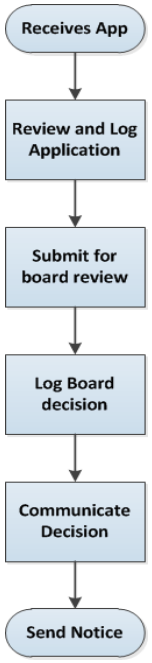
Building a SIPOC-R

1. Identify what input or information is needed to perform that process (**I**) and who provides that input (**S**). Brainstorm the significant Inputs and their Suppliers.

SIPOC					
Process: Permit Application, Review and Grant					
SUPPLIERS	**INPUTS**	**PROCESS**	**OUTPUTS**	**CUSTOMERS**	**REQUIREMENTS**
Applicant	Application		Rec'd App	Applicant	1 Week
Review Board	Phone		Logged App	Review Board	2 Days
IT Dept	E-Mail		Board Decision	IT	Real Time
	On-Line Sys		Logged Decision		
	Logged App		Comm Dec		
	Cert Form		Sent Notice/Form		

SIPOC-R

We now have a detailed account of the working components of our process, which is a key input into the next step in the hierarchy.

SIPOC					
Process: Permit Application, Review and Grant					
SUPPLIERS	**INPUTS**	**PROCESS**	**OUTPUTS**	**CUSTOMERS**	**REQUIREMENTS**
Applicant	Application		Rec'd App	Applicant	1 Week
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IT Dept	E-Mail		Board Decision	IT	Real Time
	On-Line Sys		Logged Decision		
	Logged App		Comm Dec		
	Cert Form		Sent Notice/Form		

The Mapping Tree

SIPOC-R

Value Stream Mapping

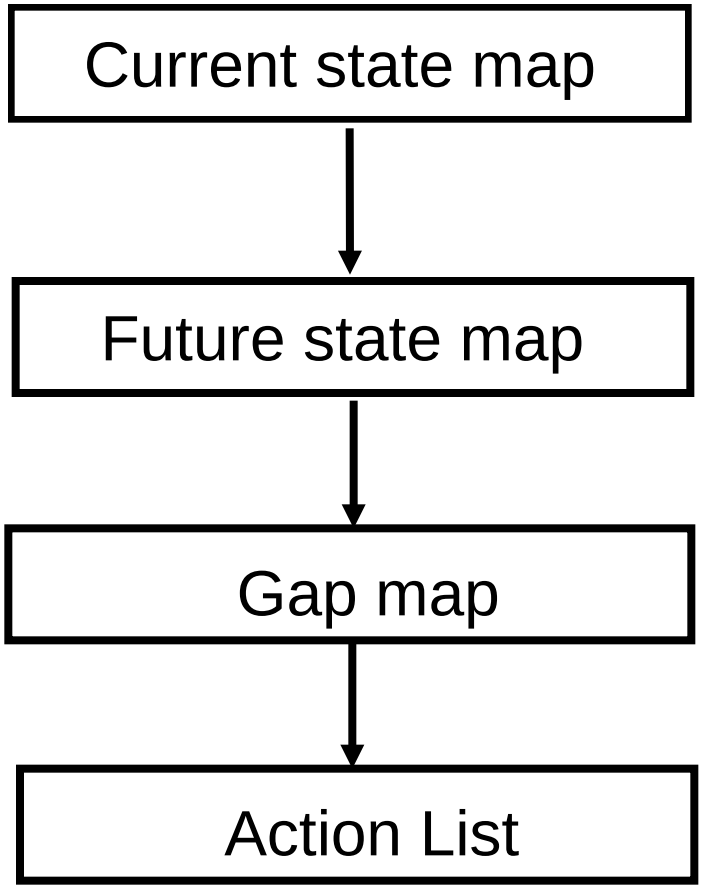
As we begin the "drill down" into our business process, we move to the Value Stream Map to better understand the value created, as well as "not created". This map will include performance metrics from our individual processes.

KPIV/KPOV Mapping

Root Cause Analysis

Value Stream Mapping

The Steps

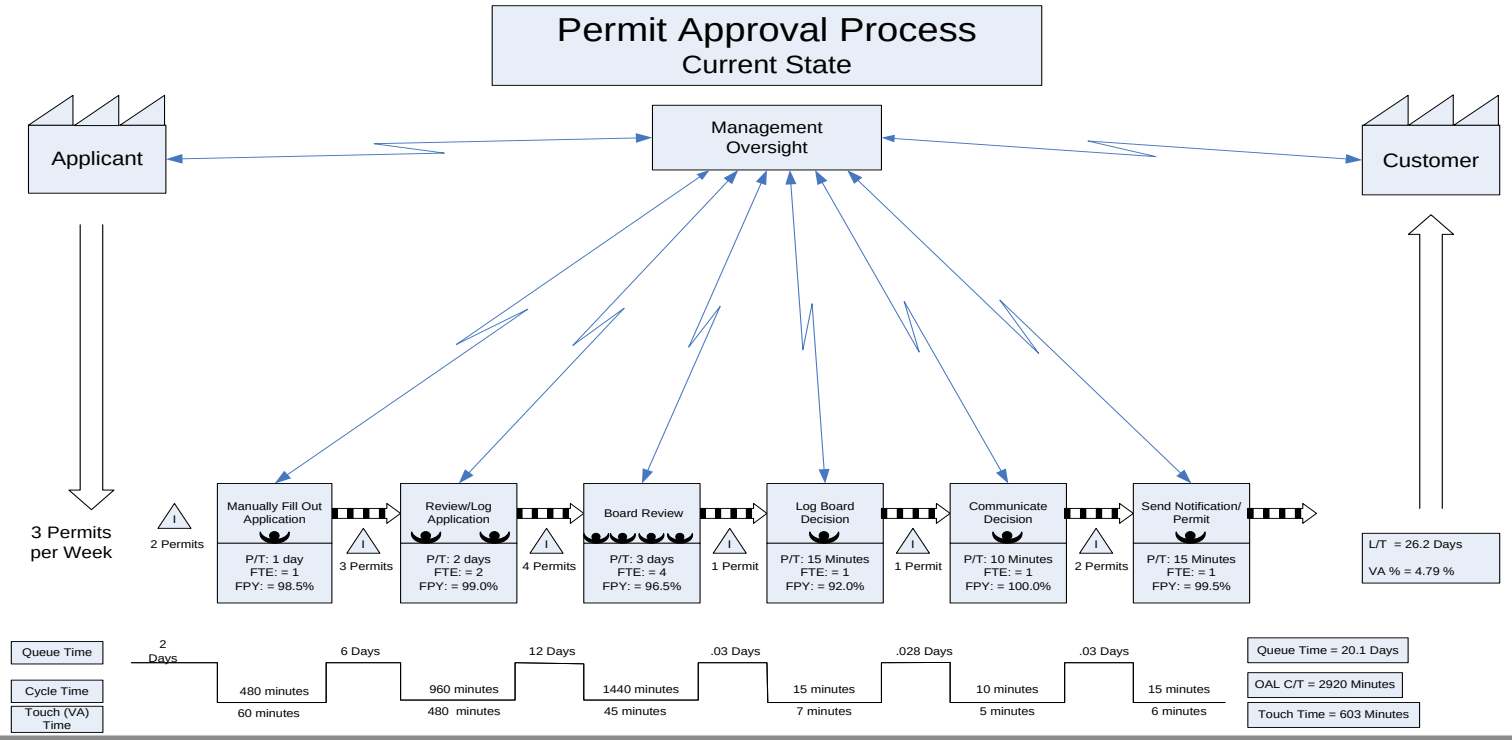


- Understand the key components of the Value Stream.
- Identify Value Added and Non-Value Added Tasks.
- Design a Customer focused Future State.
- Develop the Gap between the current and future states and build the Action Priority List.
- Begin improvements.

Value Stream Mapping

A Value Stream is all the actions (value added and non-value added) required to bring a process through the main flows essential to service the customer. It includes:

- The flow of material or services into the arms of the Customer.
- All of the organizational entities supporting the deliverable to the Customer.

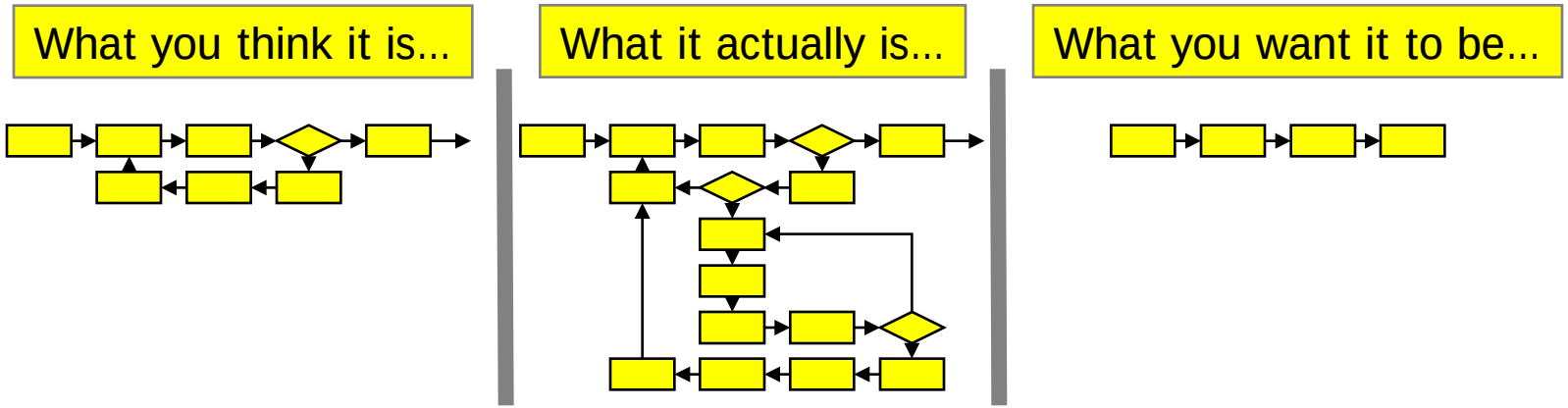


Three Process Versions (all maps)

Whenever there is a product or service for a customer, there is a value stream.

The challenge lies in seeing it.

Usually, there are at least three versions of any process…



A clear understanding and communication of the current state is essential to establishing the future state!

Determining Value Add (VA) and Non-Value Add (NVA)

Value

Capabilities of a product or process *as defined by the customer,* provided in the right form, at the right time, for an appropriate price. *The only activities an entity should be entitled to ask a price for.*

Value and Non-Value Added

Value added - VA

CUSTOMER is **willing** to pay for the material or service.

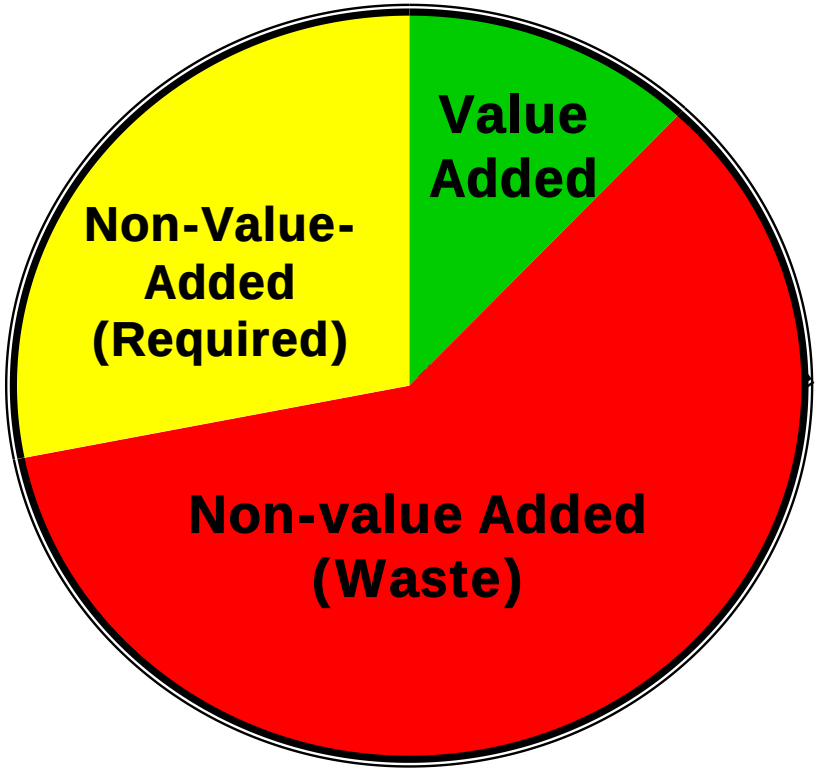
Changes the form, fit or function of the product or service. Changes the utility.

Non-value added (but required) - NVAR

CUSTOMER is **NOT willing** to pay for the material, effort or service, however, the task must be performed due to law or regulation.

Non-value added - NVA

CUSTOMER is **NOT willing** to pay for the material, effort or service.

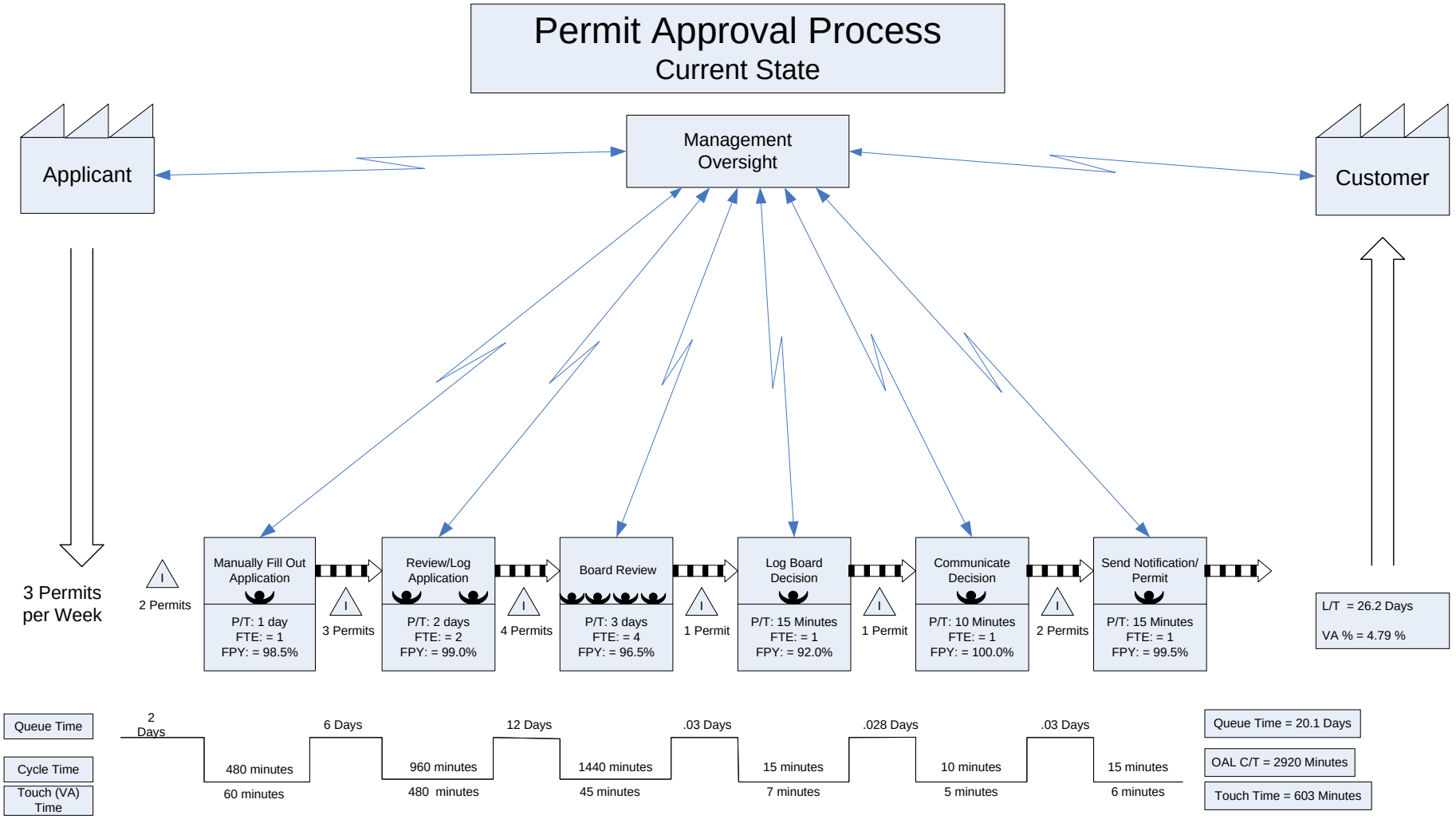


It is very common for the true "value added" percentage of a process to be below 10% of the total effort.

Tips For Value Stream Mapping

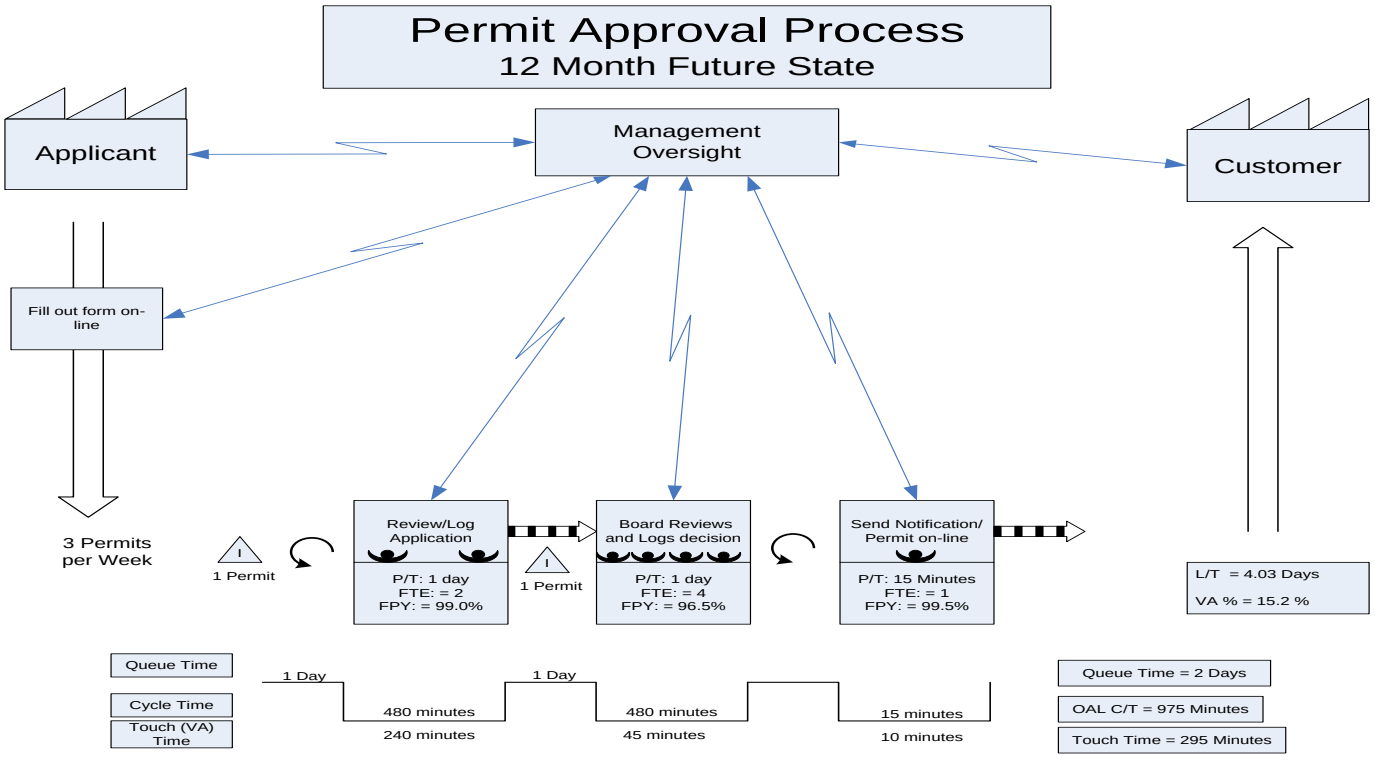
- Collect all information as you walk through the actual pathways of material, service and information flow.
- Start by walking through the entire door-to-door value stream.
- Begin at the Customer and work upstream.
- Collect cycle times and any other pertinent data available.
- Draw the whole value stream.
- Draw by hand in pencil. Clean it up later.
- Use the Process Experts.

Value Stream Map – *Current State*



Value Stream Map – *Future State*

It is common for many organizations using a Hoshin or Strategic Planning and Deployment cycle to develop a Future map 12 months out. Theses process are revisited every 12 months to measure improvement and set the new short term goals.



The Mapping Tree

SIPOC-R

Value Stream Mapping

Gap Mapping

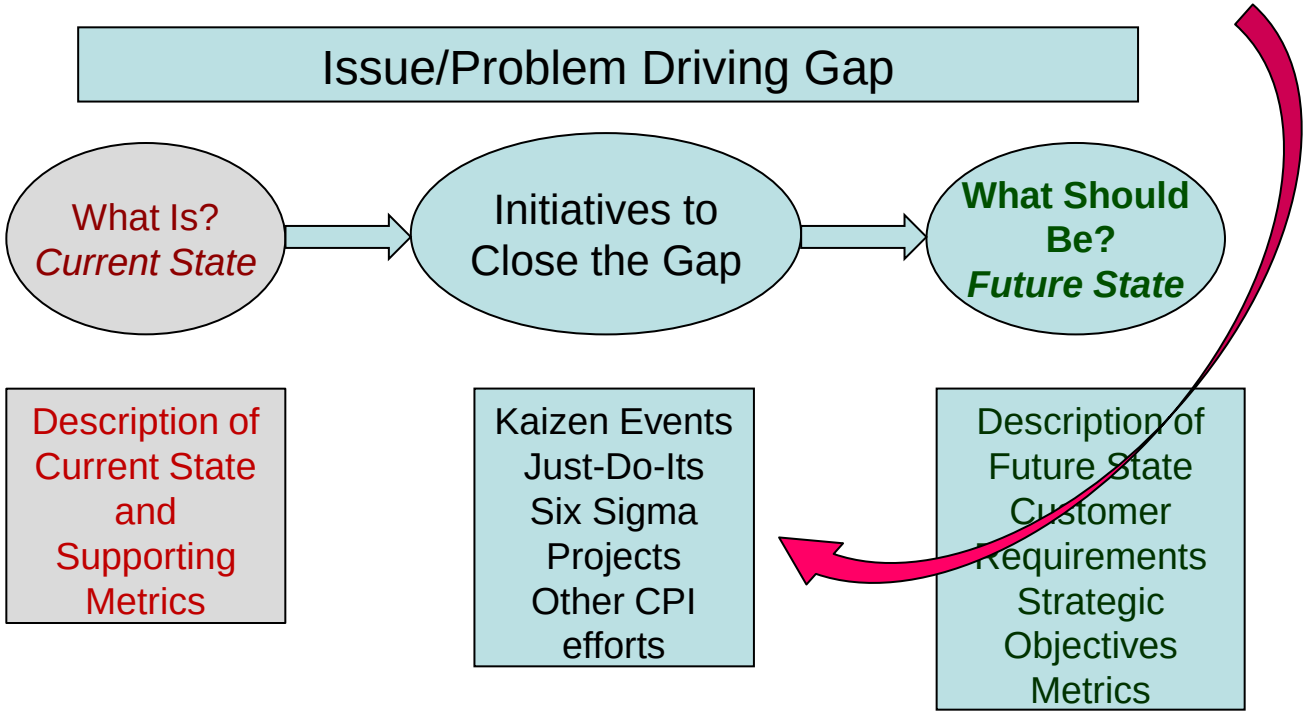
The Gap Map identifies the distance in the performance metrics from current state to future and shows the course of action to be taken to improve the metrics.

KPIV/KPOV Mapping

Root Cause Analysis

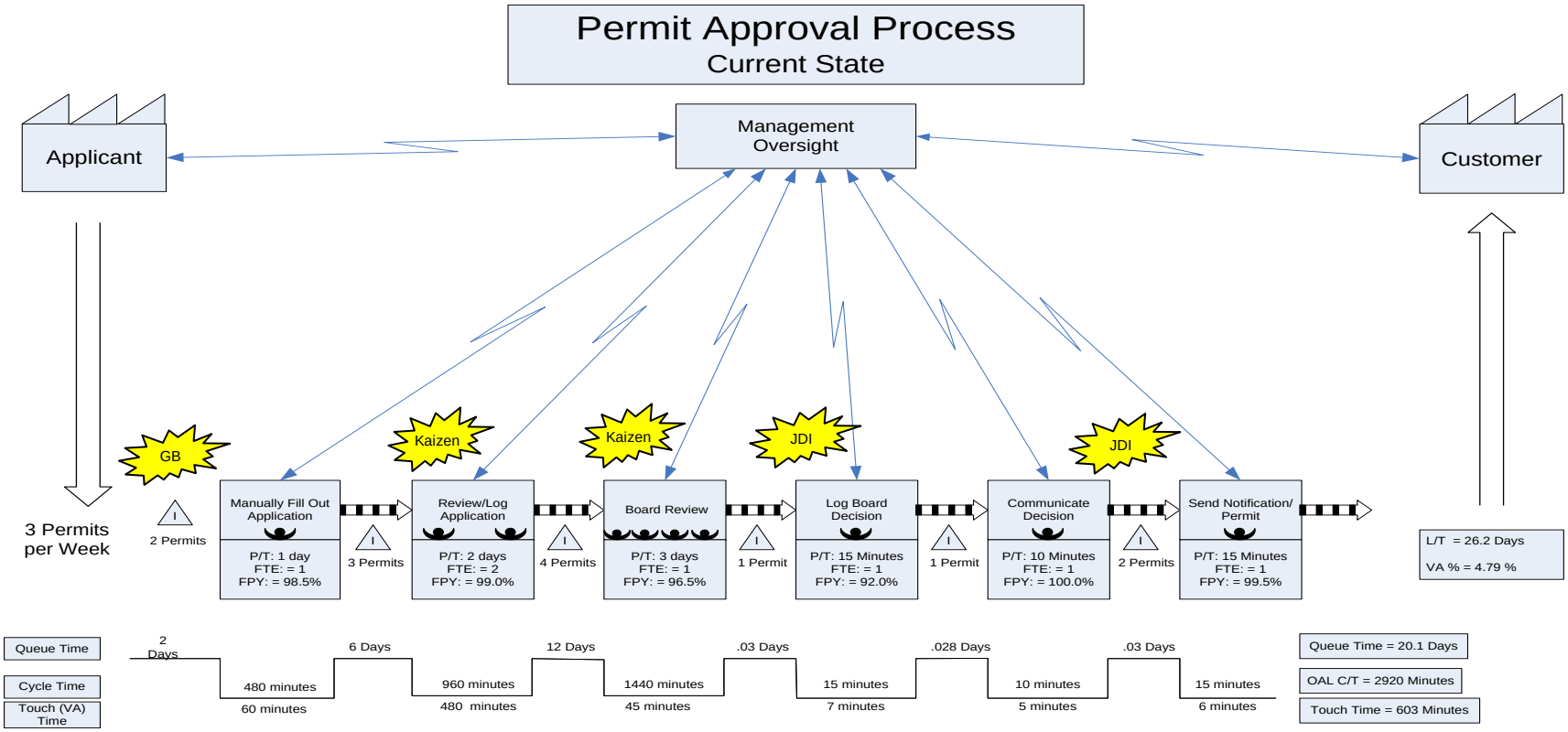
Gap Map

A Gap Map shows the distance between the Current State and the Future State, or Targets, for each CTQ characteristic in the process being reviewed. From this map an Action Priority list is built of events such as Kaizen blitzes, Just-Do-Its or Improvement Projects. These events are assigned to determine root causes and countermeasures for those causes.



Value Stream Mapping – Creating the Action List

Improvement events and projects identified to move the business from the current state to the future state (gaps) are noted on map by starbursts, indicating the area of focus.



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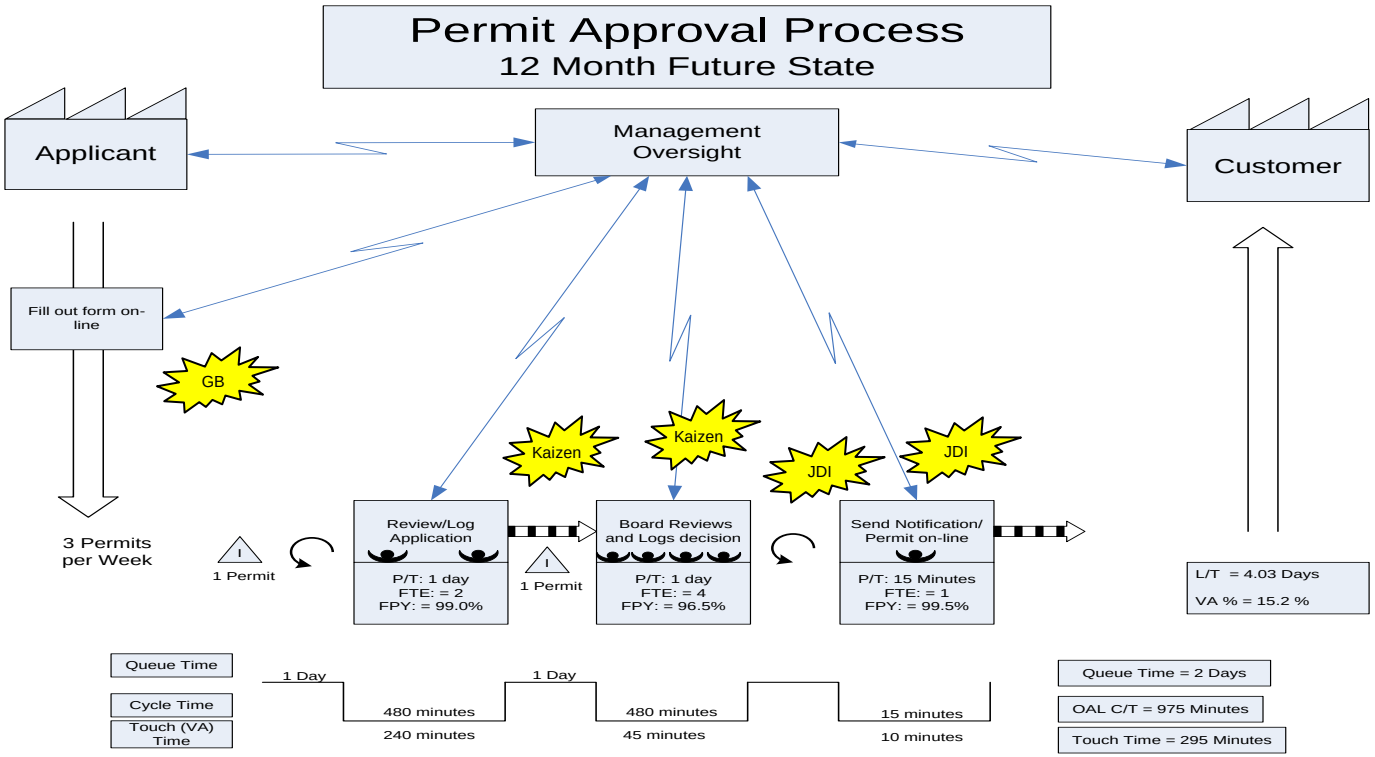


Gap Map – *Project Priority List*

From the Gap Map, events such as, Just-Do-Its, Kaizen events or Lean Six Sigma projects are assigned to determine root causes and countermeasures.

Project/Action Priority List

Process/Area: Permit Application, Approval and Grant Process **Date:** 15-Jul-13

Item	Problem	Action Req'd	Resp	Target Start	Target Complete	Status	Results
1	Manual Form Entry and Processing	Green Belt Project	Sally Jones	31-Aug	31-Dec	1 2 3 4	
2	Reviewing Applicant's Issues Too Long	Kaizen	Tom Johns	12-Sep	15-Mar	1 2 3 4	
3	Board Review Too Long	Kaizen	Joe Martin	21-Feb	15-Mar	1 2 3 4	
4	Delay in Logging Board Decision	JDI	Sally Jones	22-Jul	29-Jul	1 2 3 4	Task Moved and Consolidated
5	Communicating and Sending Notification Too Long	JDI	Tom Jones	31-Oct	15-Nov	1 2 3 4	
						1 2 3 4	
						1 2 3 4	
						1 2 3 4	
						1 2 3 4	
						1 2 3 4	
						1 2 3 4	
						1 2 3 4	

1 2 3 4	= Problem Defined
1 2 3 4	= Strategy Identified
1 2 3 4	= Solution in Process
1 2 3 4	= Complete

The Mapping Tree

SIPOC-R

Value Stream Mapping

Gap Mapping

Process Mapping

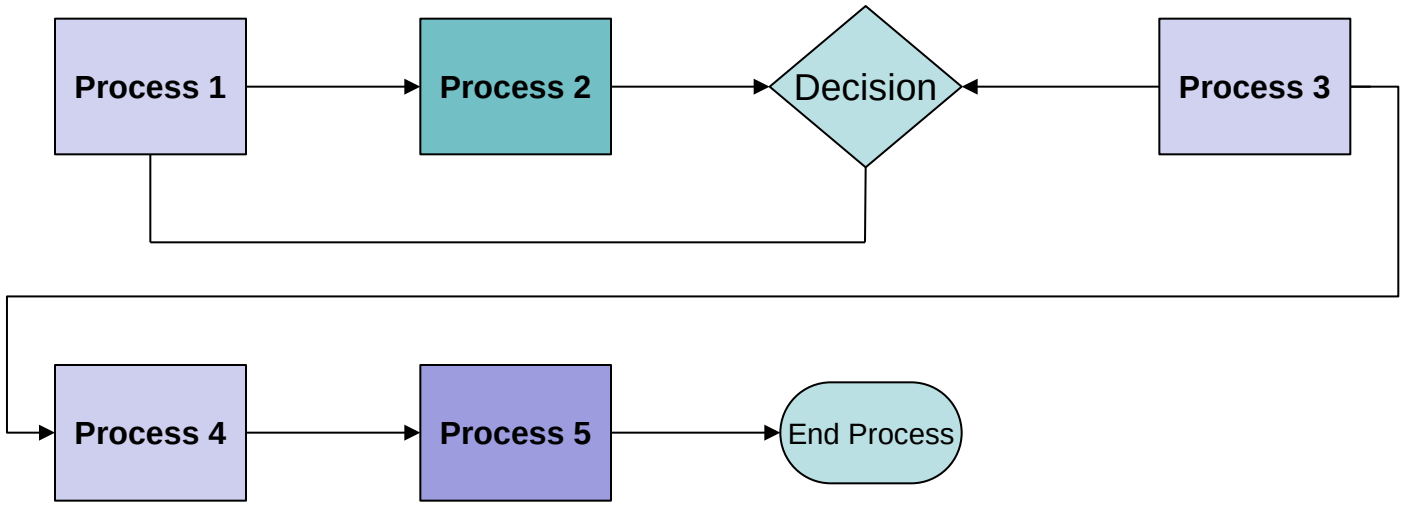
Now we begin to “drill down” further into our processes, as defined by the Value Stream Analysis and Action List, in order to better understand the processes that are performing below target, or needing improvement for strategic reasons.

Process Map

A Process Map is a visual picture of the flow or sequence of activities resulting in product or service output. It is used:

- As a visual guide to the process data.
- As a map of the series of steps that transform inputs to outputs.
- To develop the first "drilled down" level from the Value Stream Map.
- To begin understanding the lower level connection points between processes.

Option:
You can identify potential disconnects or missed hand-offs by color coding each box according to the organization



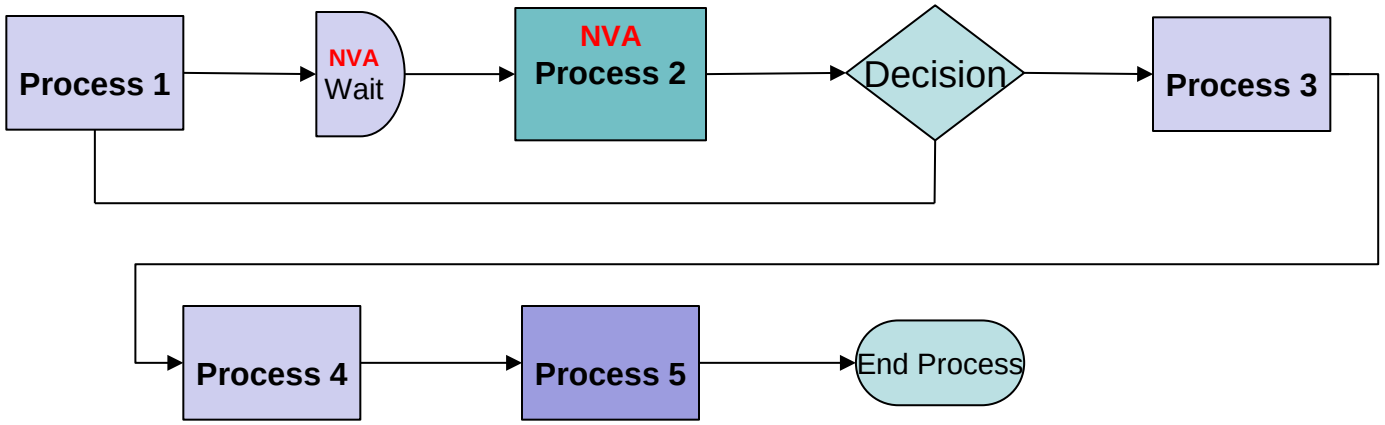
Process Map

The Process Mapping level is a great place to begin to indentify VA and NVA steps in the immediate process. One should also take note of the number of steps in the process and look at step reduction and complexity reduction as one goal of improving a process.

Absolute Rule:

If we pick something up and put it down (in the same place or another), without changing ***form, fit or function***, it is most likely a NVA step and should be removed.

Option:
You can always identify VA and NVA actions and steps by labeling them on the process map.



How do you do it?

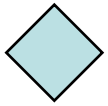
- Get team together.
- Include people that actually perform the process.
- Walk the process where it is done (the Gemba).
- Create the top level map first.
- Target specific areas of interest.
- Walk the process again to ensure you got it right.
- Utilize color changes to alert hand offs during a process.

Process Mapping Symbols

Standard symbols

Standard symbol for processing, work or activity

Data output



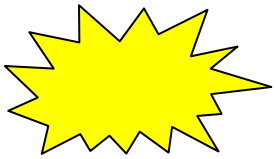
Standard symbol for a decision. Arrows from it should indicate the answers

Starts and end points of a process

Delay/Wait

Continuation – look for a matching number or letter on another diagram

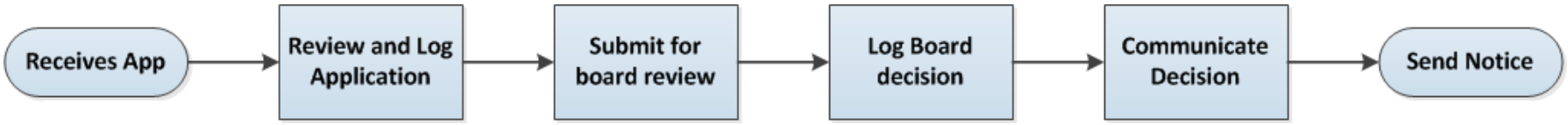
Shows the direction of flow



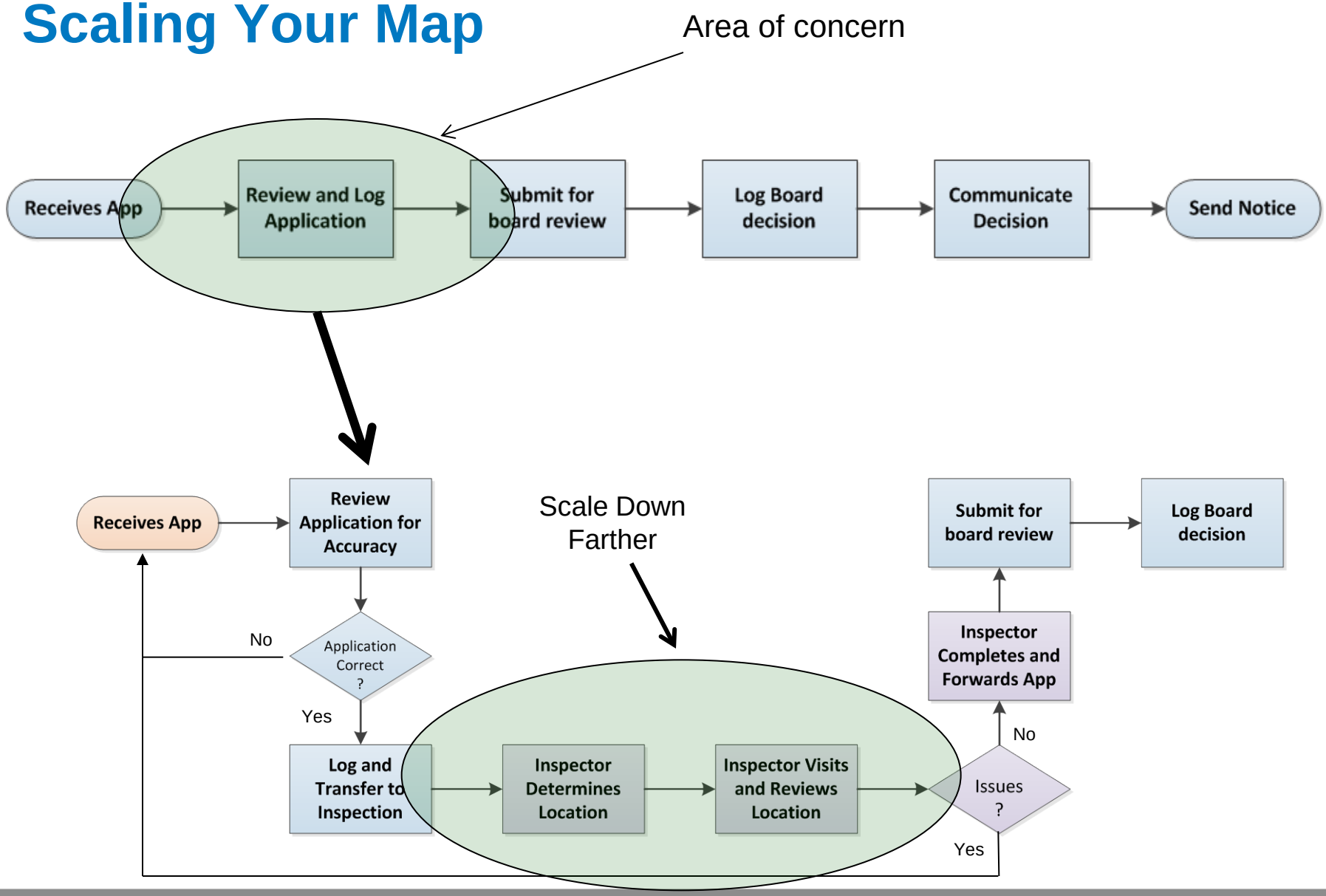
Identified area for improvement

Starting the process map

- The first requirement is to understand the overall process.
  - Start simple. Look at overall flow, identifying only the. highest level of activity.



Scaling Your Map



The Mapping Tree

SIPOC-R

Value Stream Mapping

Gap Mapping

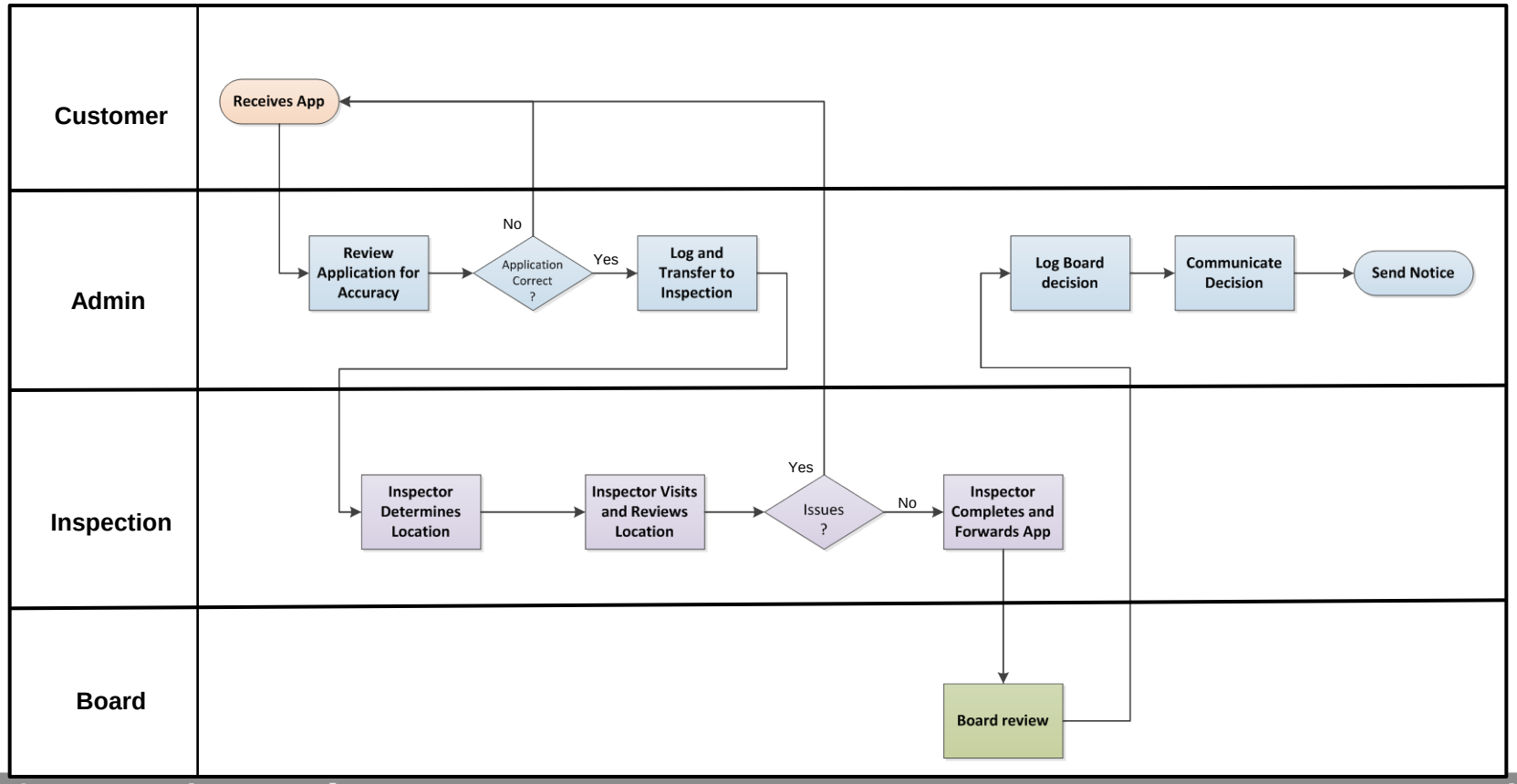
Process Mapping

Swim Lane Mapping

A Swim Lane Map is used to better understand a process that crosses organizational, or departmental boundaries. It is at the same hierarchical level as the process map.

Swim Lane Map

A Swim Lane map is used to show the flow of information/material between different organizations. This type of map is essential in showing “handoffs” between organizations, thus helping to understand failure points.



Developing the Swim Lane Map

- Identify the different people and organizations involved in the process. List them down the left side of the map.
- Retrieve the process steps from the SIPOC-R, VSM or Process Flow Map.
- Using sticky notes, align them in the appropriate place within the “Swim Lane” on the map.
- When all parties are in agreement to the process, document the process.

Documenting the Swim Lane Map

Communication paths are extremely important in mapping. Many disconnects are caused by failures to communicate due to decision trees or hand-offs. Ensure that all processes having multiple outputs are documented as such and all decision trees are documented.

Use color coding for process groups, or functions. This will help the Swim Lane map sync with the Process Flow Map.

The Mapping Tree

SIPOC-R

Value Stream Mapping

Gap Mapping

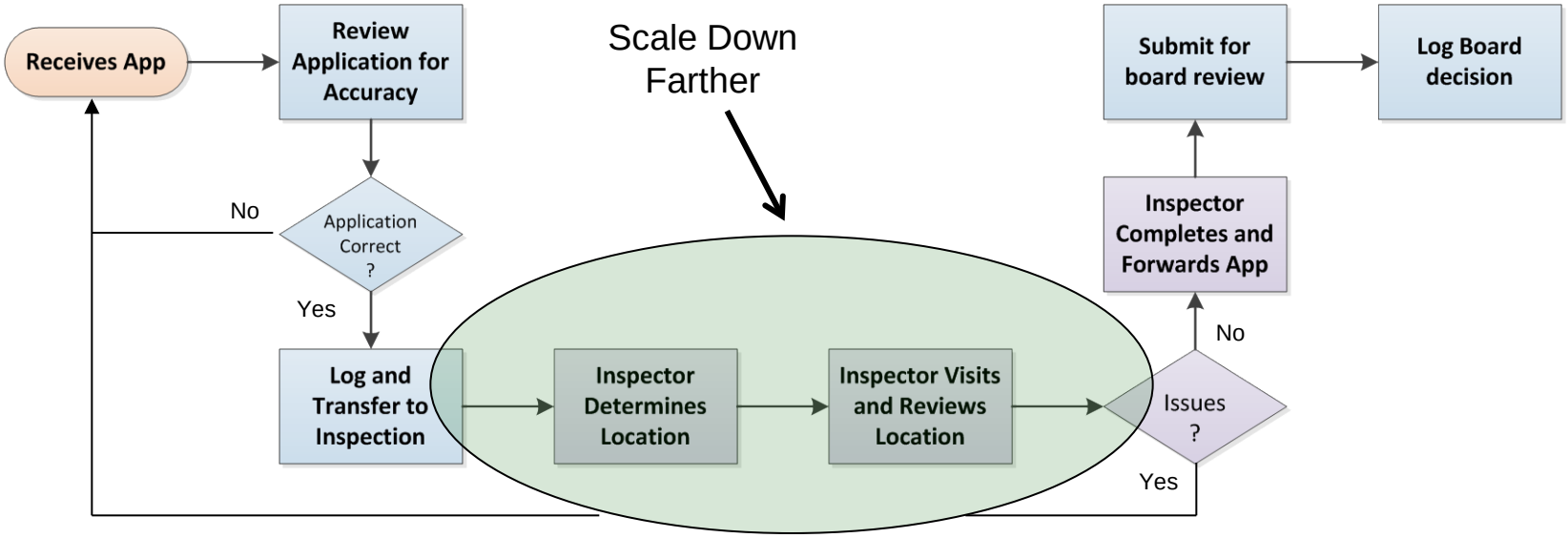
A KPIV/KPOV Map is a “Drill Down” level from the process map and shows, in detail, the inputs and outputs of a targeted process

KPIV/KPOV Mapping

Root Cause Analysis

KPIV/KPOV Map

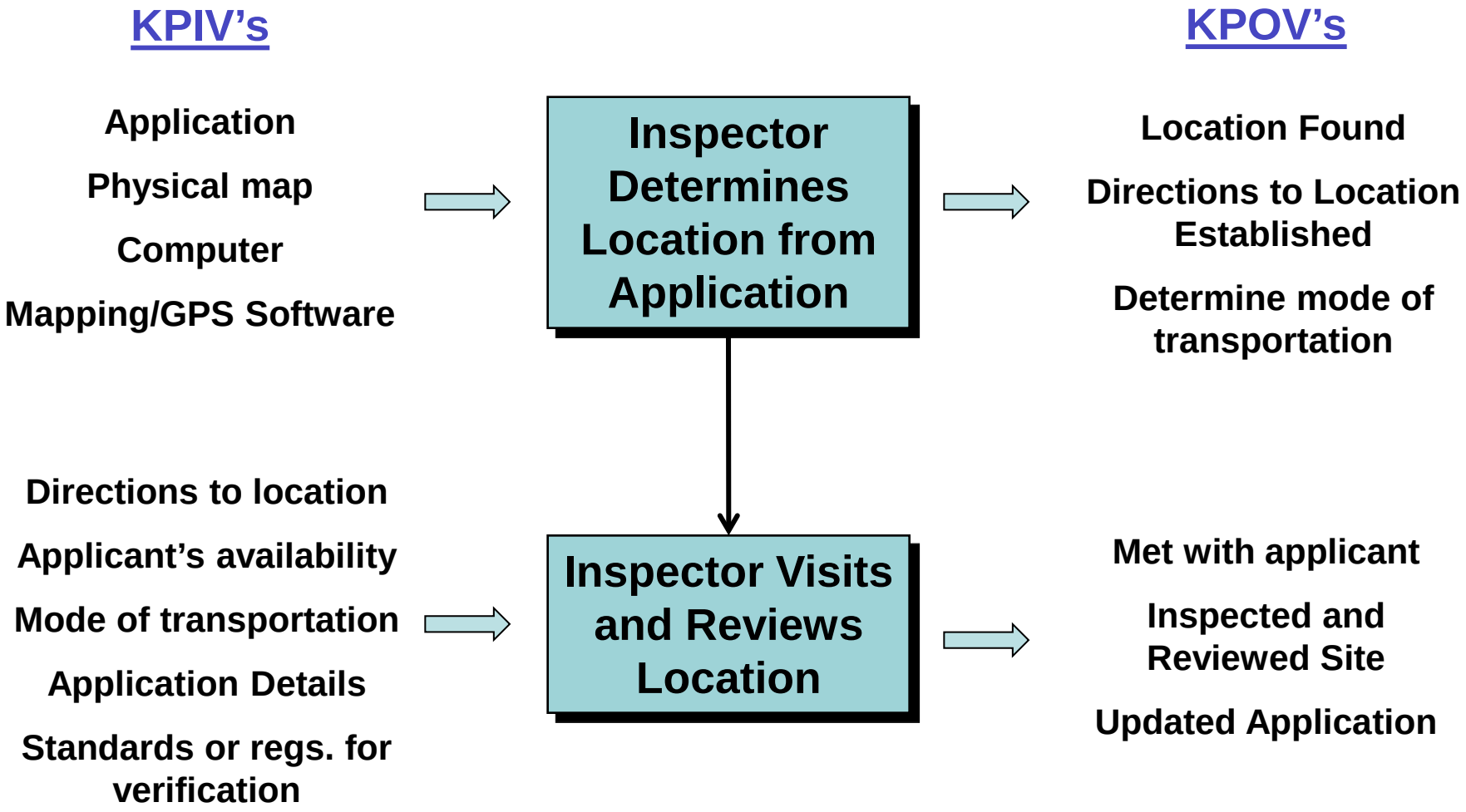
A “Key Process Input/Output Map” is a flow diagram process map of a specific area of a process under review. It is used to “drill down” into the key process input variables and key process output variables in order to begin performing root cause analysis on value added failure points.



Developing the Key Process Input/Output Map

- From the Process Flow Map or Swim Lane Map, choose the area for review by Key Strategic Objectives (poor customer service, poor FPY, poor utilization, etc).
- Once you have identified the target section of the process flow, create a standard block flow diagram of the supporting steps in that process.
- Focus on those critical things which are needed for each step in the targeted process. Document on post-its and add to the process map. These are called Key Process Input Variables or KPIVs.
- Focus on those critical things which are delivered by each step in the targeted process. Document on post-its and add to the process map. These are called Key Process Output Variables or KPOVs.
- Typically the direct symptoms of the root cause of an issue will be found in the inputs, process or outputs in this level of the mapping process.

Key Process Map—Example



The Mapping Tree

SIPOC-R

Value Stream Mapping

Gap Mapping

We have now reached the point where we can identify potential root causes through “5 Why” analysis, Pareto diagrams, Fishbone diagrams and other applicable RCA tools.

Root Cause Analysis

The Mapping Tree - Recap

SIPOC-R – Organizational Objectives determined process was not meeting customer need.

- **Value Stream Mapping –** Current State and Future State revealed where process currently is with respect to where it needs to be, based on Organizational Objectives.
  - **Gap Mapping –** Revealed the large difference, by metrics, between the to VSMs and built the "go forward" plan.
    - **Process Mapping –** Began the initial drill down in the area of greatest concern.

      Swim Lane Mapping – Graphically exposed the "hand-offs" throughout the process.
      - **KPIV/KPOV Mapping –** The lowest drill down level of the area of concern. Reveals the elements that are typically components of Pareto, Fishbone, 5 why's, etc.
        - **Root Cause Analysis**

The Mapping Tree

- SIPOC-R
- Value Stream Mapping
- Gap Mapping
- Process Mapping
- Swim Lane Mapping
- KPIV/KPOV Mapping
- Root Cause Analysis