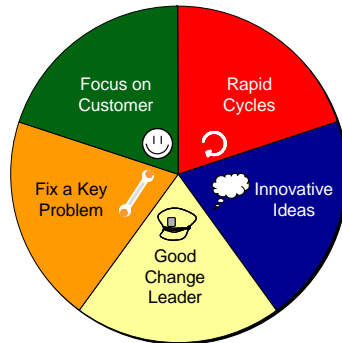# VISUAL MODELING

Though it seems clear that the five principles promote success, how to apply these principles in practice is not so clear.

We can use *visual modeling tools* to implement the five principles, because they allow us to:

- **map out the system**—the inputs, processes, and the outputs—in a clear, understandable way

- **infer cause and effect**, thus making troubleshooting easier

- **generate ideas and solutions**, and evaluate them based on their innovativeness and ease of implementation

- **determine what we should measure**, and allow us to monitor the consistency of output

- **promote transparency and accountability** within change teams, and make it easier for new team members to jump in

- **communicate** effectively and efficiently, thus leading to fewer meetings

- **manage the change process**, and give clues about where to go next.

The following pages present visual modeling tools that agencies can use to practice the five key principles. The charts and diagrams were created using Microsoft Visio or Excel—extremely useful software for visual modeling and communication. One caveat: **avoid "analysis paralysis."** Use visual tools to guide decision-making; these should not take excessive time or effort that keeps staff from getting things done.

Principle	Tools
Understanding the customer	Basic Flowcharts, Swim lane Diagrams
Fixing a key problem	Fishbone Diagrams, Inter-relationship Digraphs
Choosing a change leader	Sociograms, Team Spiderwebs
Generating innovative ideas	iBoards, i^2 Charts
Rapid cycle testing	Tug-'O-War Diagrams, WWW Charts

BASIC FLOWCHARTS

Flowcharts vary in complexity. Simple flowcharts can be more effective for troubleshooting and, when combined with cognitive walk-throughs, offer powerful aids in understanding, troubleshooting, and improving processes that directly influence the customer and the staff.

Flowcharts, however, can be intimidating and overwhelming, especially for those who do not like the quantitative sciences. Therefore, presentation is very important. Use the following rules as guidelines for effective flowcharting, whether it is done individually or as a group.

- Be consistent with **page orientation**. If flowcharts are printed on copy paper, it's probably best to make the chart flow from the top down, rather than left to right. If you have a big horizontal whiteboard in your meeting room, it would be best to have the flowchart read from left to right.

- If the flowchart is too complex, **break it down** to smaller, manageable parts. A process that is difficult to flowchart indicates a problem in itself— the problem of navigating a complex system. Having a clear, accurate diagram of a process already forms part of the solution.

- Use of standard, basic flowcharting **symbols**, as shown in FIGURE 1 below. Consistent symbols make it easier to communicate with and comprehend diagrams.
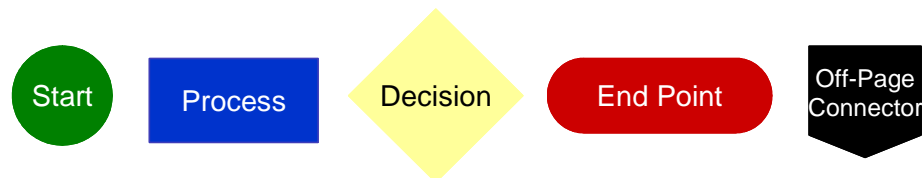

FIGURE 1: FLOWCHARTING SYMBOLS

- **Number flowchart items** for easy reference. As seen in the flowcharts in FIGURES 2a and 2b, numbering each node makes it easier to understand and troubleshoot the process.

- **Create a "before" and "after" flowchart**, to show how the process has changed. This makes communication easier, and demonstrates visually how a change project benefits the current system. Signal Behavioral Health Network provided the examples in FIGURES 3a and 3b below.
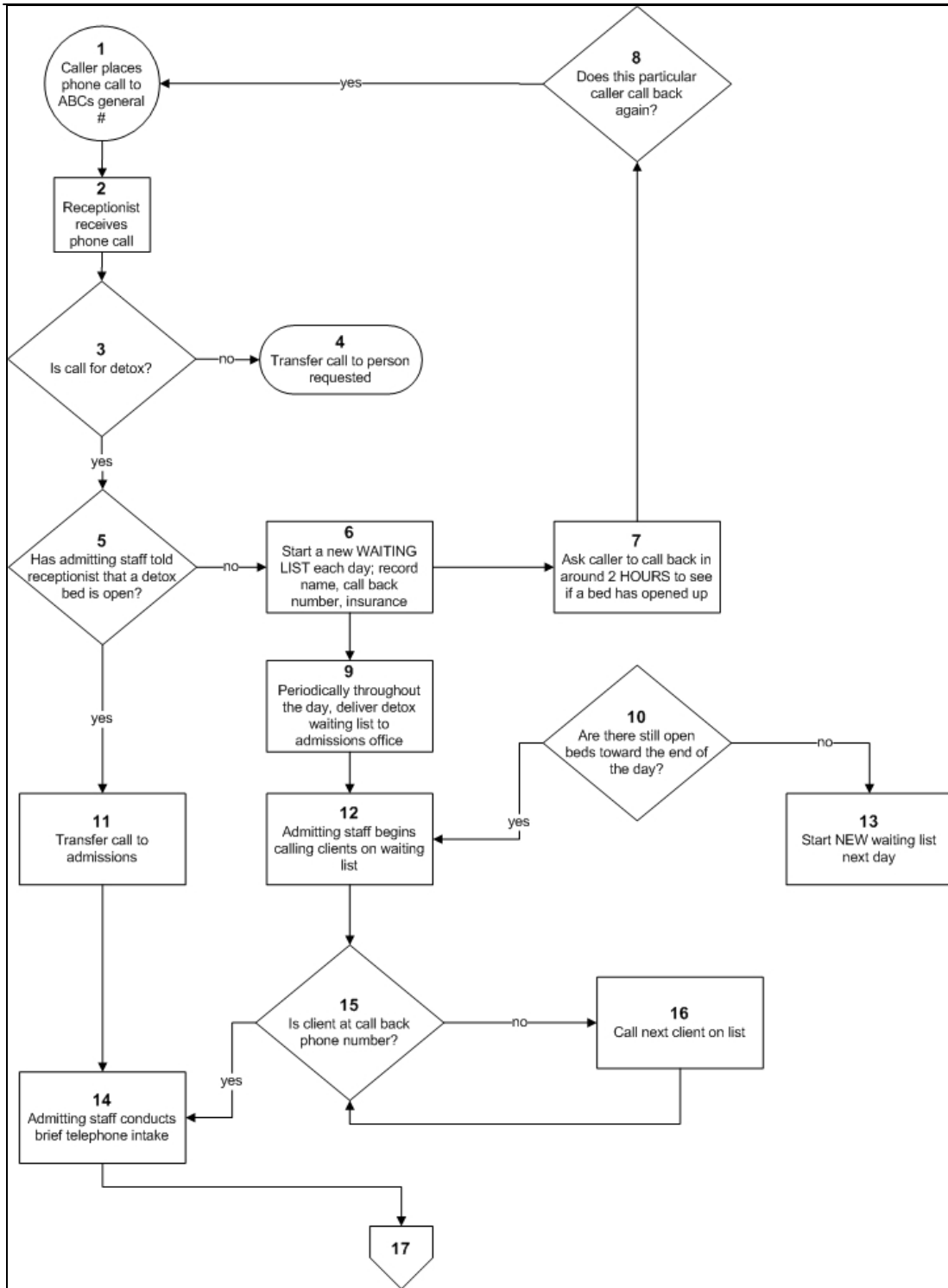
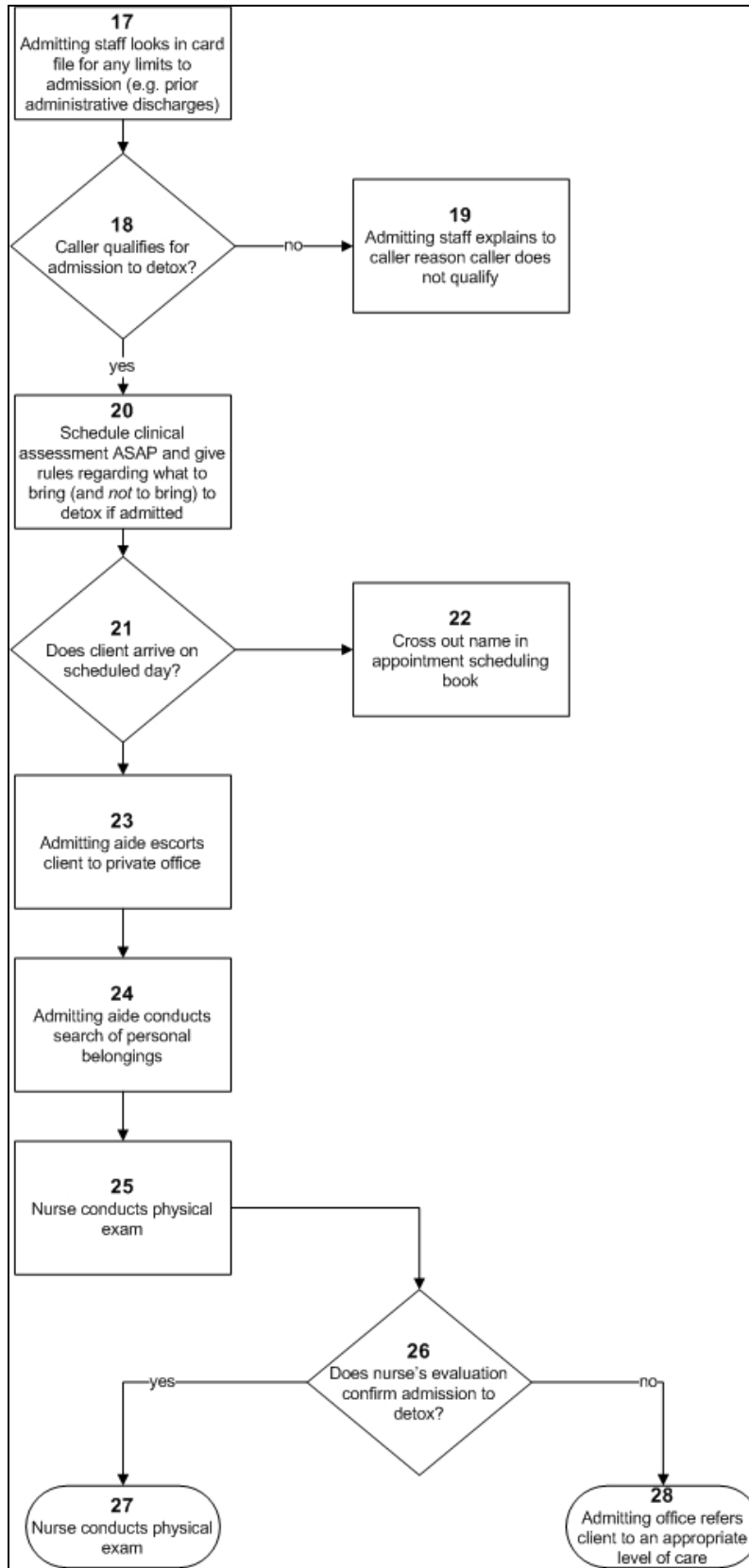**FIGURE 2a: ACCESS FLOWCHART FOR DETOX PROGRAM AT ABC RECOVERY (NODES 1-17)**

17
Admitting staff looks in card file for any limits to admission (e.g. prior administrative discharges)

18
Caller qualifies for admission to detox?

—no→

19
Admitting staff explains to caller reason caller does not qualify

yes

20
Schedule clinical assessment ASAP and give rules regarding what to bring (and *not* to bring) to detox if admitted

21
Does client arrive on scheduled day?

→

22
Cross out name in appointment scheduling book

23
Admitting aide escorts client to private office

24
Admitting aide conducts search of personal belongings

25
Nurse conducts physical exam

26
Does nurse's evaluation confirm admission to detox?

yes—   —no

27
Nurse conducts physical exam

28
Admitting office refers client to an appropriate level of care

FIGURE 2b: ACCESS FLOWCHART FOR DETOX PROGRAM AT ABC RECOVERY (NODES 17-28)
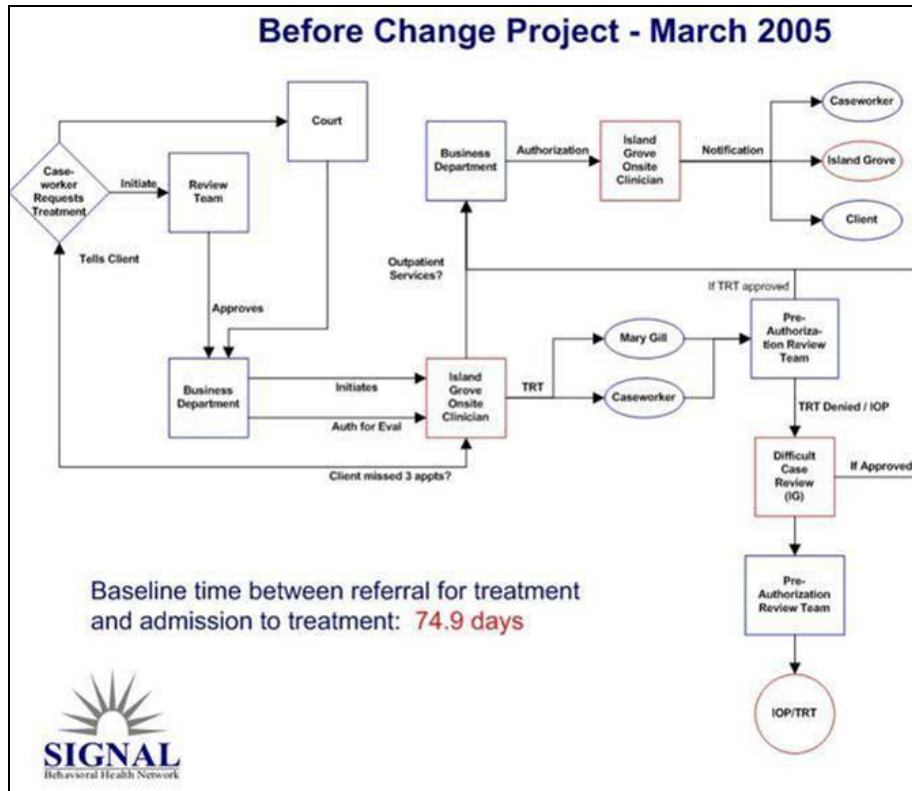
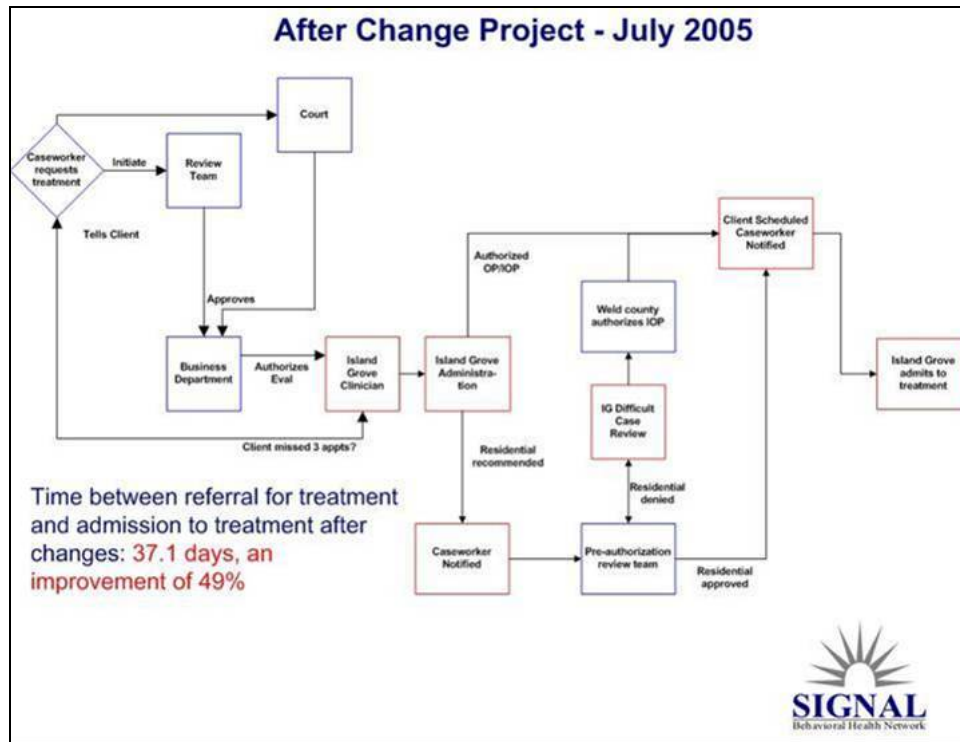FIGURE 3a: "BEFORE" FLOWCHART, SIGNAL BEHAVIORAL HEALTH NETWORK

FIGURE 3b: "AFTER" FLOWCHART, SIGNAL BEHAVIORAL HEALTH NETWORK

SWIM LANE (or CROSS-FUNCTIONAL) DIAGRAMS

A swim lane diagram, sometimes called a cross-functional diagram, is a process flowchart that provides richer information on **who does what**. It can also be expanded to show times—**when** tasks are done and **how long** they take. As seen in a swim lane diagram of ARC Community Services' intake process (FIGURE 4), the visual metaphor is a swimming pool, with each participant in the process assigned to "lanes."

The steps to create a swim lane diagram follow:

1. Focus on a specific process, and put the title of your diagram on top.
2. Enumerate the people involved in this process and assign them to rows, typically beginning with the customer on the top row.
3. Create the process flowchart, drawing processes and decisions made, as well as arrows that indicate the process flow.
4. If the diagram is too complex, break it up into its components. As seen in FIGURE 4, the diagram indicates *phases* or *sub-processes* (i.e., pre-intake, intake, pre-treatment, treatment, etc.).
5. If possible, indicate times for each node on the bottom of the diagram. Compute cumulative totals—the total time elapsed—within each phase.
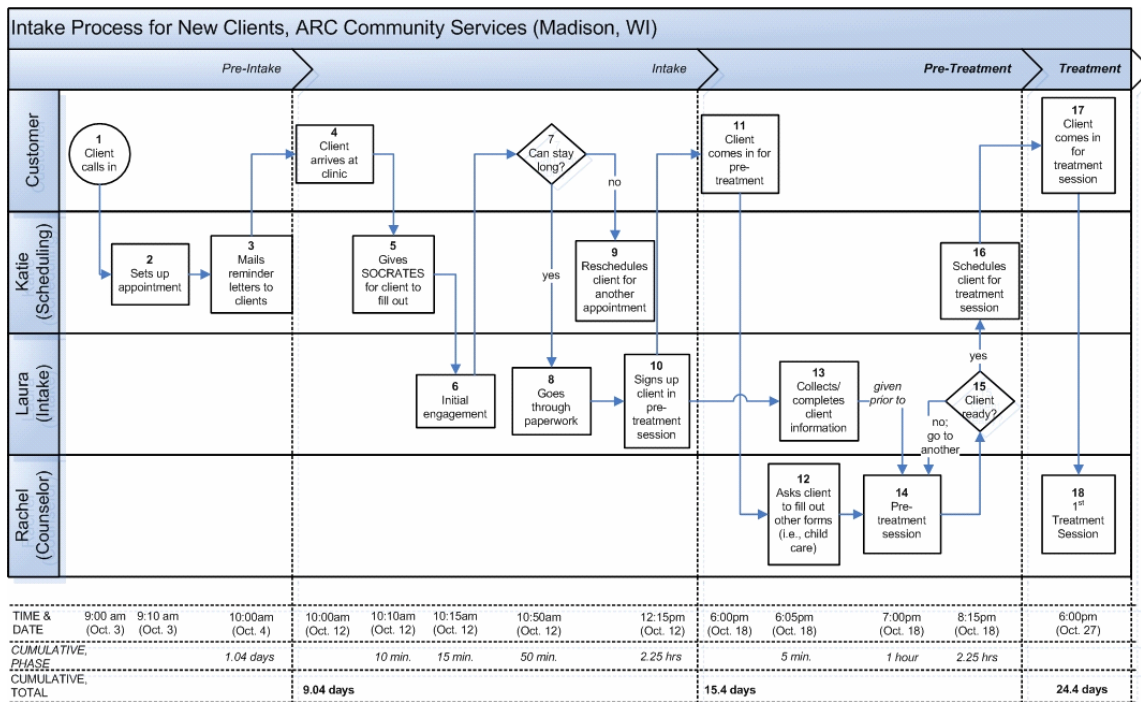

FIGURE 4: SWIM LANE DIAGRAM OF THE INTAKE PROCESS (ARC COMMUNITY SERVICES)

Swim lane diagrams take more time to develop, but enable teams to identify *time traps*—which processes take the longest—as well as *capacity constraints*, or which resources get bogged down because of work. Ideally, after identifying the current process, teams should try to map out a better process, based on the information provided in the diagram.

FISHBONE (ISHIKAWA) DIAGRAMS

One of the more popular tools used in process improvement is the *fishbone diagram,* otherwise known as the *Ishikawa diagram,* named after Kaoru Ishikawa, who developed it in the 1960s. A fishbone diagram is perhaps the easiest tool in the family of cause-and-effect diagrams that engineers and scientists use in unearthing factors that lead to an undesirable outcome.

FIGURE 5 below shows a fishbone diagram created by Palladia, Inc., that enabled them to analyze the problem of low continuation rates. The working visual metaphor is that of a fish, whose "head" indicates the particular problem being analyzed, and whose skeleton consists of "bones" representing potential causes of the problem. The steps in creating a basic fishbone diagram are straightforward.

1. Brainstorm the potential causes of the problem using any method, such the nominal group technique.
2. Group similar ideas/concepts together.
3. Choose the biggest problem area—either by voting or by consensus—and brainstorm ways to solve it. If the problem is too complex, break up the diagram into smaller, manageable parts.
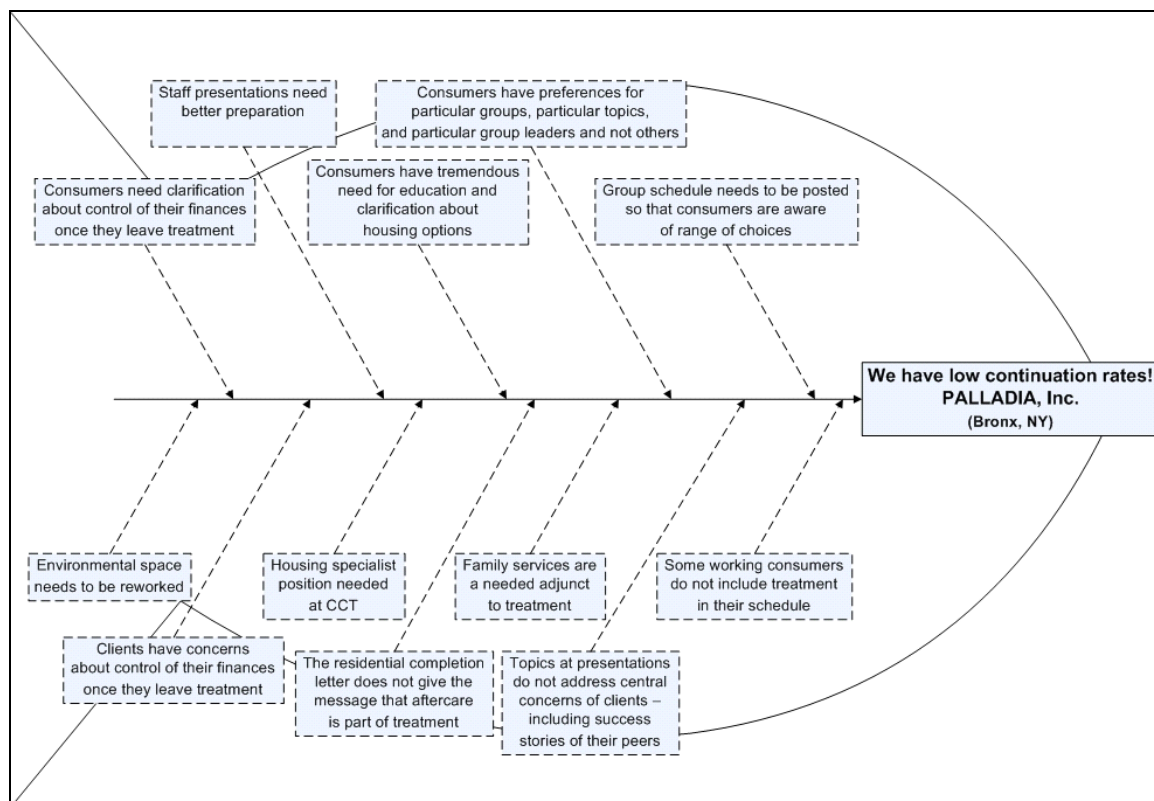

FIGURE 5: FISHBONE DIAGRAM ON CONTINUATION RATES, (PALLADIA, INC.)

There are many variations to this basic process, and teams should be able to adapt it to their particular needs and constraints. As FIGURE 6 below

demonstrates, Asian Counseling and Referral Services not only identified potential causes to the problem of delay in time from first request to first treatment, but simultaneously identified potential solutions for each of these, maximizing their efforts.
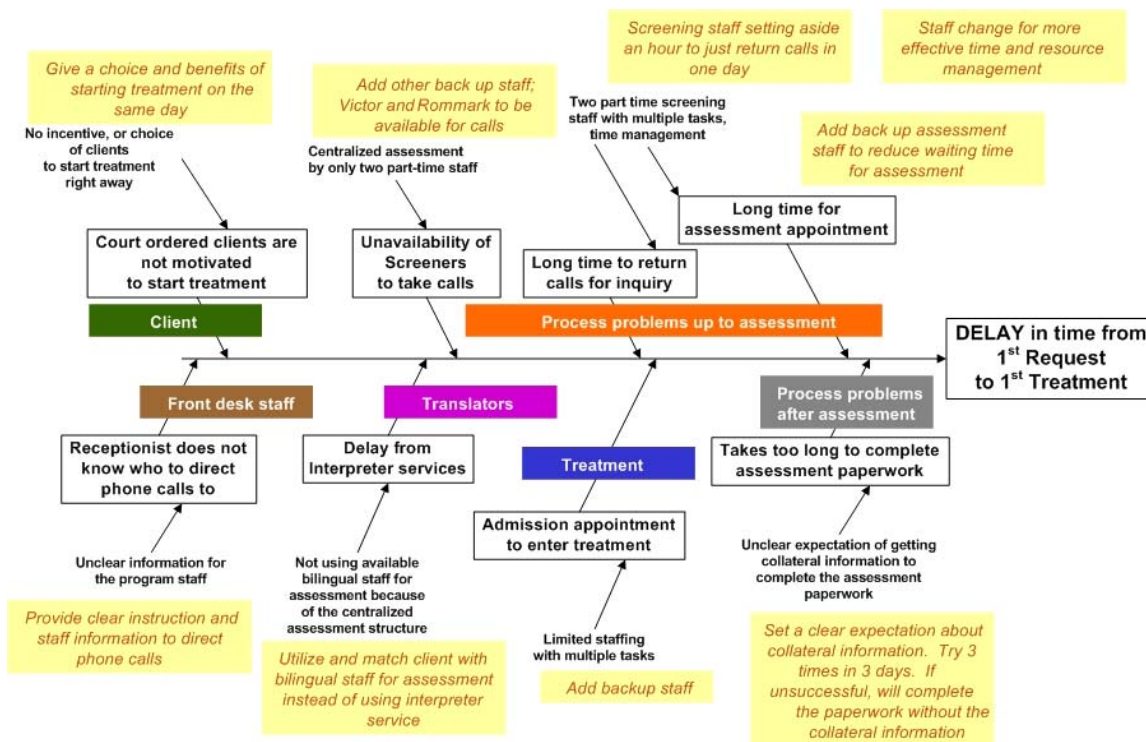

FIGURE 6: FISHBONE DIAGRAM ON DELAY IN TIME FROM 1st REQUEST TO 1st TREATMENT, (ASIAN COUNSELING & REFERRAL SERVICES)

A fishbone diagram is an easy tool that facilitates quick analysis of key problem areas that "keep the CEO awake at night."

INTER-RELATIONSHIP DIGRAPH

Another type of cause-and-effect diagram is an *inter-relationship digraph* (*di* is short for directional). This type of diagram adds a layer of complexity, but helps identify problems that, when addressed properly, provide the greatest benefits

FIGURE 7 below is a sample inter-relationship digraph for the problem of high no-show rates. The basic steps are as follows:

1. Brainstorm the potential causes of the problem, group similar concepts together, and label these nodes A, B, C, etc.
2. Identify cause and effect, and draw directional arrows. For example, too much paperwork (node G) leads to an overworked staff (node D), and consequently an unfriendly environment for clients and staff (node A). There may be cases when arrows point both ways, which typically indicates a vicious cycle. Again, if the problem is too complex, break up the diagram into manageable parts.
3. Count the number of arrows coming into and going out of each node. These counts determine:
   - the root *causes*—the nodes that have the most number of arrows coming *out* of them,
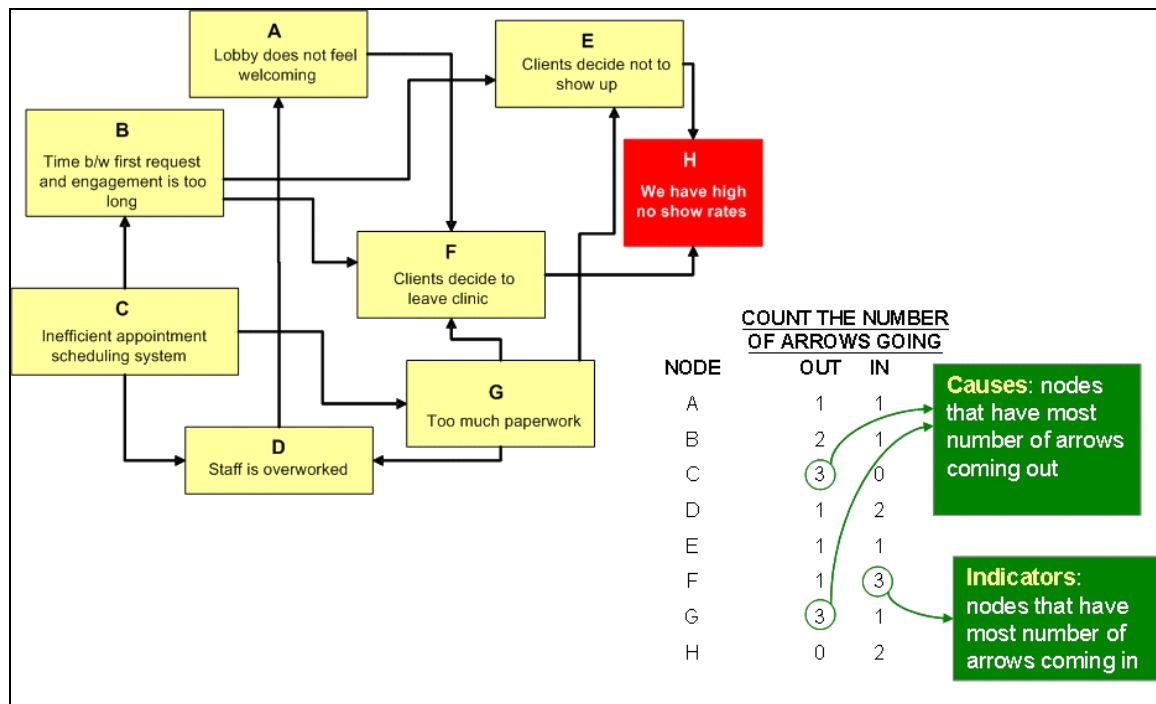   - and the key *indicators*—the nodes that have the most number of arrows going into them.

FIGURE 7: SAMPLE INTER-RELATIONSHIP DIGRAPH ON HIGH NO-SHOW RATES

Focusing on the root causes (in this case, nodes C and G) provides the greatest benefits as they help resolve other problems down the stream. Measuring and monitoring the key indicators (such as node F) give clues on overall system performance.

WORK SOCIOGRAM

How do we choose good change leaders? One of the standard tools in the field of social network analysis—the *sociogram*—can help identify candidates for change leader, and shed light on why change projects don't produce change, as well as on how to design effective change teams.

FIGURE 8a is a simple social network diagram that shows the working relationships in a group of eight colleagues. It is readily apparent that some individuals depend heavily on others at work, while others are fairly isolated.
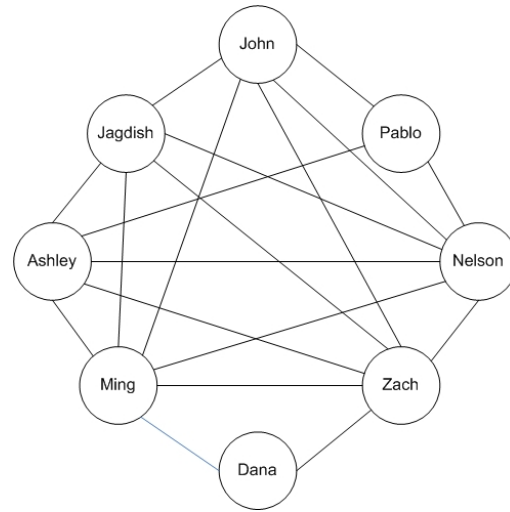
We can add more information by indicating the *frequency of contact* between individuals.
For example, in FIGURE 8b, thick heavy lines may indicate heavy interaction between two colleagues, such as working together on certain tasks or exchanging information on a daily basis. Thin black lines may indicate occasional collaboration a few times per week, while dashed lines may indicate that individuals rarely work together. In FIGURE 8b, for example, Nelson heavily depends on, or is heavily depended on by, several individuals on a daily basis. In contrast, Dana at the bottom works only with Zach on a daily basis.
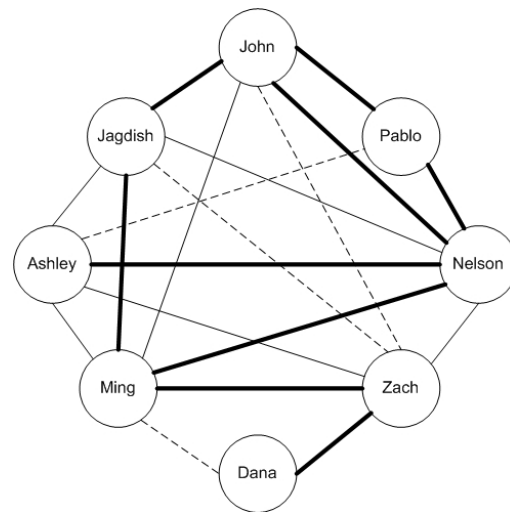

FIGURE 8a: Simple Work Sociogram

FIGURE 8b: Weighted Work Sociogram

We can add another layer of complexity by indicating the type of relationship people have. In any organization, there will always be people who *do not like* working with certain individuals. FIGURE 8c captures this with the red lines. This is natural in any organization, and does not mean these individuals cannot work together efficiently. Such a diagram, however, provides clues on who can better lead change efforts (i.e., Nelson), as well as who may not be successful (i.e., Dana).
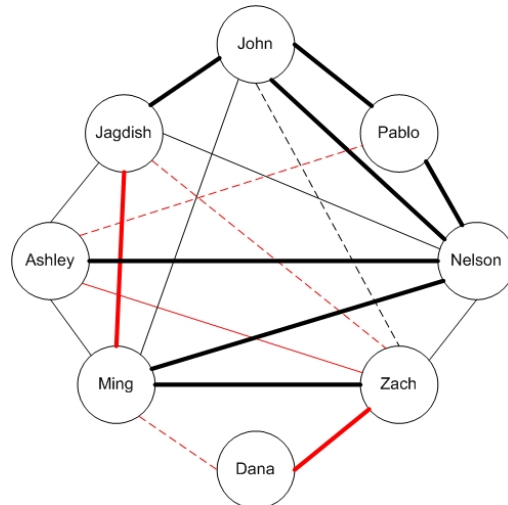

FIGURE 8c: Weighted, Bicolor Work Sociogram

We can then attempt to measure individuals' degree of connectivity, as well as the degree to which each one is liked or disliked and thus have a sense of the network's overall health.

FIGURE 8d shows an example of such a scheme. While measuring the strength of these relationships is difficult, a good change leader will have a sense of how well two people work together. If a change leader's perceptions are accurate, then such a diagram is a powerful tool to identify and nurture future change leaders, and to support other staff.
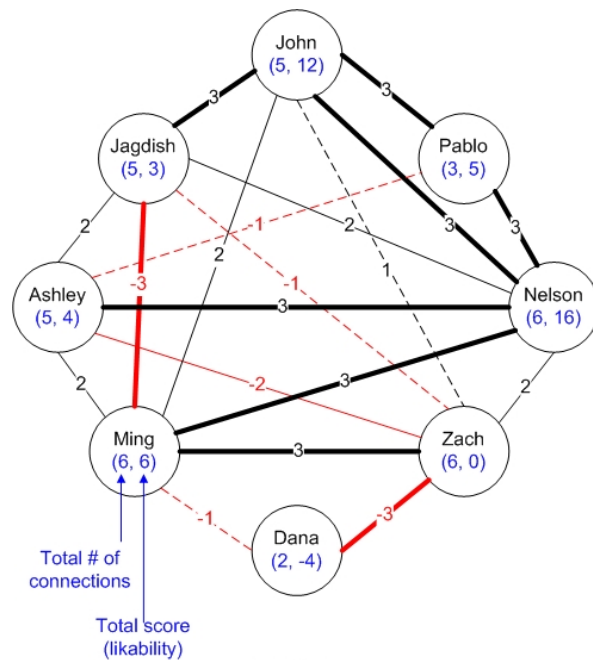
FIGURE 8d: A More Complicated Sociogram

TEAM SPIDERWEB

Ideally, a change leader is both likeable and competent. FIGURE 9 below shows a spider diagram, sometimes known as a radar diagram, of individual competence (in red) and degree of likeability (in blue) for the eight-person team presented earlier. (Note: These charts are easy to create through Microsoft Excel or other commercially available charting programs.)
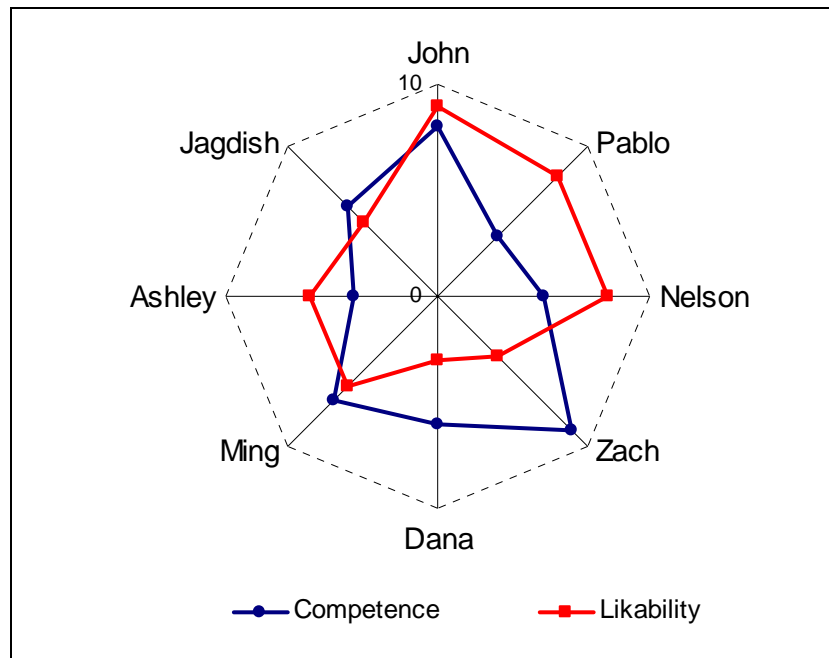

FIGURE 9: TEAM SPIDERWEB

Executive sponsors and change leaders can assess their team members' competence and likeability (for example, on a scale of 0–10) and place them on this standardized diagram to identify potential change agents. The likable yet relatively less competent individuals such as Pablo and Nelson can effect change because they everyone likes them, while leaders can coach the competent yet less well-liked individuals such as Zach and Dana more positively to maximize their much-needed skills.

iBOARD

Change teams have heard the term "think outside of the box" many times, and are asked – either implicitly or explicitly – to apply this principle in their work, or in brainstorming sessions all the time. Not all of us, however, are naturally creative thinkers. Yet it is possible to train yourself and your change team to be more creative by encouraging daily *observation, reflection*, and *creative thinking*.

An "iBoard" (where "i" stands for "ideas," or "inspiration," or "imagination") such as the one below in FIGURE 10 can help people generate innovative ideas and foster creativity. An iBoard does not have to be elaborate; it is simply a place to write, draw, post, or tack any material, from photos and magazine clippings, to lists of words and Web sites, that stimulates creative thinking. These may include:

- **Artifacts**: "cool" iPods, BMWs, Harley motorcycles, Swiss army knives
- **Experiences:** roller coasters, restaurants, concerts, travel
- **Stories**: inspirational stories from sports, the news, or even patients)
- **Ideas**: which can come at any time, and which we might lose if we don't capture them in writing
- **Observations**: behavior in waiting rooms, reactions to paperwork)
- **Word Cues**: lists of metaphors, "all I need to know about life, I learned from…")

FIGURE 10: SAMPLE iBOARD (IDEAS, INSPIRATION)

i² CHART

Once a team generates several good ideas, how do you *evaluate* them to choose one or two that hold the most promise? One method is through a 2 x 2 diagram that maps out ideas with respect to their degree of innovation, as well as their ease of implementation.

Suppose there are eight potential solutions brainstormed to a given problem, as seen below.

FIGURE 11a shows that each solution is assigned a number and placed on one of the four regions in the i² chart. The best solution(s) are the ones that are exciting yet easy to implement (ideas 1 and 3).

FIGURE 11b is a variant, where one *rates* solutions with respect to their degree of difficulty and their degree of innovativeness (i.e., 0–10), and places them on a 10 x 10 grid. This makes it easier to tease out the best solution(s).
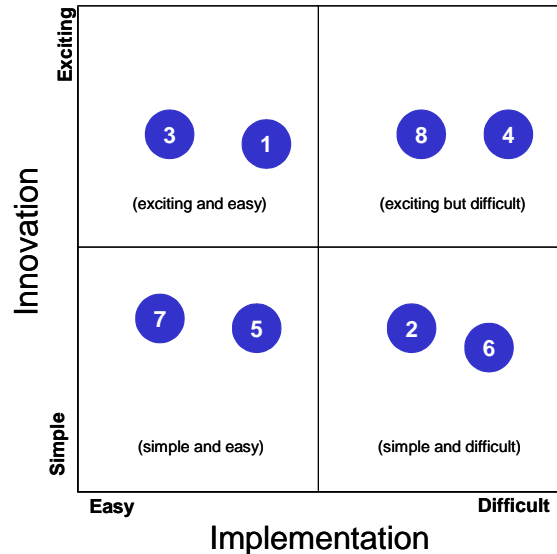

FIGURE 11a: i² CHART

It takes forever for patient to get from first contact to 1st pre-treatment session!

POTENTIAL SOLUTIONS BRAINSTORMED:

❶ Reshuffle/postpone paperwork

❷ Cross-train staff

❸ Structure encounter as an "experience"

❹ Computer-based information system

❺ Have counselors finish paperwork later

❻ Redesign paper forms

❼ Divide tasks and have people specialize
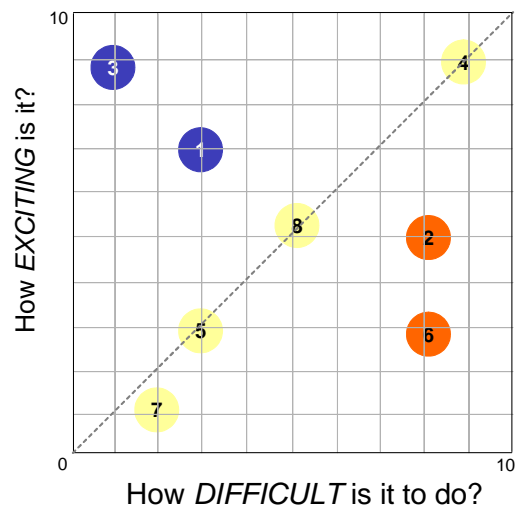
❽ TV/snack breaks

FIGURE 11b: VARIANT OF AN i² CHART

VISUAL AIDS TO PROJECT EXECUTION

Process improvement efforts suffer primarily when change teams do not anticipate barriers to change, which then requires more iterations of a change project and extending deadlines.

FIGURE 12 presents a *tug-'o-war diagram,* which provides a visual representation of factors that keep the system in the status quo, as well as those that drive change. Removing the former and capitalizing on the latter factors early in the change cycle promotes greater success and productivity.
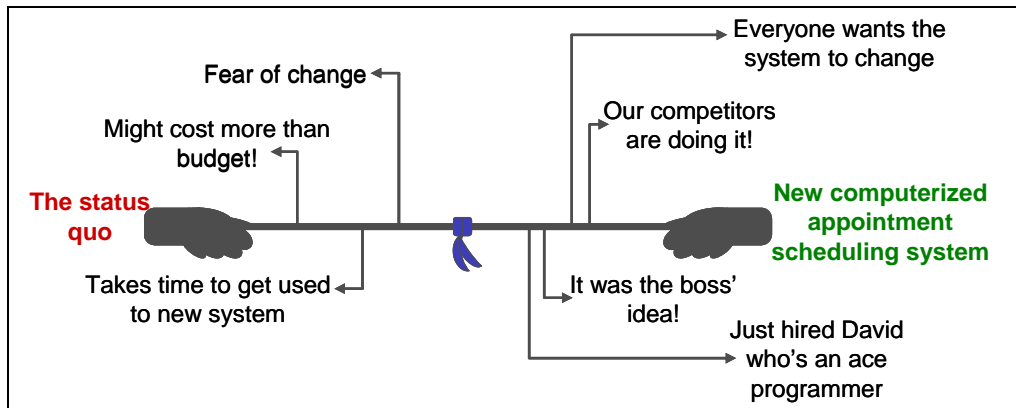

FIGURE 12: TUG-'O-WAR DIAGRAM

FIGURE 13 below is a sample *WWW chart* – or a *Who-What-When chart*, which shows who is responsible for key deliverables, and most importantly, their *deadlines*. This simple chart provides transparency and accountability, and defines discrete points in time when tasks should be done. Without such deadlines, process improvement efforts will remain open-ended and futile.

WHAT	WHO	WHEN
Gather data on arrival, service times	Jean*, Ben, Wanda	9/1-9/5
Determine peak hours and figure out appropriate staffing	Steve	9/8-9/10
Try out new system and gather feedback	Peter*, Jean, Tony, Emma	9/11-9/19
Refine and make decision to adopt	Whole team, Steve*	9/22, 1pm meeting

FIGURE 12: WWW (WHO-WHAT-WHEN) CHART