

# Setup Reduction Module 7

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# Setup Reduction: Key Points

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- ▶ Setup time is the amount of time taken to change over a piece of equipment from the last piece of a production lot to the first good piece of the next production lot. In health care, from the patient leaving a step in their process to the next patient entering that step.
- ▶ Setup reduction reduces defects, reduces inventory, increases production, and increases on-time delivery.
- ▶ Setup activities are categorized into internal and external.
- ▶ There are seven rules for setup reduction.

# Healthcare Setup Time is...

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- ▶ For health care, setup time can be thought of as the time taken to get ready from the patient leaving one step in their process to the next patient entering that step – like setting up the exam room for the next patient.
  - ▶ “Setup time” measures clock time, not labor time.
  - ▶ If adjustments are made, then the time to produce the part after adjustments counts towards setup time. For example, if you set up a patient to have an EKG, but have to make an adjustment to get the reading correct, that time counts as set up time.

# Why reduce setup times?

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## *Bottlenecks*

- ▶ **Need:** Demand exceeds the current capacity of the process.
- ▶ **Goal:** Create more capacity.  
Capacity = (Available run time) x (Production rate)
- ▶ **Solution:** Reducing setup time increases available run time. Increasing available run time increases capacity.
- ▶ **Result:** Capacity is increased to meet demand without additional capital expenditure.



1. Remove linens from OR bed, garbage out.
2. Remove light handles and clean lights with disinfectant wipe.
3. With same disinfectant wipe clean bed, safety strap and transfer board/roller.
4. With a new disinfectant wipe, clean all horizontal surfaces, float tables, back tables, ring stands, equipment.
5. Clean kick bucket.
6. Sweep floor of larger debris, pre-wash floor if necessary.

# Bottlenecks

**Capacity = (Available run time) x (Production rate)**



**Decreased setup time = Increased available run time**



**Increased available run time = More capacity**

*Run time can be thought of the time an exam room or OR is in use for patient care.*



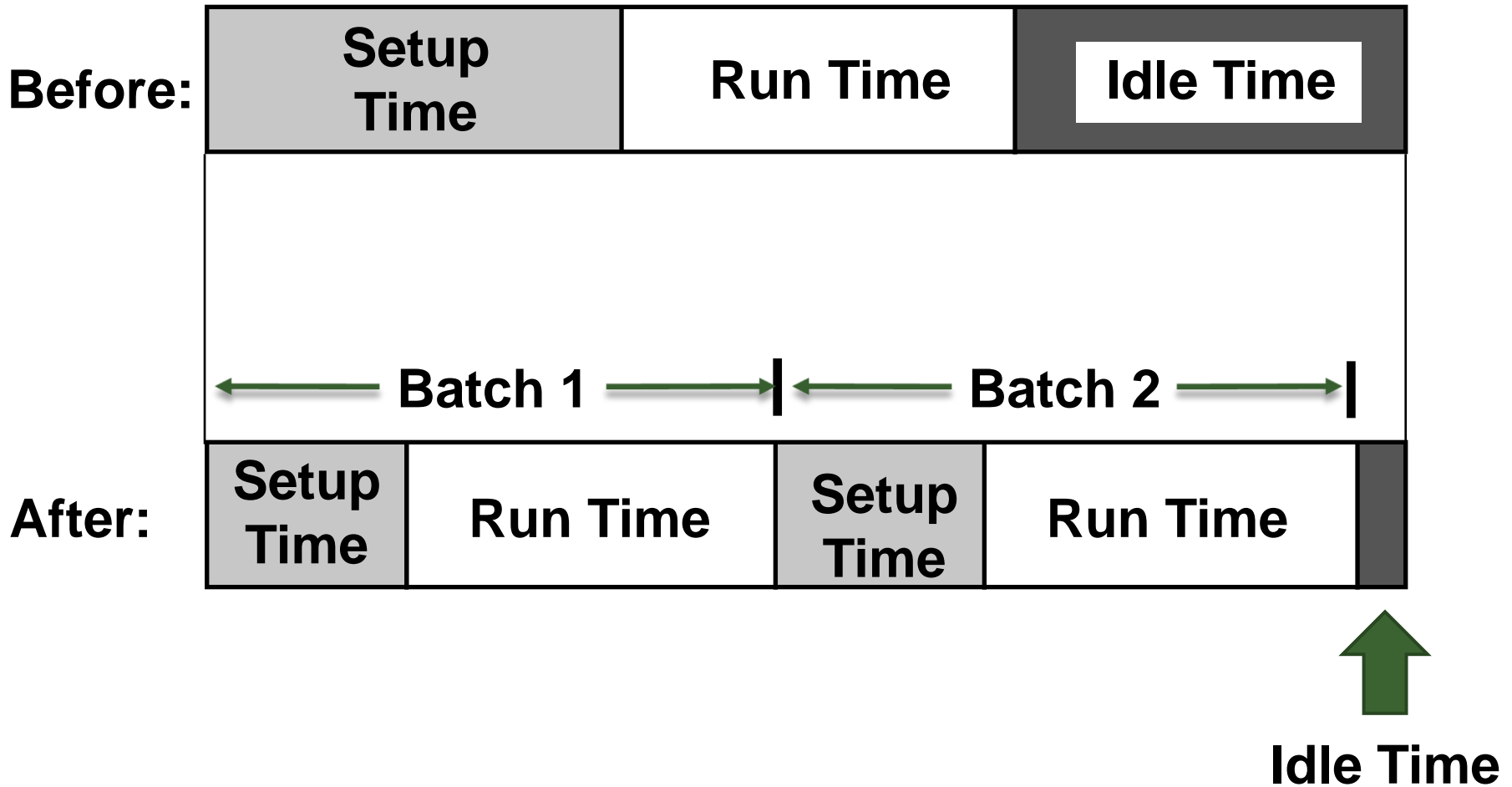
# Why reduce setup times?

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## *Non-Bottlenecks*

- ▶ **Need:** More flexibility for mixed-model production, such as being able to see different types of patients in a clinic during the day or different types of surgeries in a single OR.
  - ▶ Example: Moving from monthly model mix production to a daily model mix. Assumes no bottleneck exists.
- ▶ **Goal:** Create more flexibility.
- ▶ **Solution:** Reducing setup time increases available run time. Increasing available run time increases capacity.
- ▶ **Result:** Capacity is increased to meet demand without additional capital expenditure.

# Non-Bottlenecks



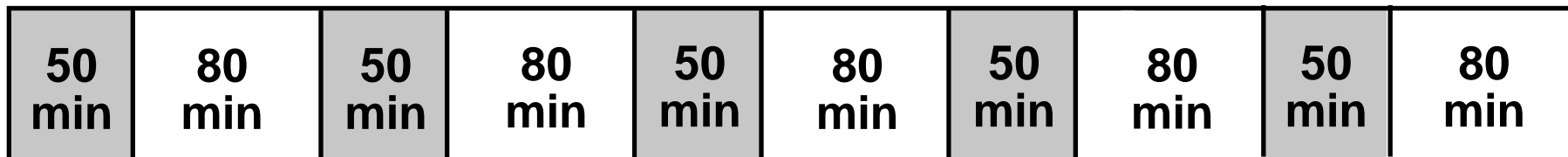


# Setup Reduction Example

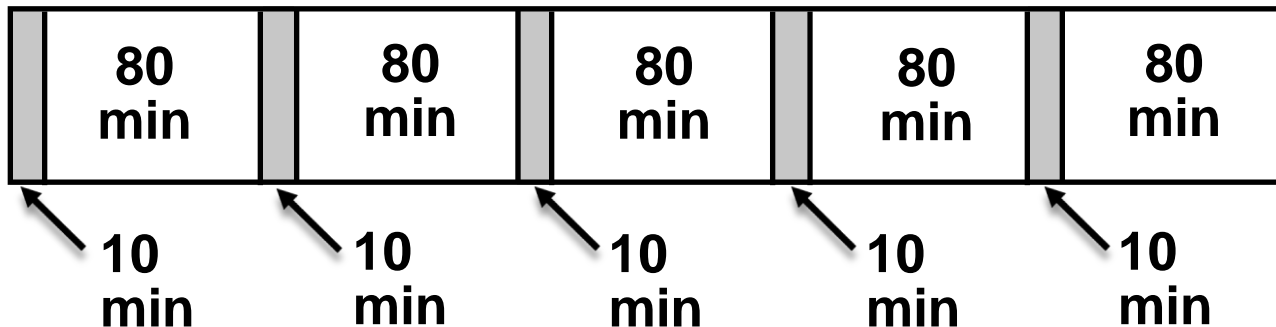
**1 Batch:**



**5 Batches (no improvement):**

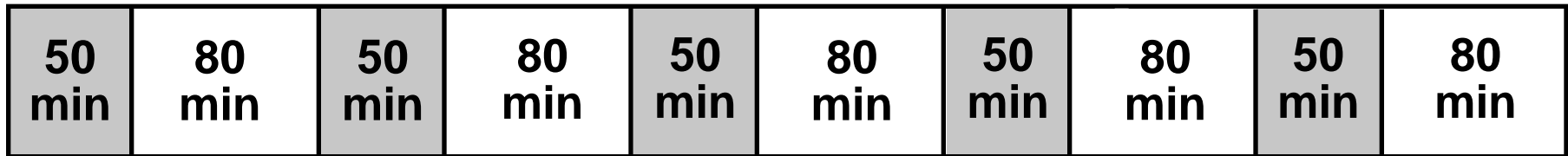


**5 Batches (after setup reduction):**

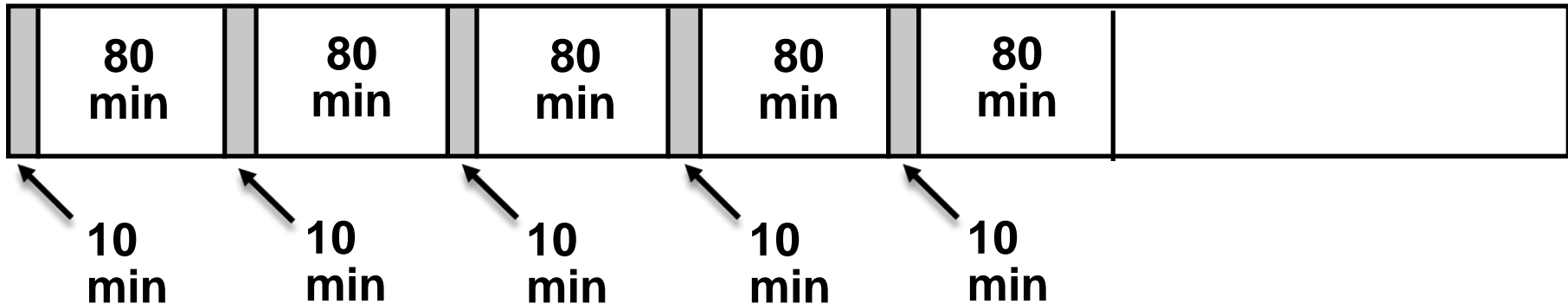


# Let's look at a Health Care example: OR Changeover

**5 Surgeries (no improvement in room setup):  
Total OR time = 650 min, but only 400 min for surgery**



**5 Surgeries (after setup reduction):  
Total OR time = 650 min, now with time for 2 additional surgeries**



# Setup Reduction Benefits

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- ▶ Reduces the defect rate.
  - ▶ Eliminates adjustments as part of the setup.
  - ▶ The first piece is a good piece every time.
- ▶ Reduces inventory cost.
  - ▶ Produce in daily batches or less.
  - ▶ Recover square footage.
- ▶ Increases production flexibility.
  - ▶ Enables average daily production.
  - ▶ More responsive to customer orders.
- ▶ Improves on-time delivery.
  - ▶ Increases capacity to meet customer demand.
  - ▶ Shortens production lead time for mixed-model production.

## Typical Setup Activities:

- ▶ Install/remove equipment, position equipment, use tools.
- ▶ Transport/present material, such as surgical equipment, sets.
- ▶ Gather necessary items, such as preparing for a Gyn exam.

## Setup Activity Categories:

- ▶ Internal activities – all activities which must be performed while the machine is not running.

*If you think of the OR with the patient, surgical team, equipment, and supplies as the “machine” ready to run, room turnover must be done when the OR is empty.*

- ▶ External activities – any activities that can be performed while the machine is making parts.

*The changeover team can be getting supplies ready, cart organized, etc., while the first patient is in the OR. This allows the changeover to begin as soon as the room is empty, or the “machine” stops running.*

## Setup Wastes:

- Waiting** Machine is down during setup.  
Operator is idle during setup.  
*OR changeover team waits until first surgery is done to start getting ready to clean the OR so the next surgical team and patient have to wait a longer time to start.*
- Defects** Determining adjustments by making out-of-spec pieces.  
Wrong setups.  
*For identical surgeries, each team wants the room set up differently, or the surgical setup team does the setup for the wrong type of surgery.*
- Excess Motion** Too much walking to collect tools, equipment, supplies, etc.  
Too many touches to accomplish a changeover.  
*OR changeover team has to travel to a central supply area to get supplies for each changeover, repeatedly clean equipment that has not been used, or clean an area twice because it is not clear it has already been done.*
- Transportation** Tools, fixtures, materials.  
*Bringing needed equipment from a distance after the surgery has started.*

# Methodology

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- ▶ Make observations.
- ▶ Establish goals.
- ▶ Separate internal activities from external activities.
- ▶ Convert internals to externals.
- ▶ Eliminate adjustments.
- ▶ Streamline remaining activities.

# Make Observations:

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- ▶ Identify elements.
- ▶ Map process flow.
- ▶ Make time observations.
- ▶ Define standard work.



# Establish Goals:

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Define goals that are specific and measurable.

- ▶ WIP – Inventory levels.
- ▶ Batch size – Goal: Batch size of one day or less.
- ▶ Throughput – if a bottleneck is targeted.
- ▶ Walking distance.
- ▶ Time per setup – Generally, target a setup time of less than 10 minutes.

# Separate Internals from Externals

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**Identify all activities related to the setup.**

## ***Identify external activities.***

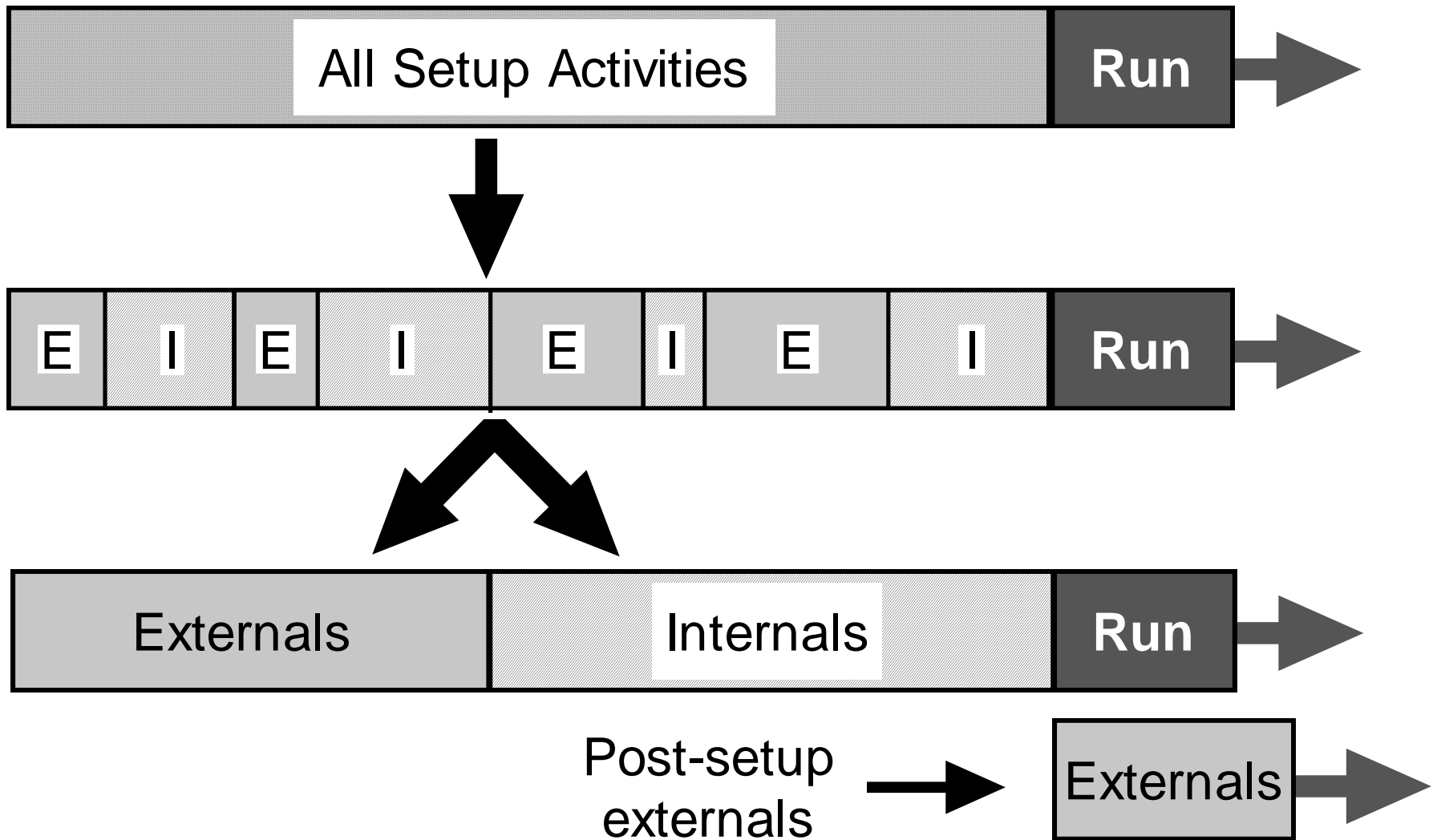
- ▶ Items necessary for the setup – Tools, equipment, supplies, paperwork, etc.
- ▶ Pre-setup activities – Tools cleaned and sharpened, supplies transported/sequenced in order used, tools/equipment positioned.
- ▶ Post setup activities – Clean, inspect, repair (if needed) tools and equipment, store all items in assigned locations.

## ***Identify internal activities.***

Once internals have been identified, perform the post-setup external activities:

- ▶ After the setup for the current batch is complete.
- ▶ While the machine is still running the current batch.

# Separate Internals from Externals



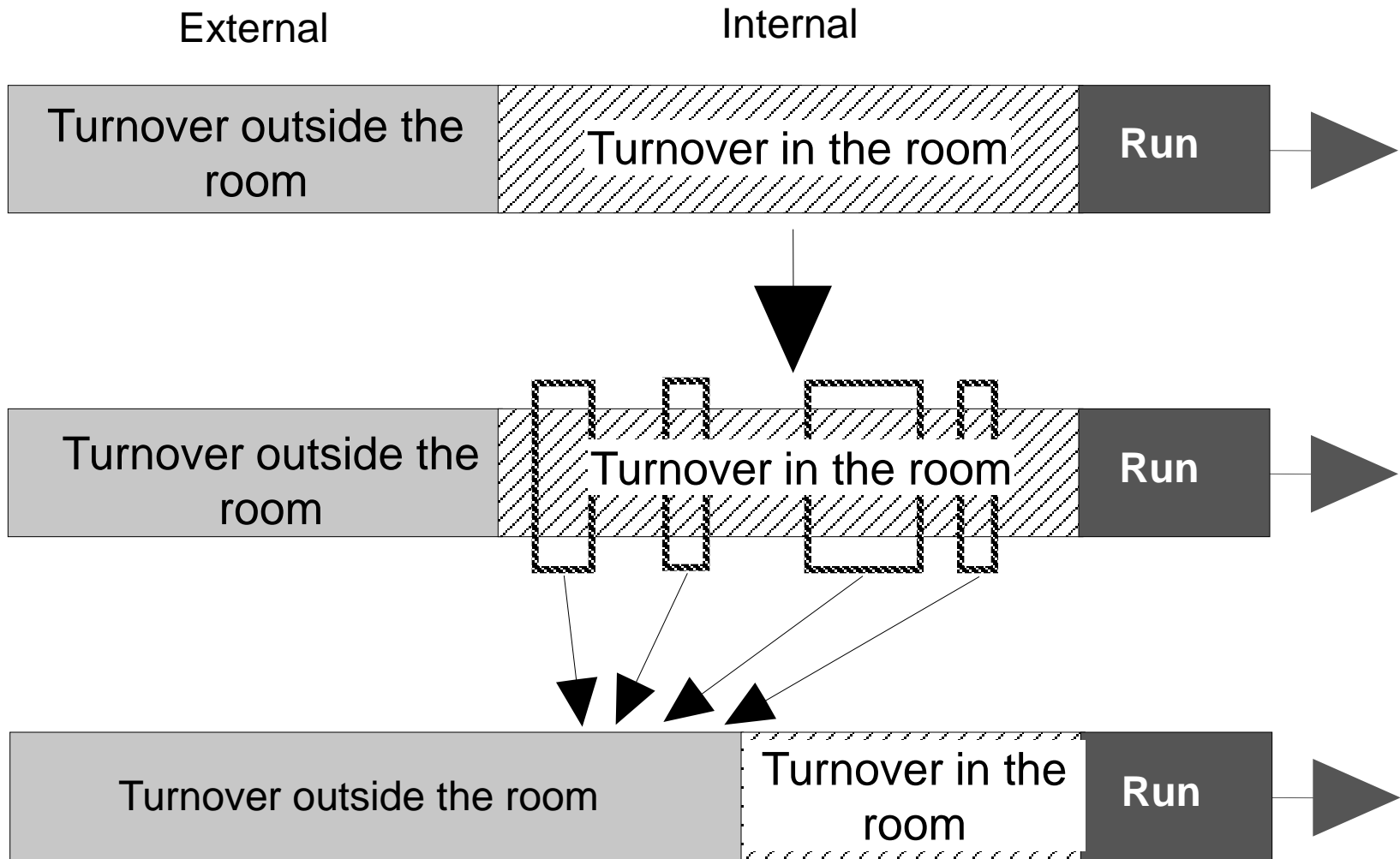
## Convert Internals to Externals:

- ▶ Prepare prior to the changeover  
*OR changeover cart stocked with supplies prior to surgical team leaving.*
- ▶ Use intermediary fixtures/jigs/kits  
*Presetting tools, positioning equipment, making kits of supplies where possible.*

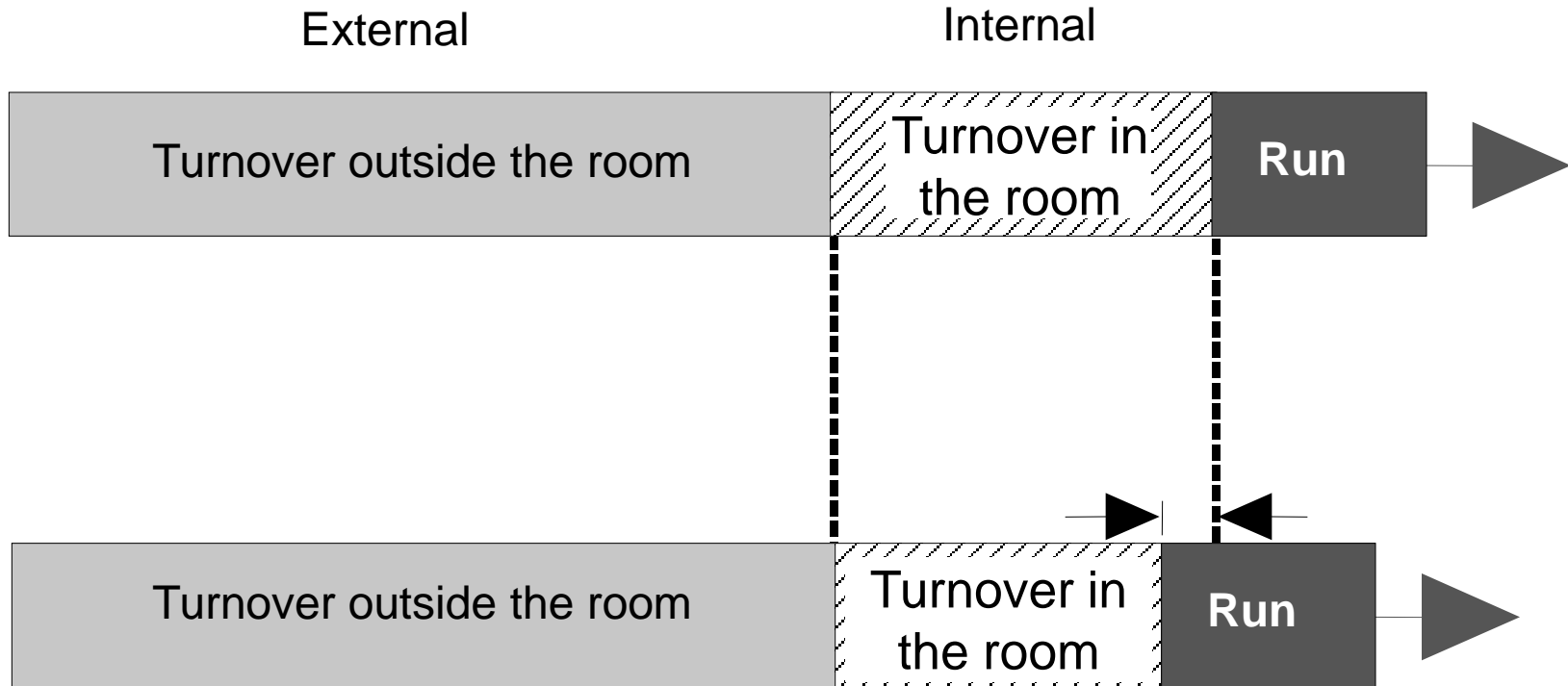
## Eliminate Adjustment

- ▶ Numerical settings vs. feel  
*In radiation oncology, repeat treatments are positioned to permanent tattooed locations on the patient, rather than re-adjusting to tumor location each time.*
- ▶ **Goal:** the first piece inspected is always a good piece; first test is always a good test; first image is always a good image; and the treatment occurs in the right location every time.

# Convert Internals to External



# Eliminate Adjustments



# Streamline remaining activities

## *Other considerations for internal or external activities*

- ▶ Standardize necessary functions  
*Standard label locations, standard tool set, standard location for supplies on a cart.*
- ▶ Perform parallel operations  
*Go from 1 setup person to 2 or more.*

This is always important for internal activities.

This is important for external activities if the current external setup time is preventing the process from running to Takt Time.

## *Automate activities where appropriate.*

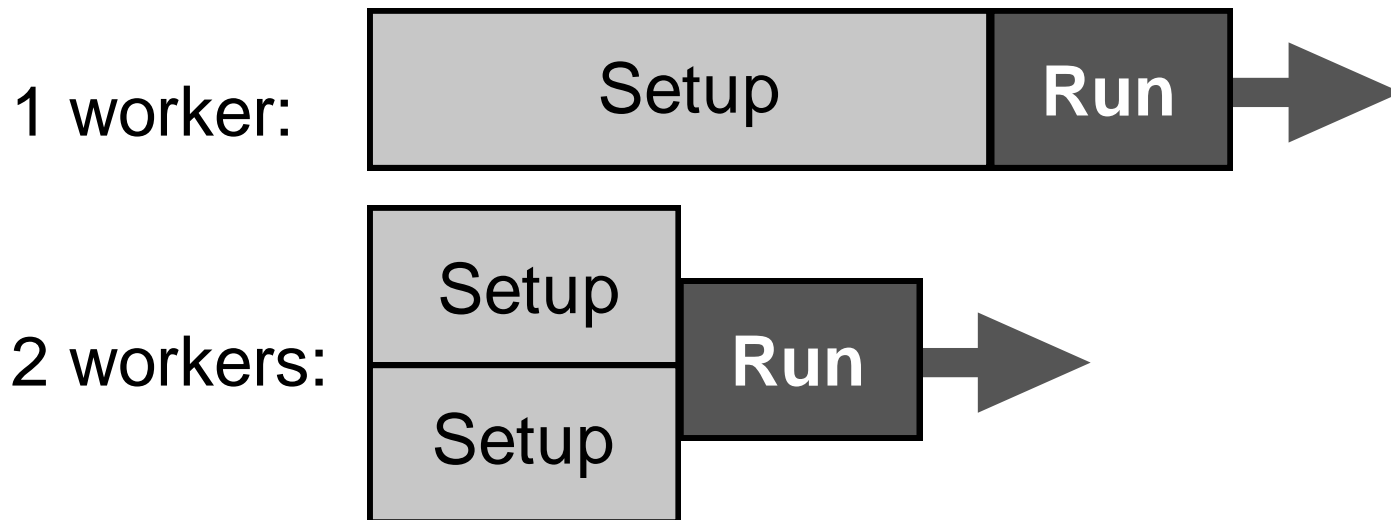
- ▶ **Criterion 1:** The operation has already been dramatically simplified.  
*Shingo's rule of thumb: setup is less than 3 minutes before automating.*
- ▶ **Criterion 2:** The automaton is cost-effective.  
*Additional significant reduction is still needed.*  
*The automation is capable of achieving the needed reaction.*



# Streamline External or Internal

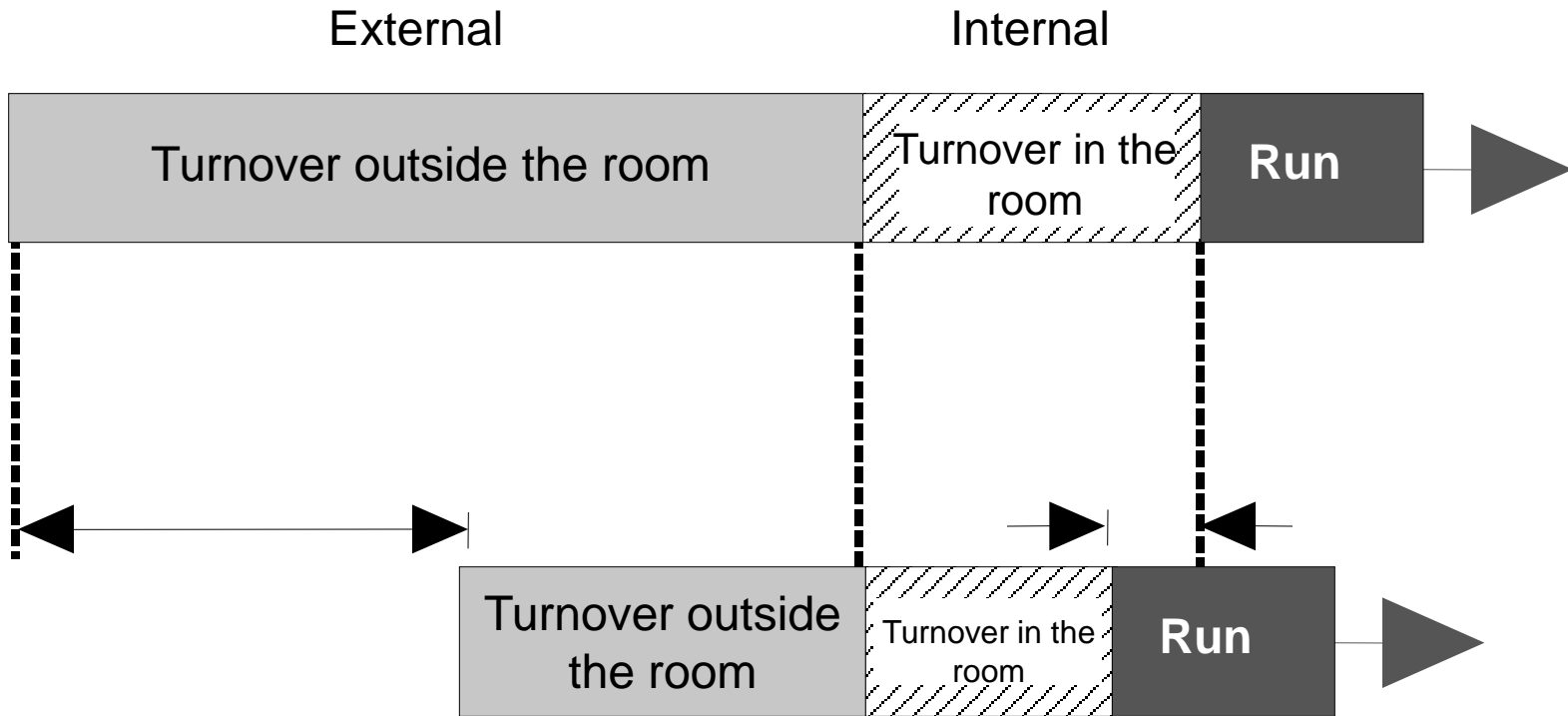
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- Perform parallel operations



- Automate activities

# Streamline



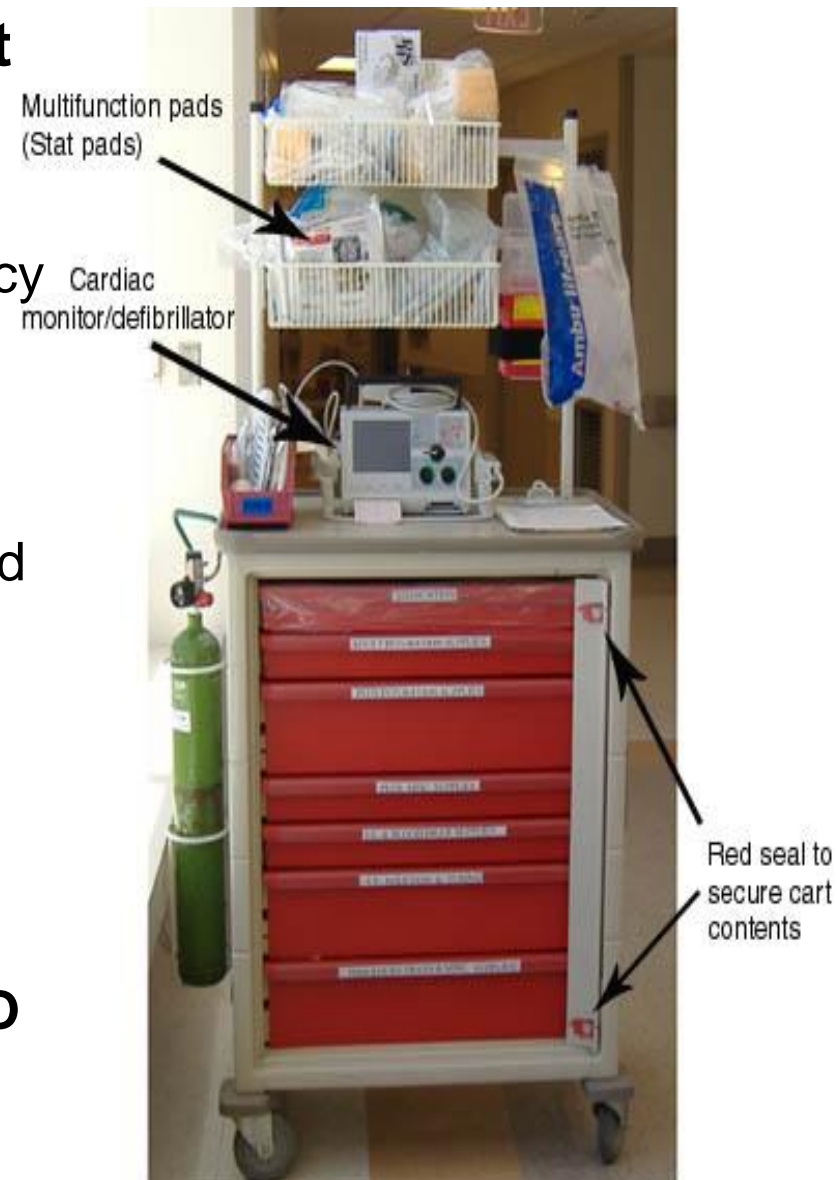
## Setup Reduction: The Crash Cart

A **crash cart** or **code cart** is a set of drawers on wheels used in hospitals for transportation and dispensing of emergency medication/equipment for life support protocols at the site of medical/surgical emergency.

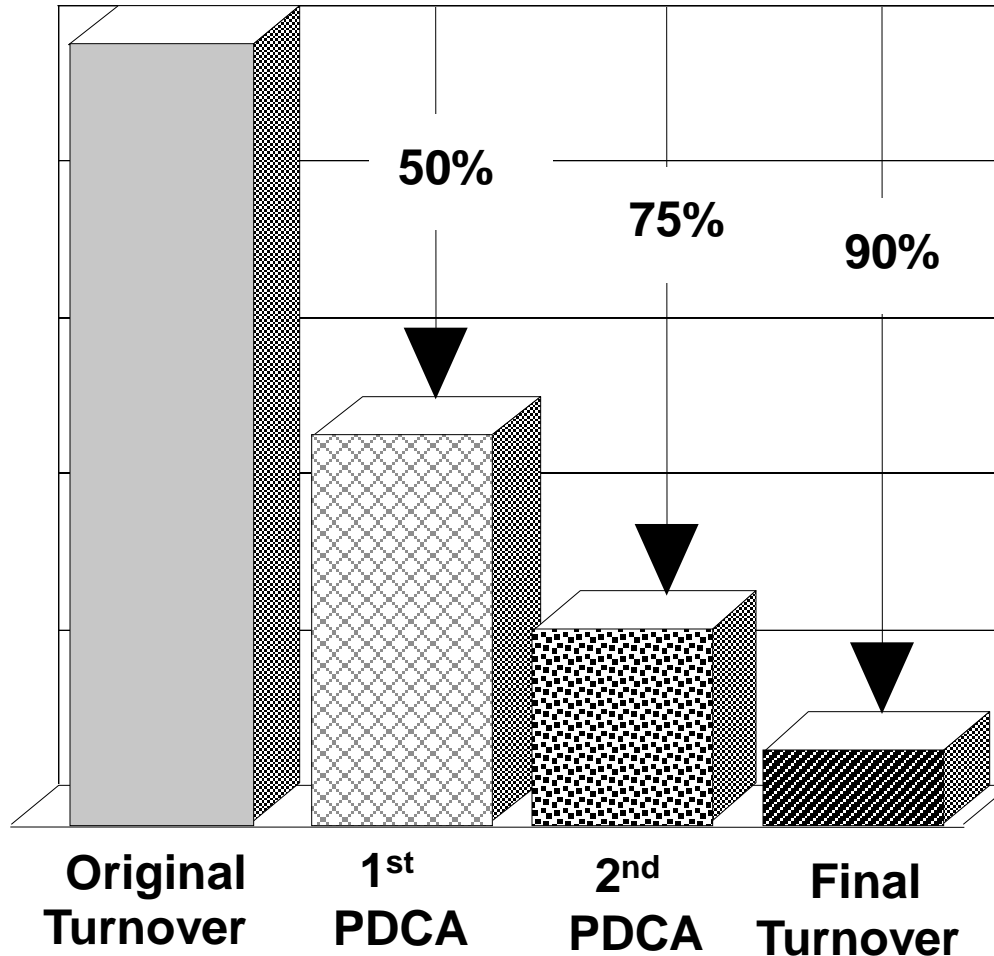
The contents typically contain the tools and drugs needed to treat a person in or near cardiac arrest.

All tools, equipment, supplies, drugs, and instructions are ready to go to the patient with no setup time to prepare.

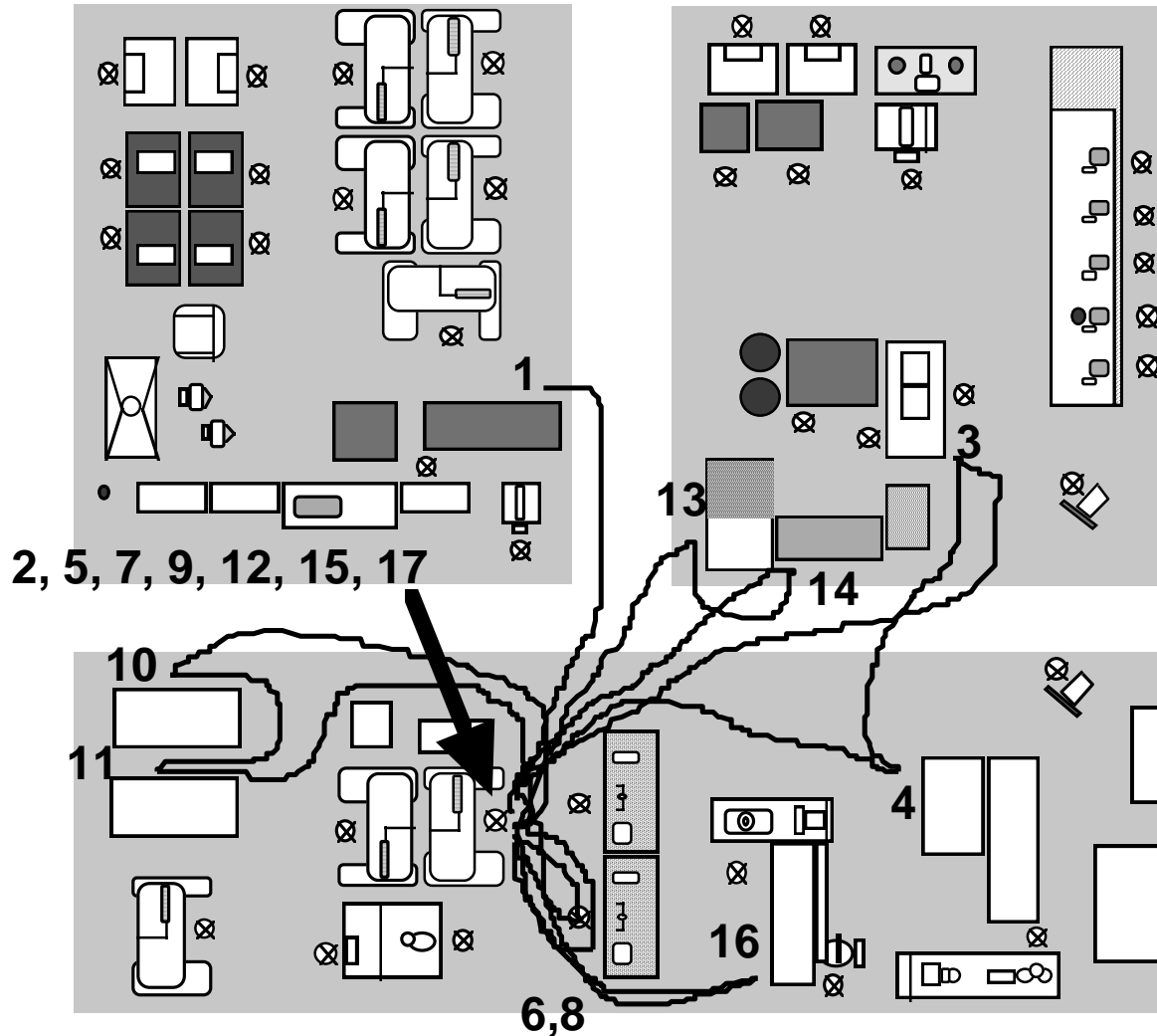
**SETUP TIME HAS BEEN REDUCED TO A MINIMUM.**



# Synchronize Stages With Goals



# Spaghetti Chart for New Turnover



# The Seven Rules to Improving Setups

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- Rule 1:** Setups begin and end with the 5S's
- Rule 2:** Change Internal into External, then improve the remaining internal.
- Rule 3:** Bolts are our enemies.
- Rule 4:** If you have to use your hands, make sure your feet stay put.
- Rule 5:** Don't rely on special fine-tuning skills.
- Rule 6:** Standards are standard; they are *not* flexible.
- Rule 7:** Standardize all setup operations.

# Setup Reduction Summary

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The methodology for setup reduction includes

- ▶ Making observations.
- ▶ Establishing goals.
- ▶ Separating internal activities from external activities.
- ▶ Eliminating adjustments.
- ▶ Streamlining remaining activities.