Designing for Improvement

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quality by design

“everything is designed…

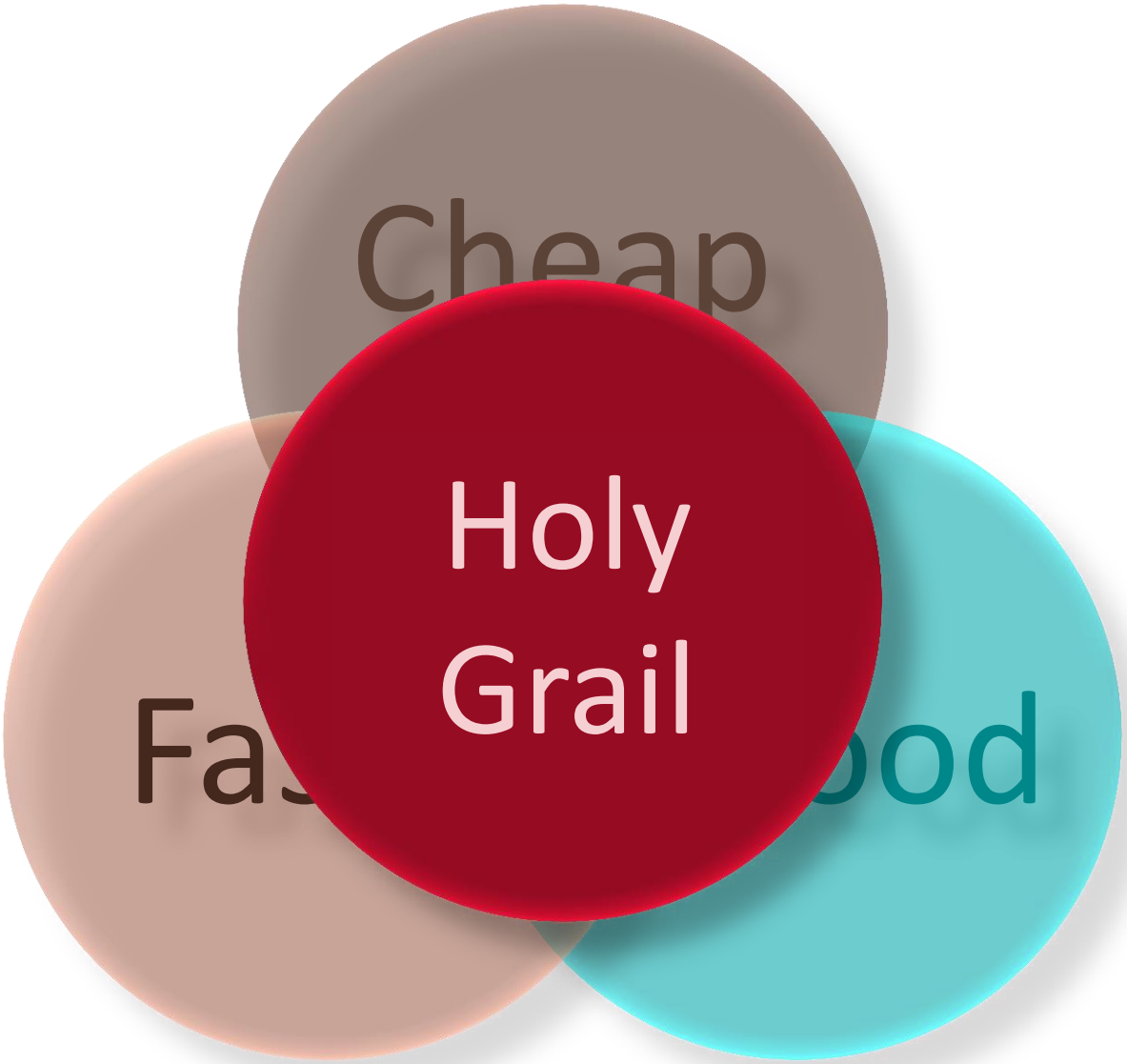
few things are designed well.”

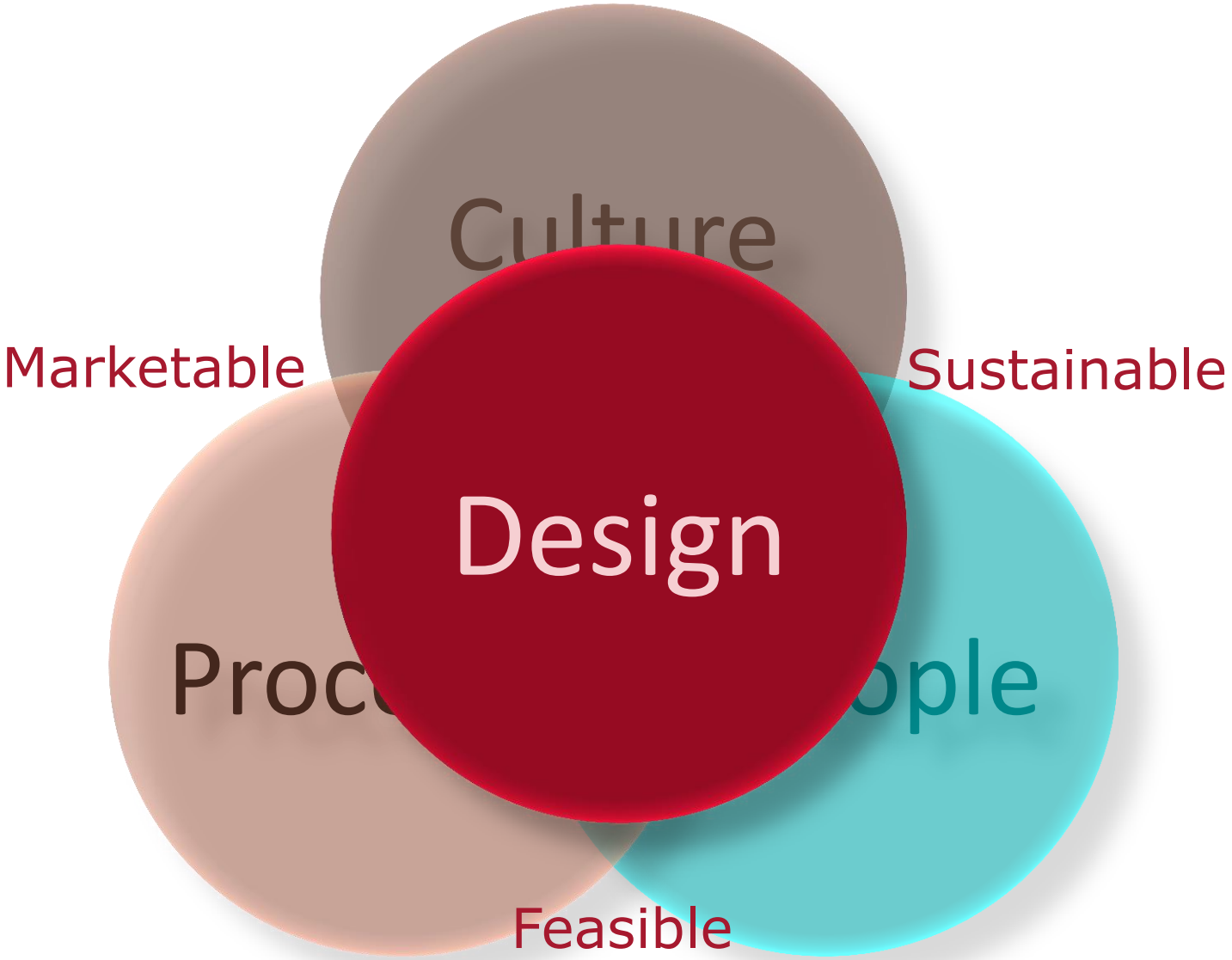
- Brian Reed

essential demands

cost-effective
fast and flexible
continually improving

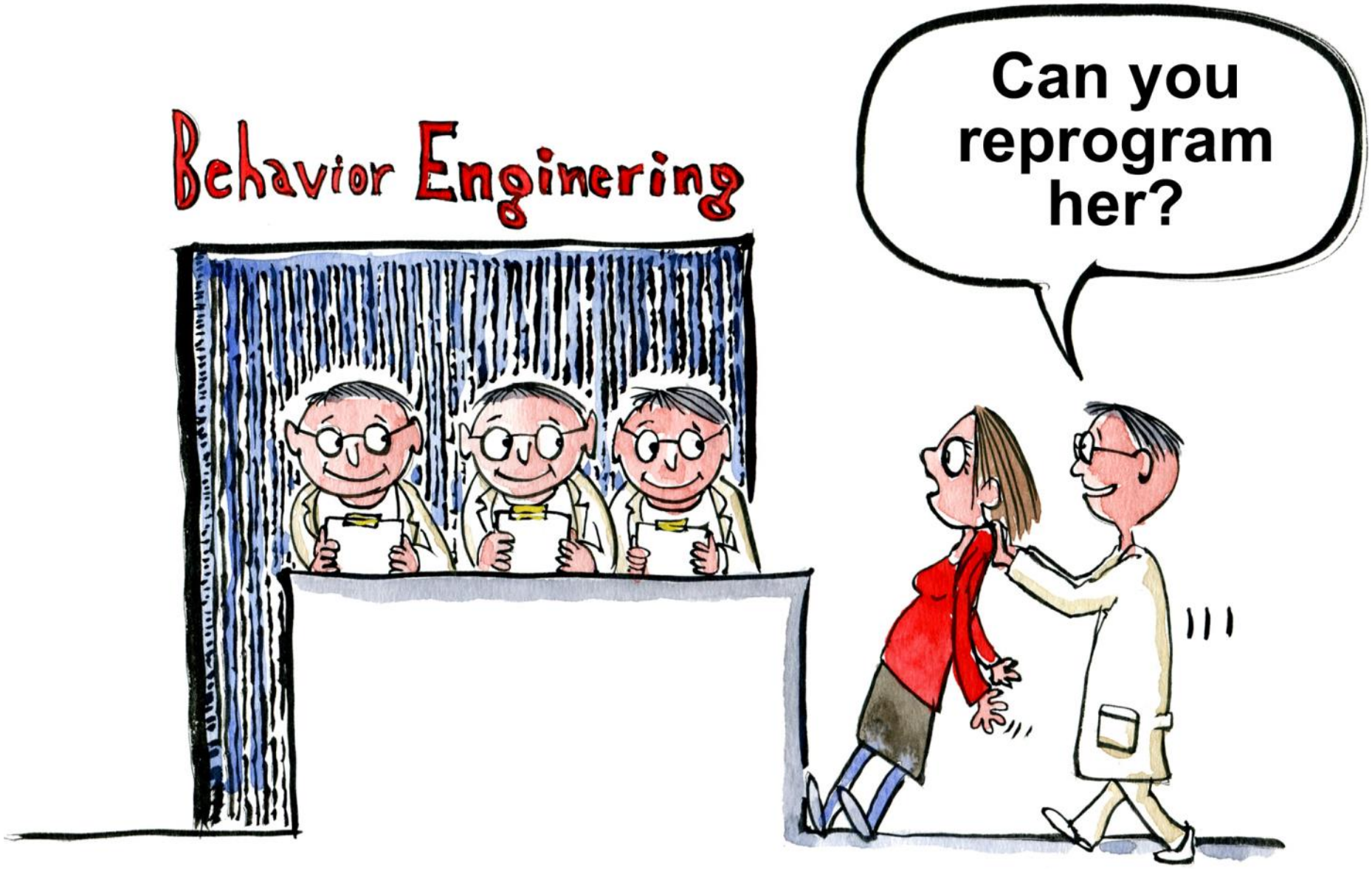
"We have low cost, fast turn-around time
and high quality.
Which do you prefer?"


Cheap
Holy
Grail
Fas
ood

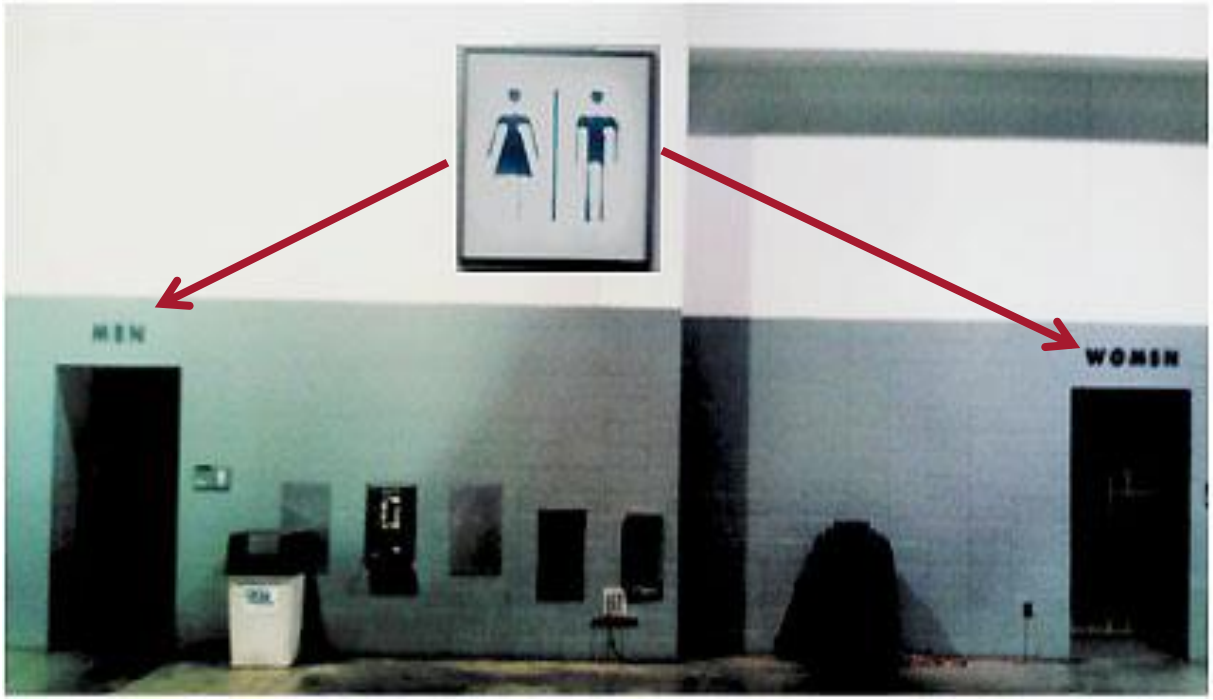

Culture
Marketable
Sustainable
Design
Proc
ople
Feasible

design targets

- **behaviors - sustainable**
- **work - feasible**
- **value - marketable**


Behavior Enginering
Can you reprogram her?
By HikingArtist.com

What's wrong with this picture?



visual workplace

visual workplace

translates information into behavior

traditional

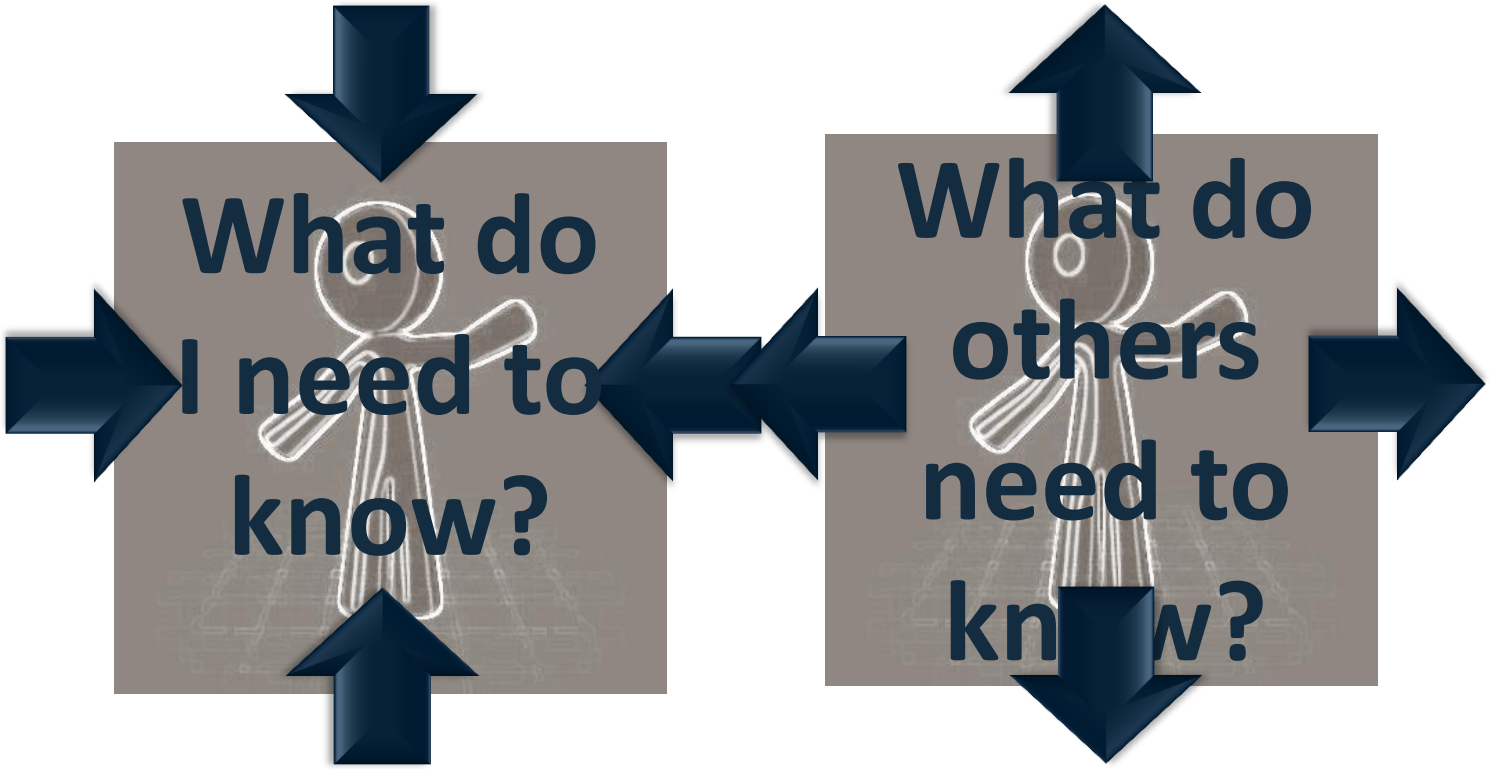
- classes
- OJT
- manuals
- procedures
- meetings
- questions

visual workplace

- **visual devices**

1. understand *I-Driven Visuality*
2. establish standards
3. ask the “6 Core Questions”
4. discover information deficits
5. learn to “see” motion
6. define work
7. locate the value field
8. collect and evaluate motion metrics
9. optimize

i-driven visuality



standards

technical

- distance
- volume
- weight
- time
- pressure

procedural

- how to…
- sequence of steps
- shared measures
- outcome focused

6 core questions

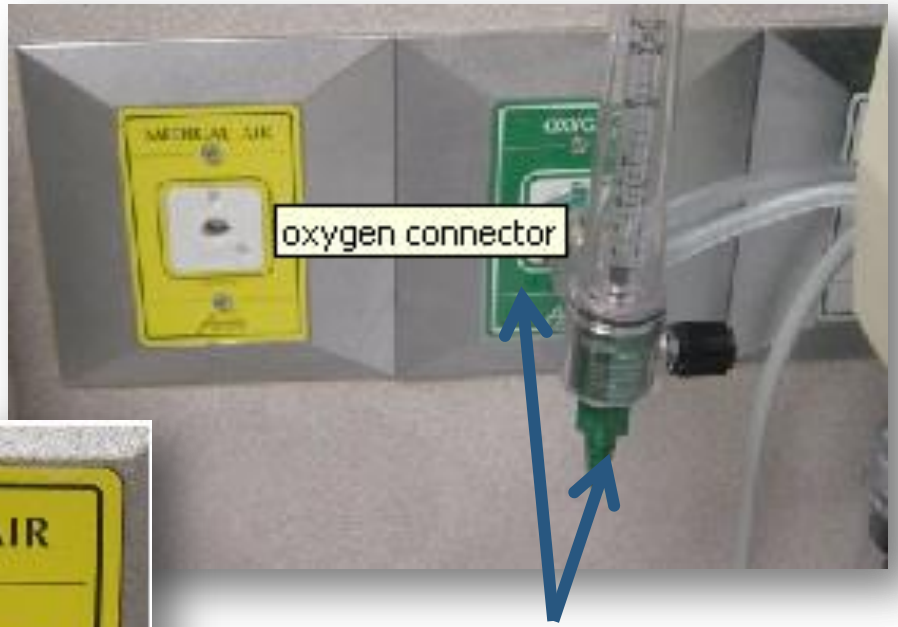
where?

how?

when?

Reorder at 500 sheets 750 1,000

what?



who?

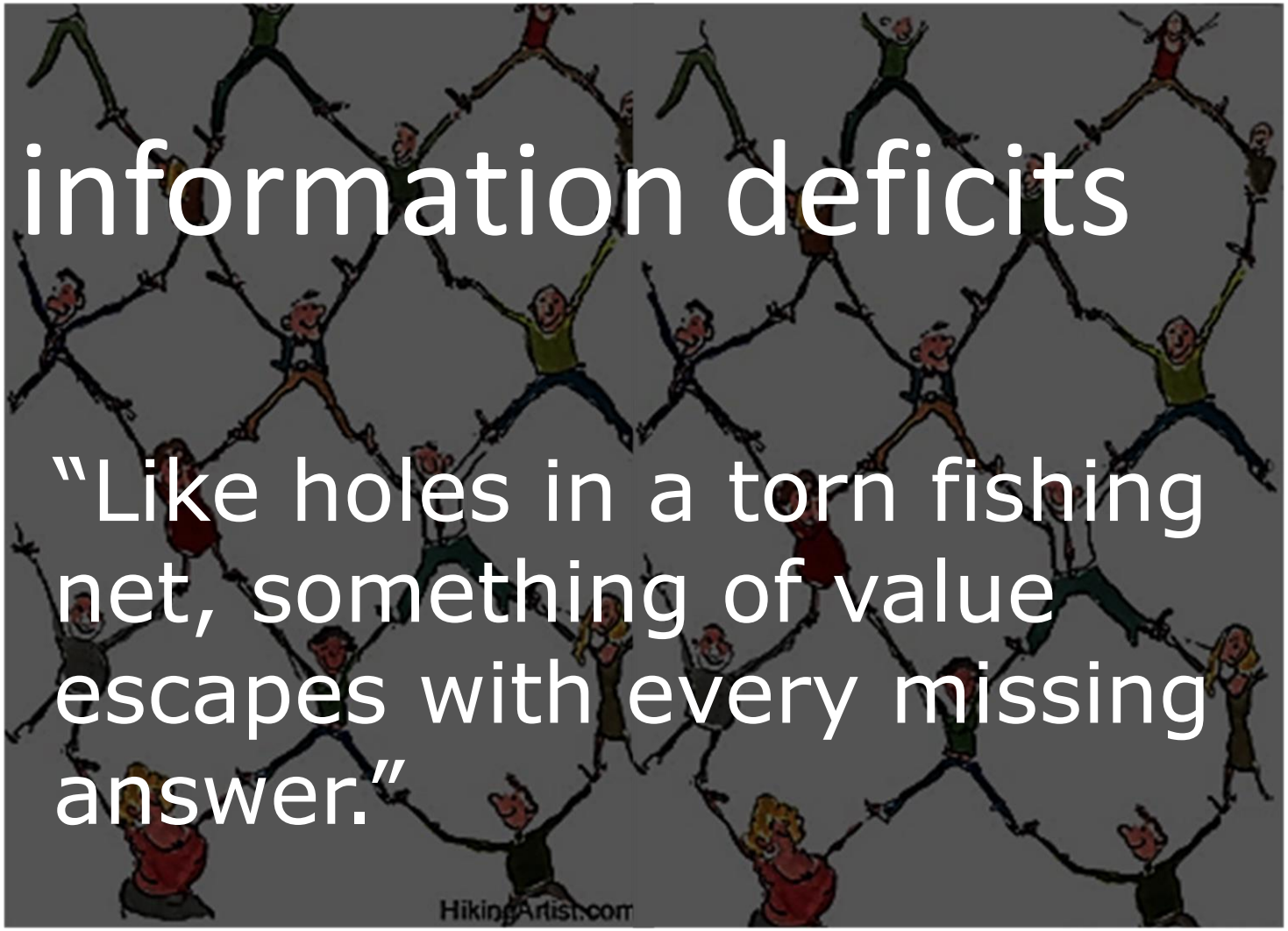
how much?

			RESUSCITATION		
			Epinephrine 1st Dose (1:10,000)	0.1 mg/1 ml	
			Epinephrine High Dose/TT (1:1,000)	1 mg/1 ml	
			Atropine	0.21 mg	
			Sodium Bicarbonate	10 mEq	
			Lidocaine	10 mg	
			Defibrillation		
			First dose	20 Joules	
			Second dose (may repeat)	40 Joules	
			Cardioversion	10 Joules	
			Adenosine		
			1st Dose	1 mg	
			2nd Dose If Needed	2.1 mg	
			Amiodarone	52 mg	
			Calcium Chloride	210 mg	
			Magnesium Sulfate	525 mg	
Midazolam	2.5 mg				
34 Joules	Propofol	25 mg			
9 Joules	PARALYTIC AGENTS				
	Succinylcholine (give atropine prior)	17 mg			
0.85 mg	Pancuronium	1.7 mg			
1.7 mg	Vecuronium	1.7 mg			
42 mg	Rocuronium	9 mg			
170 mg	MAINTENANCE				
425 mg	Pancuronium/Vecuronium	0.9 mg			
	Lorazepam	0.4 mg			
KG	9 KG		10 KG	11 KG	

			RAPID SEQUENCE INTUBATION		
			PREMEDICATIONS		
			Atropine	0.21 mg	
			Pan/Vecuronium	N/A	
			(Defasiculating Agent)	N/A < 20 kg	
			Lidocaine	15 mg	
			Fentanyl	32 mcg	
			INDUCTION AGENTS		
			Etomidate	3.2 mg	
			Ketamine	21 mg	
			Midazolam	3.2 mg	
			Propofol	32 mg	
			PARALYTIC AGENTS		
			Succinylcholine (give atropine prior)	20 mg	
			Pancuronium	2.1 mg	
			Vecuronium	2.1 mg	
			Rocuronium	10 mg	
			MAINTENANCE		
			Pancuronium/Vecuronium	1 mg	
			Lorazepam	0.5 mg	

RESUSCITATION	
Epinephrine 1st Dose (1:10,000)	0.13 mg/1.3
Epinephrine High Dose/TT (1:1,000)	1.3 mg/1.3
Atropine	0.26 mg
Sodium Bicarbonate	13 mEq
Lidocaine	13 mg
Defibrillation	
First dose	26 Joules
Second dose (may repeat)	52 Joules
Cardioversion	13 Joules
Adenosine	
1st Dose	1.3 mg
2nd Dose If Needed	2.6 mg
Amiodarone	65 mg
Calcium Chloride	260 mg
Magnesium Sulfate	650 mg

12 KG


information deficits
"Like holes in a torn fishing net, something of value escapes with every missing answer."
HikingArtist.com

motion

moving

- without adding value
- not in the value field
- waste
- due to information deficits

work

moving

- and adding value
- in the value field
- value
- the result of having the information needed to complete the task

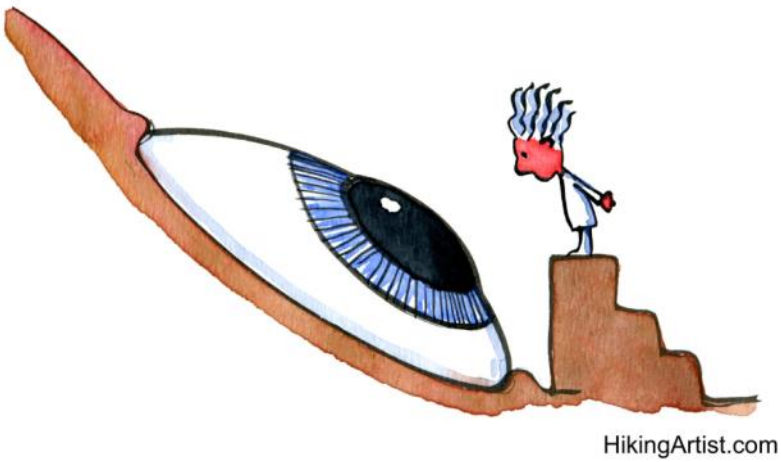
the visual workplace

forms of motion

- searching
- looking for
- wandering
- wondering
- guessing
- checking
- re-checking
- handling
- handling again
- moving again
- counting
- counting again
  - **asking**
  - **answering**
  - **interrupting**
  - **waiting**
- doing again
- re-working
- re-testing
- stopping


Your mother doesn't work here
Amana
KNIVES


ONE HOOK
ONE NAME
ONE LABCOAT



Go Look
Go See

the place where work happens is the place where innovation happens

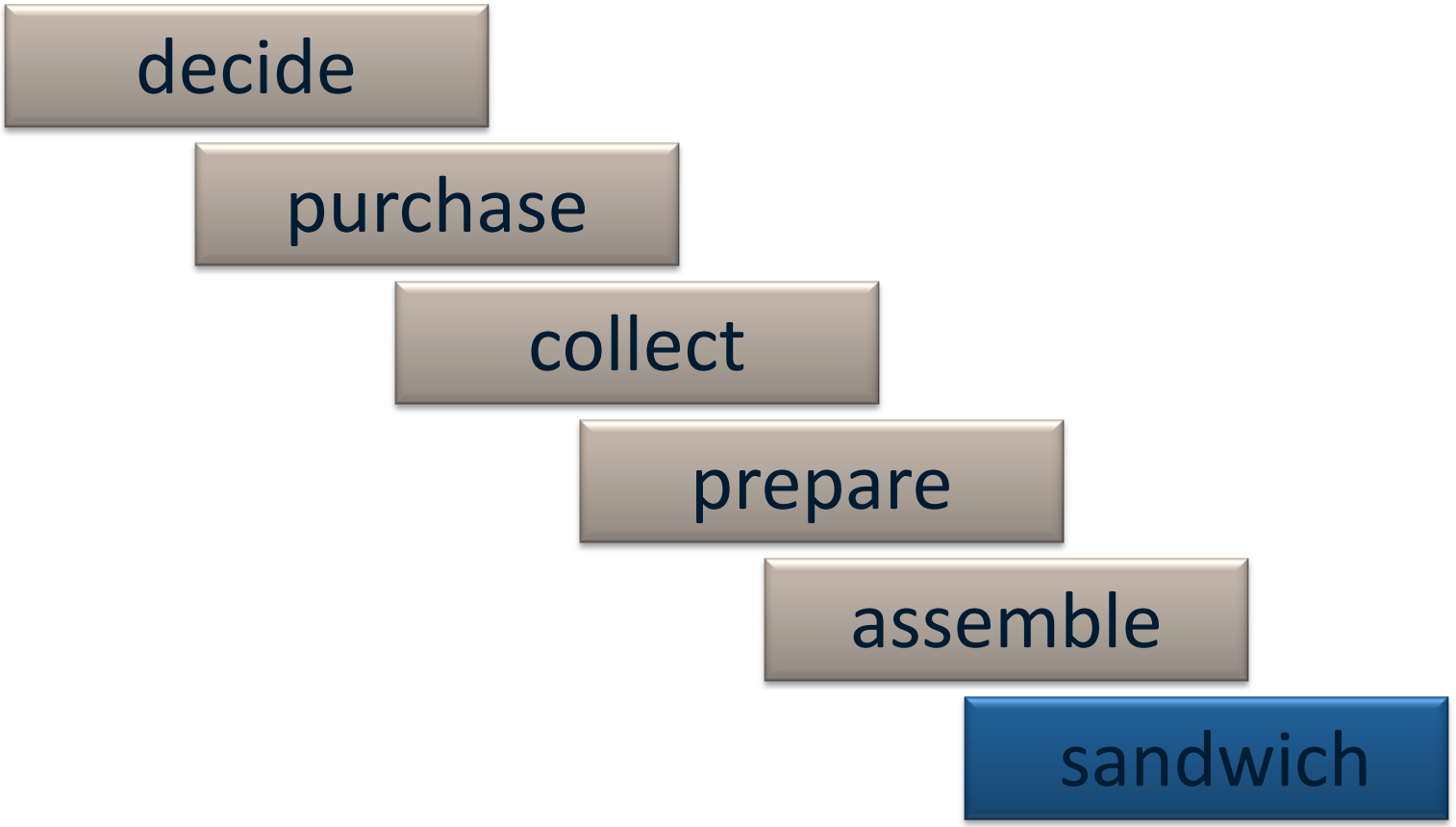
design targets

- **behaviors - sustainable**
- **work - feasible**
- **value - marketable**

process design tool

step 1

- start with the final product or service.
- describe each major step required to achieve the final product or service—**backward**.
- do not include decision steps.
- agree when to stop



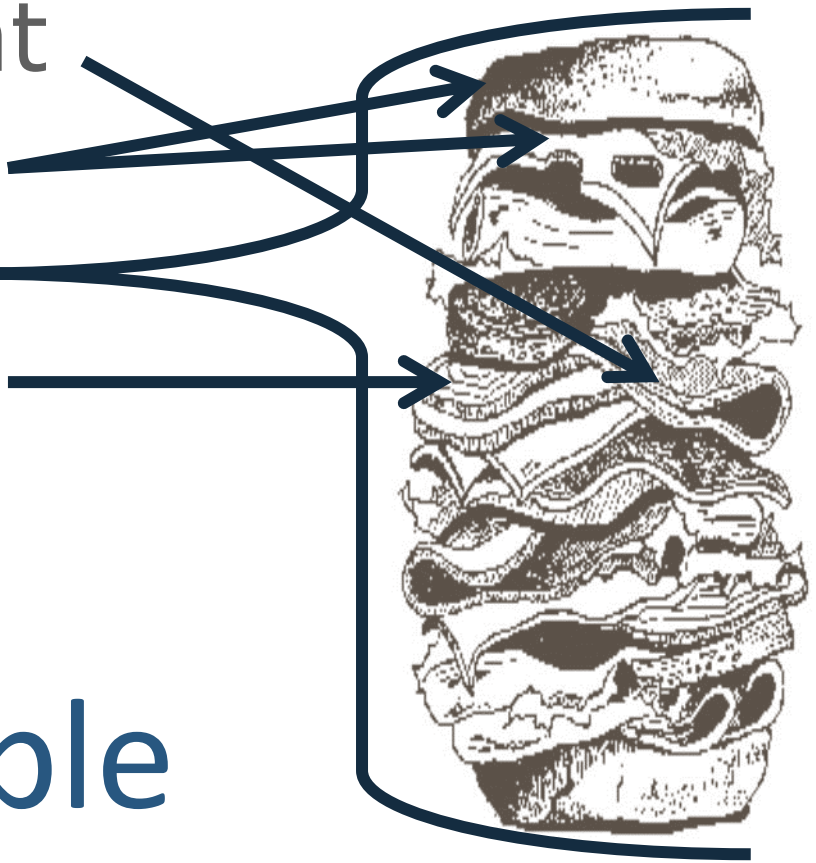
making a sandwich

step 2

- identify the variables associated with each step.
- don’t record the same variable more than once.

an element or cause

- independent
- dependent
- controlled
- extraneous



variable

making a sandwich

decide	purchase	collect
condiments	cost	on hand
side dishes	availability	how many sandwiches

prepare	assemble	eat
chopped	grilled	where to eat
cold	formal dinnerware	alone

step 3

- evaluate each variable
- determine if it must be
  - eliminated
  - controlled
  - accepted
- cross out those that can be eliminated
- circle those that will be accepted

error-proofing

establish and enforce standards

facilitate early detection

making a sandwich

decide	purchase	collect
condiments	~~cost~~	on hand
~~side dishes~~	availability	how many sandwiches

prepare	assemble	eat
chopped	grilled	~~where to eat~~
cold	~~formal dinnerware~~	alone

step 4

- make a list of the variables to be controlled
- identify the earliest step where each variable can be controlled.
- list the variable under that step

making a sandwich

decide

alone?
how many?
condiments?
on hand?
chopped?
cold?
grilled?

purchase

collect

prepare

assemble

eat

step 5

- make a list of the variables to be accepted
- identify the earliest step where each variable will be encountered.
- list the variable under that step
- as you design the rest of the process, look for a natural spot for a second check step

making a sandwich

decide

alone?
how many?
condiments?
on hand?
chopped?
cold?
grilled?

purchase

available?

collect

available?

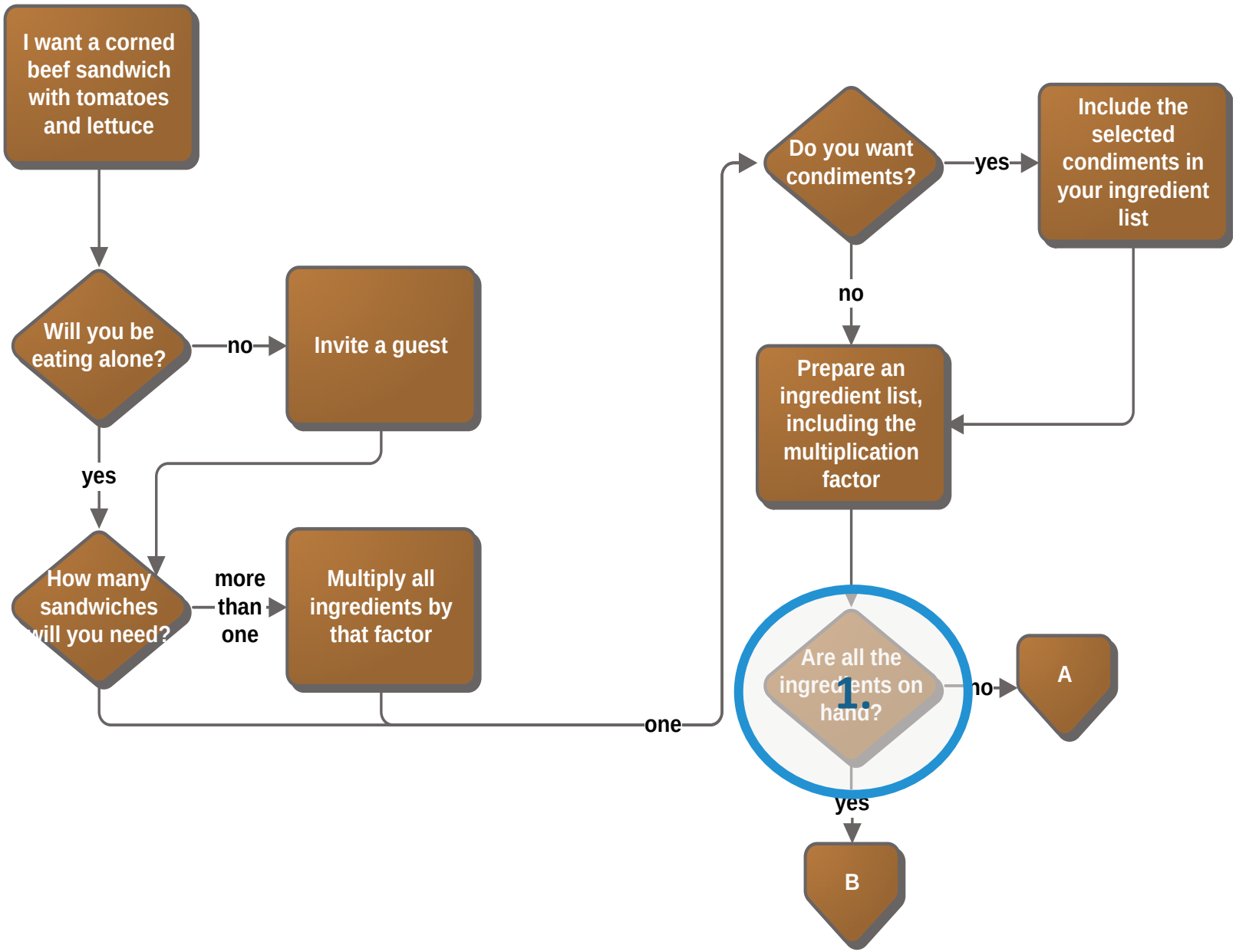
prepare

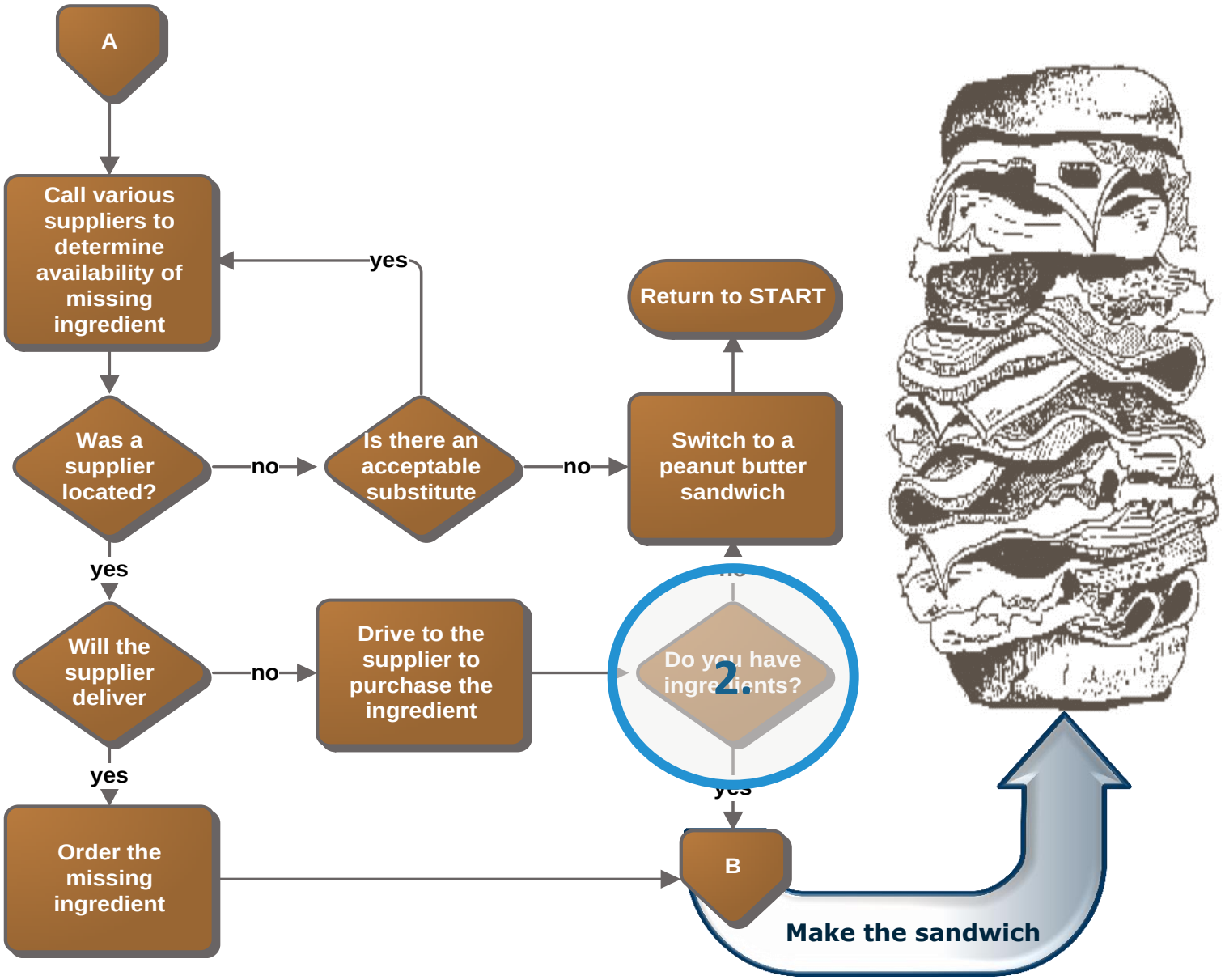
assemble

eat

step 6

- create a detail flow chart
- controlled variables are decisions
- for accepted variables, build at least two inspection points
- describe the best response to each variable
- include supporting activities


I want a corned beef sandwich with tomatoes and lettuce
Will you be eating alone?
no
Invite a guest
yes
How many sandwiches will you need?
more than one
Multiply all ingredients by that factor
one
Do you want condiments?
yes
Include the selected condiments in your ingredient list
no
Prepare an ingredient list, including the multiplication factor
Are all the ingredients on hand?
no
A
yes
B


A
Call various suppliers to determine availability of missing ingredient
yes
Return to START
Was a supplier located?
no
Is there an acceptable substitute
no
Switch to a peanut butter sandwich
yes
Will the supplier deliver
no
Drive to the supplier to purchase the ingredient
Do you have ingredients?
2.
yes
Order the missing ingredient
B
Make the sandwich

step 7

For each step, account for

- resources needed (equipment, supplies, applications, space, etc.)
- staff required
- step duration--minimum and maximum times
- step dependencies

step 8

- test the process
- make changes
- implement
- make changes
- test the process

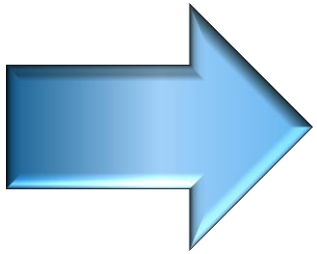
creativity vs. innovation

coming up with new ideas

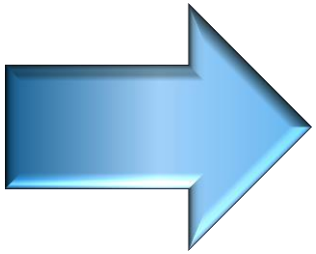
putting those ideas into practice

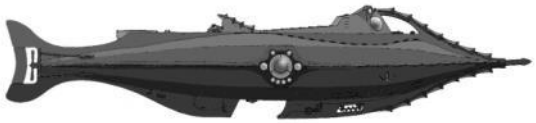
creative thinking

linear techniques



intuitive techniques





creative thinking

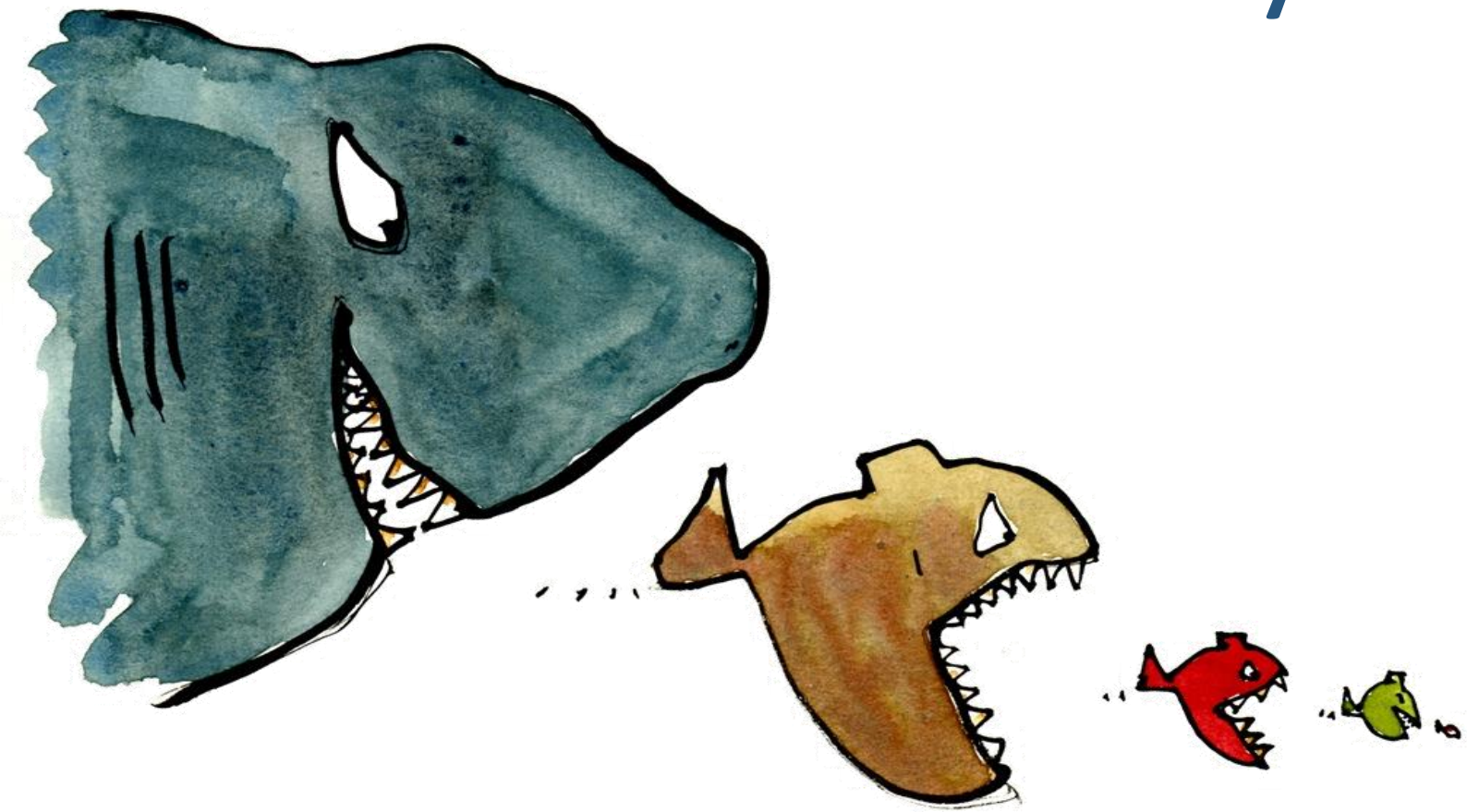
1. identify assumptions
2. deny the constraints
3. study what happens

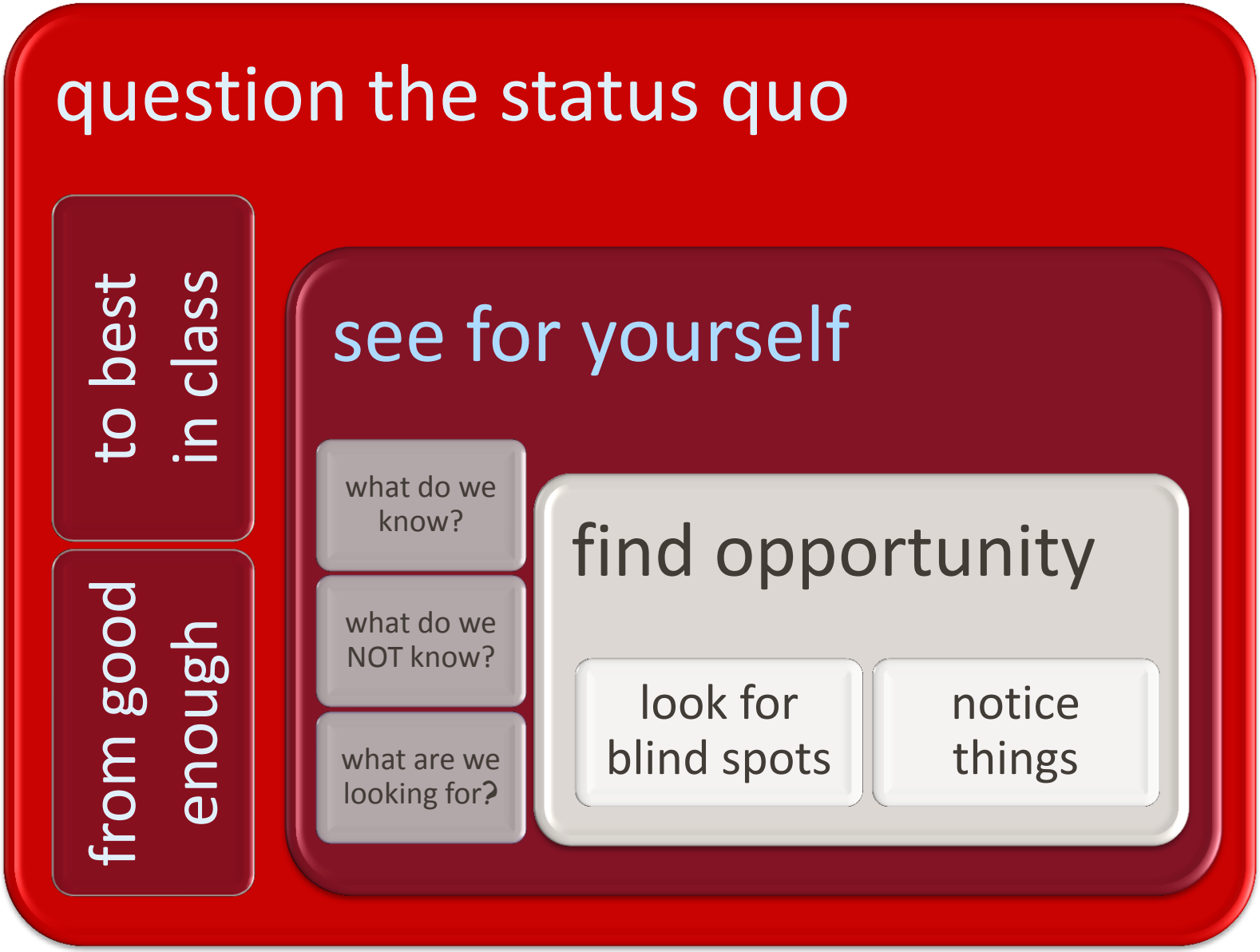
problems

contradictions

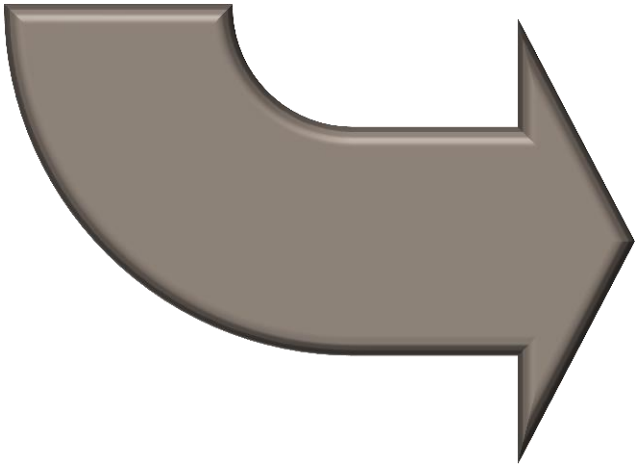
innovation
arises from
resolving
contradictions

the five “why?”s

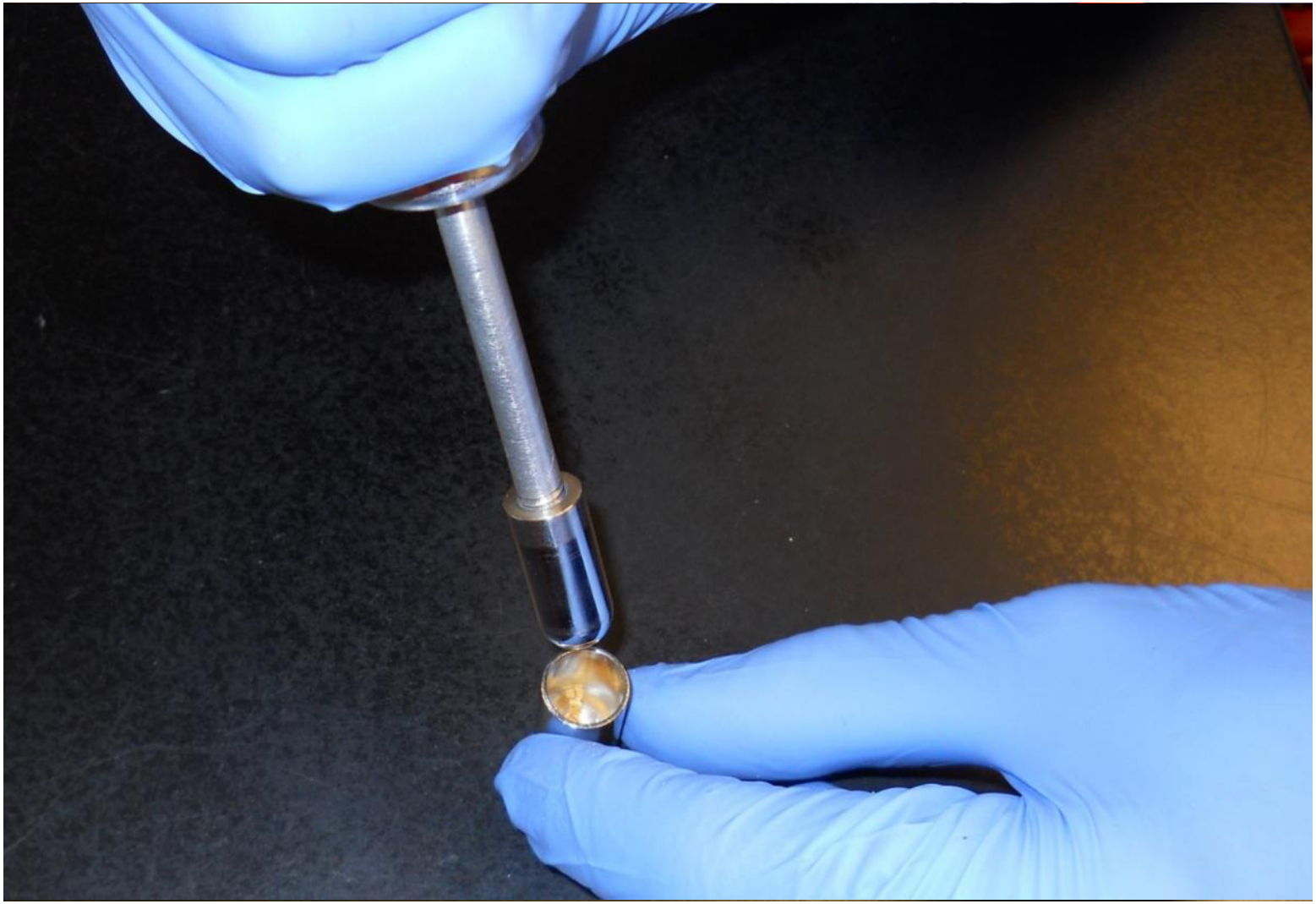



question the status quo
to best in class
from good enough
see for yourself
what do we know?
what do we NOT know?
what are we looking for?
find opportunity
look for blind spots
notice things

excuses



preemptive surrender



A designer knows he has achieved perfection not when there is nothing left to add, but when there is nothing left to take away.

Antoine de Saint-Exupery

design targets

- **behaviors - sustainable**
- **work - feasible**
- **value - marketable**

Subjective Theory of Value

- value resides in the mind
- value is a function of time
- we select the value that we perceive to rank highest at the moment of exchange

Objective Theory of Value

- value is an outcome of action
- value is both an end and a means
- a value-for-value exchange is a condition of survival

The best way to predict the future is to invent it, not prevent it.

(Alan Kay)

organizational system is…

social system, not a biological system

- ownership is irrelevant
- member development is an obligation
- “lower-archy” selects leaders

designing a system

a culture design that recognizes the organization as a social system

"creates the conditions under which a good outcome is not only possible, but probable."

A person having a nightmare can do many things in his dream—run, hide, fight, scream, jump off a cliff, etc.—but no change from any of these behaviors to another would ever terminate that nightmare…

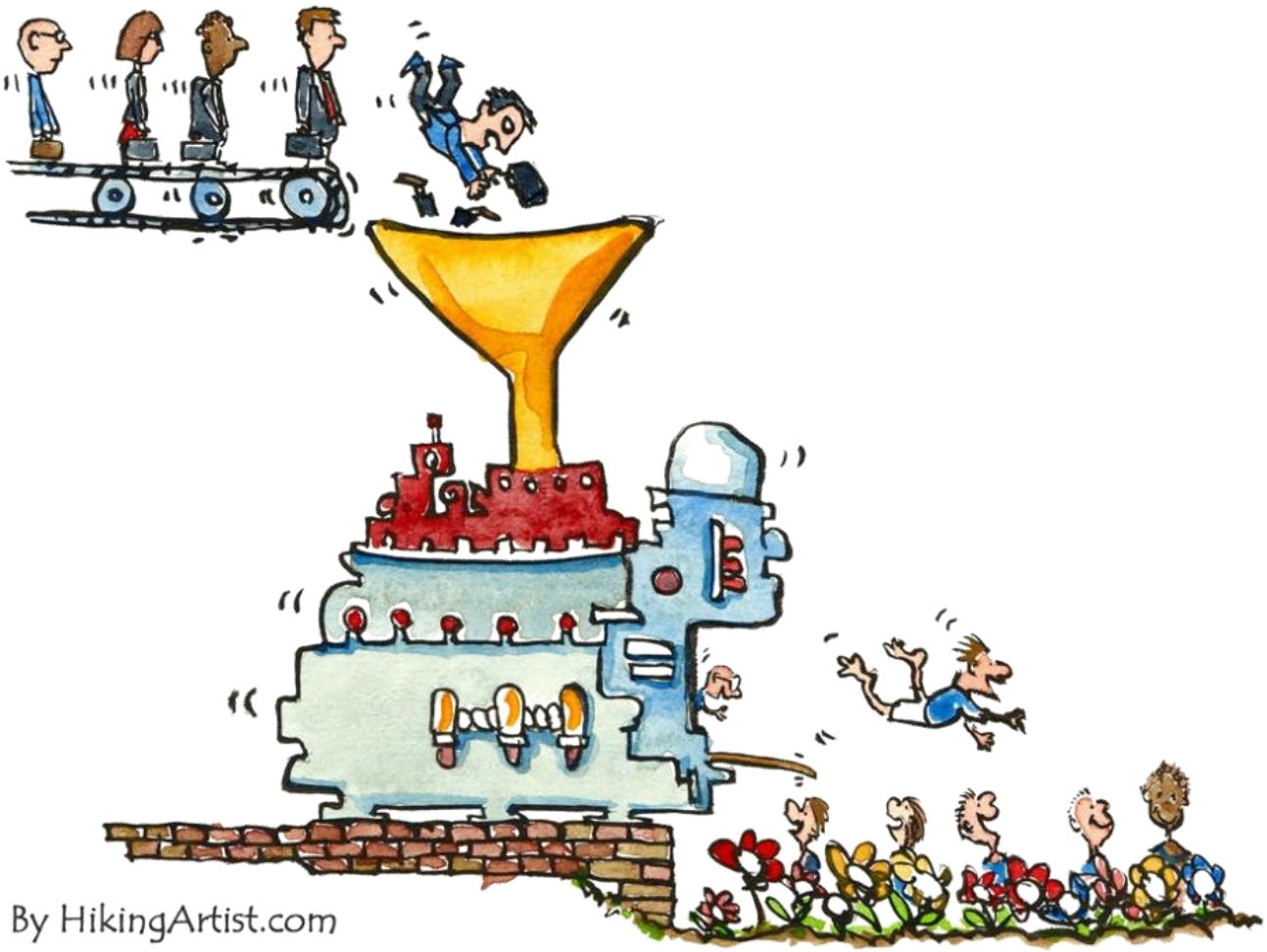
The only way out of a dream involves a change from dreaming to waking.

(Paul Watzlawick)

The first step in creating a culture of innovation requires overcoming paradigm paralysis

design key

- context
- limitations
- goals


By HikingArtist.com

value drives design

design creates culture

culture shapes values

values determine the future


Best in
Class!


Best in Class!
Faster
Cheaper
Standardize
SPC
5S
Clean it Up
Stability
Visualize
VSM
Poka-Yoke
Go see
Excellence
Optimize
CpK
5 Whys
Never Give Up
Agility
Work
People
Culture


1
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