Management of Technological Innovation

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INNOVETY
unleash your innovation

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IXL CENTER

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Outline

- Innovation levers (What is Innovation?)
- Types & Sources of Innovation
  - Collaboration
    - Licensing
- Technology cycles
  - Dominant Designs
  - Timing of entry
- Product Design and Innovation
  - Product Design Principles
  - Product and Service Design Activities

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Product Design & Innovation

The 15 Product Design Principles

1-Parameter Changes

Change an object's physical state

ex: Mosquito coils and liquid mosquito killer

Change the temperature

ex: Preserve medical specimens

Parameter Changes

Change the degree of flexibility

ex: Medical plaster cast

Change the concentration or consistency

ex: Liquid soap vs bar soap

Exercise

Use the principle of parameter changes to redesign a pot that reminds people to water their plants.

Exercise

One possible solution is to design the pot from material with a certain level of water absorptivity.

2-Intrinsic Functionality

Let the product compensate the undesirable effects of use

ex: Self-rebooting PC when the processor is overheated

ex: LG G Flex self-repairing phone

ex: Self-cleaning fish tank

Intrinsic Functionality

Prepare emergency means beforehand to compensate for the relatively low reliability of an object

ex: Back-up parachute

ex: Alternate air system for aircraft instruments

ex: Hard drive mirroring or cloning

3-Shape

Change the shape of an object from symmetrical to asymmetrical

ex: Cake mixers and blenders

Exercise

Use the shape principles to redesign a fork for eating spaghetti.

Exercise

One possible solution is to use twisted tines.

4-Feedback

Use visual, auditory,... feedback to convey information to the user

ex: Refrigerator LED display

ex: Sound and vibration phone alerts

ex: Beeping sound when calling someone

5-Preliminary Action

Perform, before it is needed, the required change of an object

ex: Pre-pasted wallpaper

6-Segmentation

Divide an object into independent parts

ex: Replace mainframe computer by personal computers

Segmentation

Increase the degree of fragmentation or segmentation

ex: Replace solid shades with Venetian blind

Exercise

Use the segmentation principle to design modular chairs that take minimum space when not used.

Exercise

One possible solution is to stack the chairs horizontally.

7-Dynamics

Allow the characteristics of an object to change to find an optimal operating condition

ex: Adjustable wash basin and toilet

Dynamics

Divide an object into parts capable of movement relative to each other

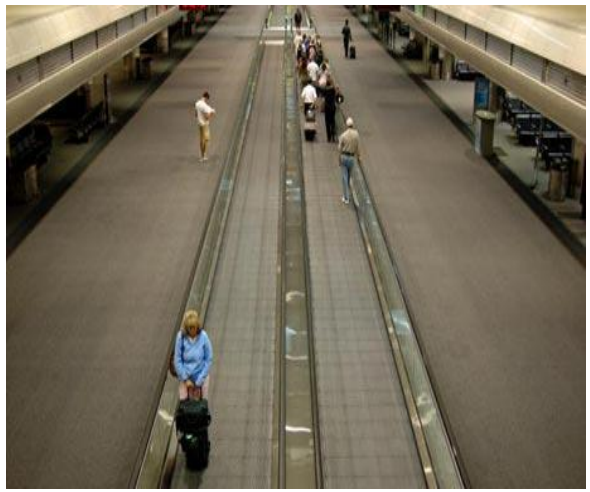
ex: The *butterfly* computer keyboard

8-The Other Way Round

Invert the process. For example, make movable parts fixed, and fixed parts movable

ex: Moving sidewalk with standing people

ex: Electric toothbrush



Exercise

Use the other way around principle to redesign the watch.

Exercise

One possible solution is to make the numbers showing time move instead of being static.

9-Discarding and Recovering

Make portions of an object that have fulfilled their functions go away

ex: Use a dissolving capsule for medicine

ex: Ariel Pods

10-Another Dimension

To move an object in two or three dimensional space

ex: Garden hose sprinklers

Exercise

Use the principle of another dimension to redesign the power outlet to allow for a more efficient use of space.

Exercise

One possible solution is to make the power outlet 3D.

11-Universality

Make a part or object perform multiple functions, eliminate the need for other parts

ex: Handle of a toothbrush contains toothpaste

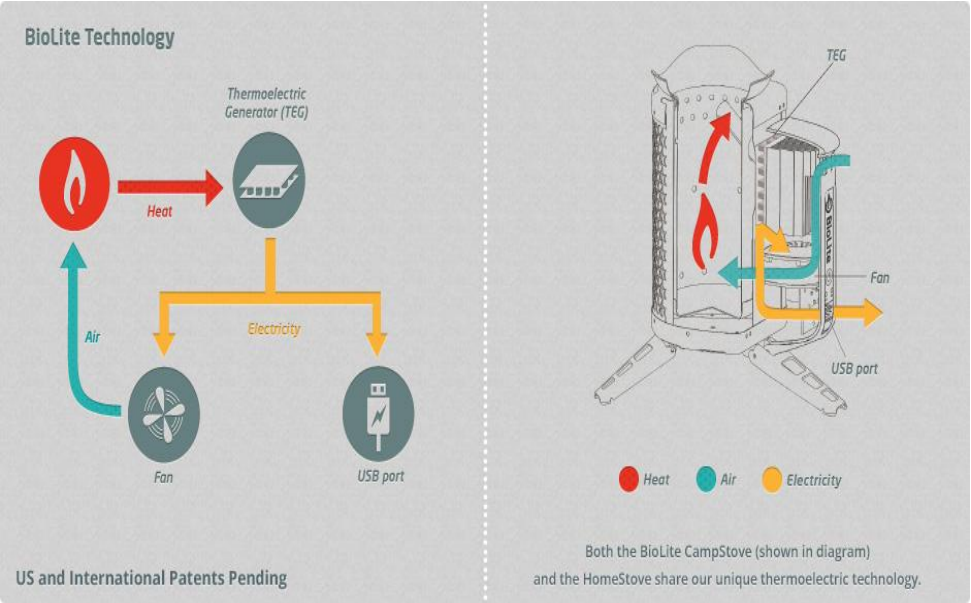
ex: Swiss Knife

12-Eliminating Waste

Use waste to achieve a positive effect

ex: Use waste heat to generate electric power

ex: Flush the toilet with washer's water



13-Merging

Merge objects together to perform new or combined functionality

ex: Multifunction printers

ex: Watch + lighter

14-Nested Doll

Place one object inside another and place each object, in turn, inside the other

ex: Camera lenses

Make one part pass through a cavity in the other

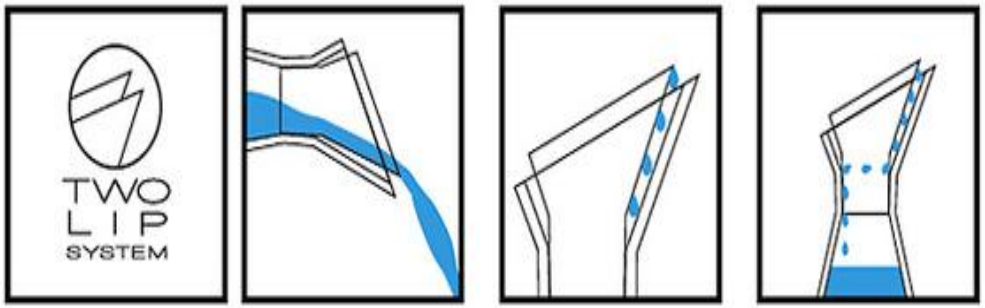
ex: Extending radio antenna

Exercise

Use the merging and nested doll principles to come up with an innovative solution for the bottles' dripping problem.

Exercise

One possible solution is to place two (merging) bottle tips inside one another (nested doll).

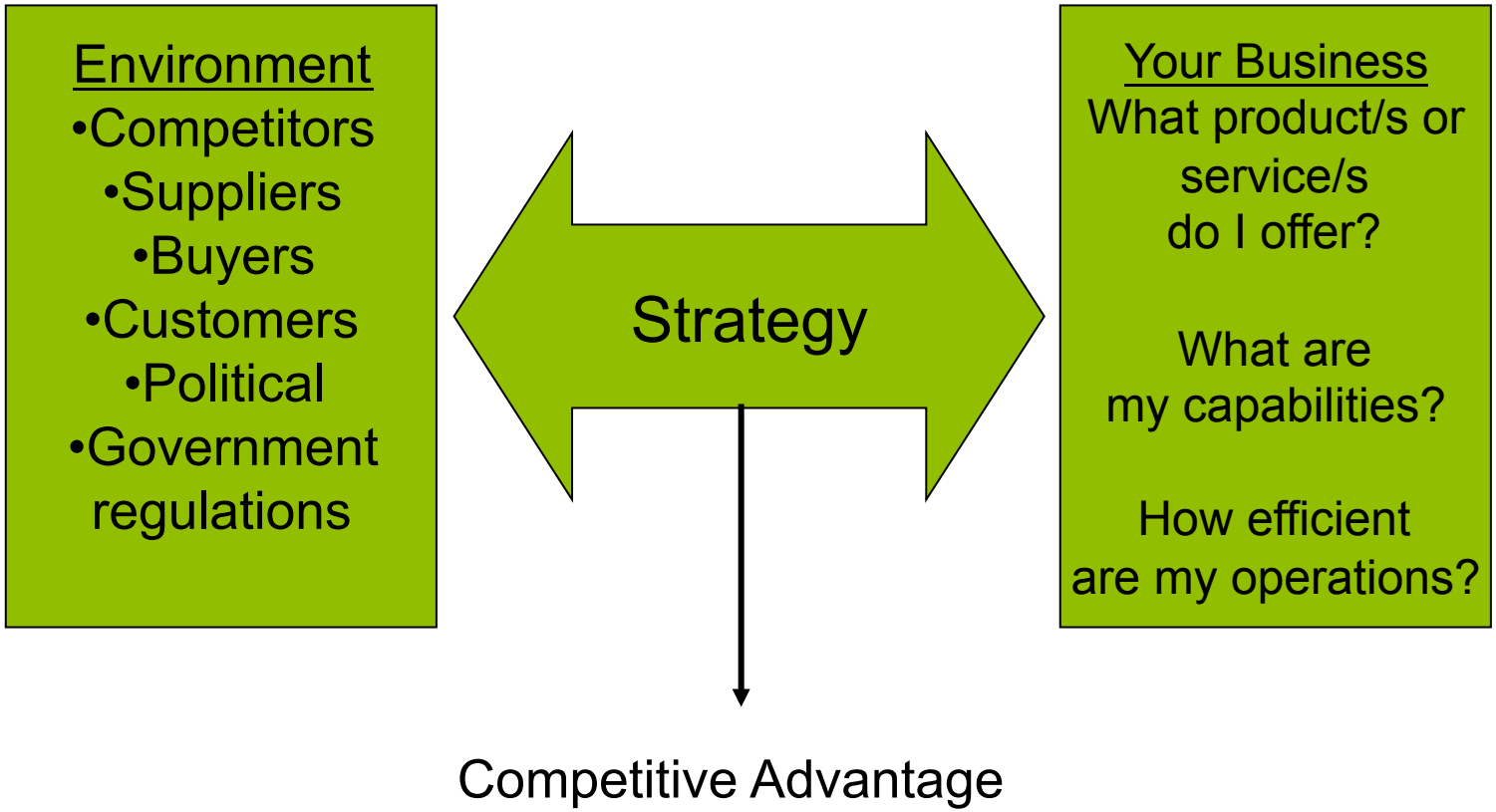


15-Mechanical Vibration

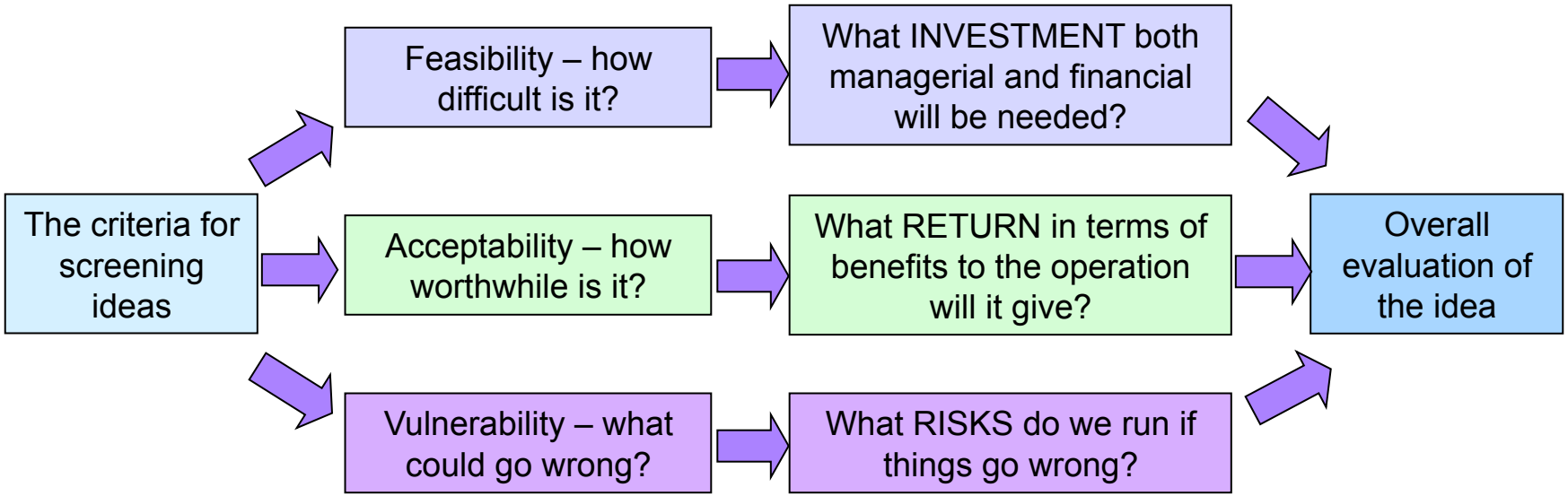
Cause an object to oscillate or vibrate

ex: Electric carving knife with vibrating blades

Linking your Business Idea to the Environment



Broad categories of evaluation criteria for assessing ideas



Product and Service Design Activities

1. Translate customer wants and needs into product and service requirements.
2. Refine existing products and services
3. or Develop new products and services
4. Formulate quality and cost targets
5. Construct and test prototypes
6. Document specifications

Quality Function Deployment (QFD)

- Purpose is to ensure that customer requirements are factored into every aspect of the process
- Tool for defining the “right” problem to solve

QFD: A structured approach that integrates the “voice of the customer” into the product and service development process.

A QFD Example for Amazon

Customer requirements (What)	Importance to Customer				
User Friendly search	3				
Find what I'm looking for	2				
Speed of delivery	2				
Reliability of sale	3				
Return of products	1				
Importance Weighting					

A QFD Example for Amazon

Customer requirements (What)	Importance to Customer	**Operating requirements (How)**			
		Web and Technical Support Expertise	Number of zShops	Number of Ware - houses	Logistics Network
User Friendly search	3				
Find what I'm looking for	2				
Speed of delivery	2				
Reliability of sale	3				
Return of products	1				
Importance Weighting					

A QFD Example for Amazon

Customer requirements (What)	Importance to Customer	**Operating requirements (How)**			
		Web and Technical Support Expertise	Number of zShops	Number of Ware - houses	Logistics Network
User Friendly search	3	☺			
Find what I'm looking for	2	□	☺	□	
Speed of delivery	2	◊	□	☺	☺
Reliability of sale	1		◊		◊
Return of products	2	◊		◊	☺
Importance Weighting					

Relationship	Value	Symbol
Strong	9	☺
Medium	3	□
Weak	1	◊

A QFD Example for Amazon

Customer requirements (What)	Importance to Customer	**Operating requirements (How)**			
		Web and Technical Support Expertise	Number of zShops	Number of Ware - houses	Logistics Network
User Friendly search	3	☺			
Find what I'm looking for	2	□	☺	□	
Speed of delivery	2	◊	□	☺	☺
Reliability of sale	1		◊		◊
Return of products	2	◊		◊	☺
Importance Weighting		**37**	**25**	**26**	**55**

Relationship	Value	Symbol
Strong	9	☺
Medium	3	□
Weak	1	◊

Exercise

- Decide on a particular product or service that you will design for your business and prepare a QFD matrix
- List five to six customer priorities and rate their importance in light of your competitive strategy (try not to include price or cost, except if it is critical to your competitive priorities)
- List five or six operational capabilities (things you can control)
- Discuss the strength of the relationships between customers needs and operational capabilities, and use symbols to reflect your decisions on the strength of the relationships
- Calculate Importance Weights (Multiply value of each symbol with the corresponding customers importance)

Service Blueprinting

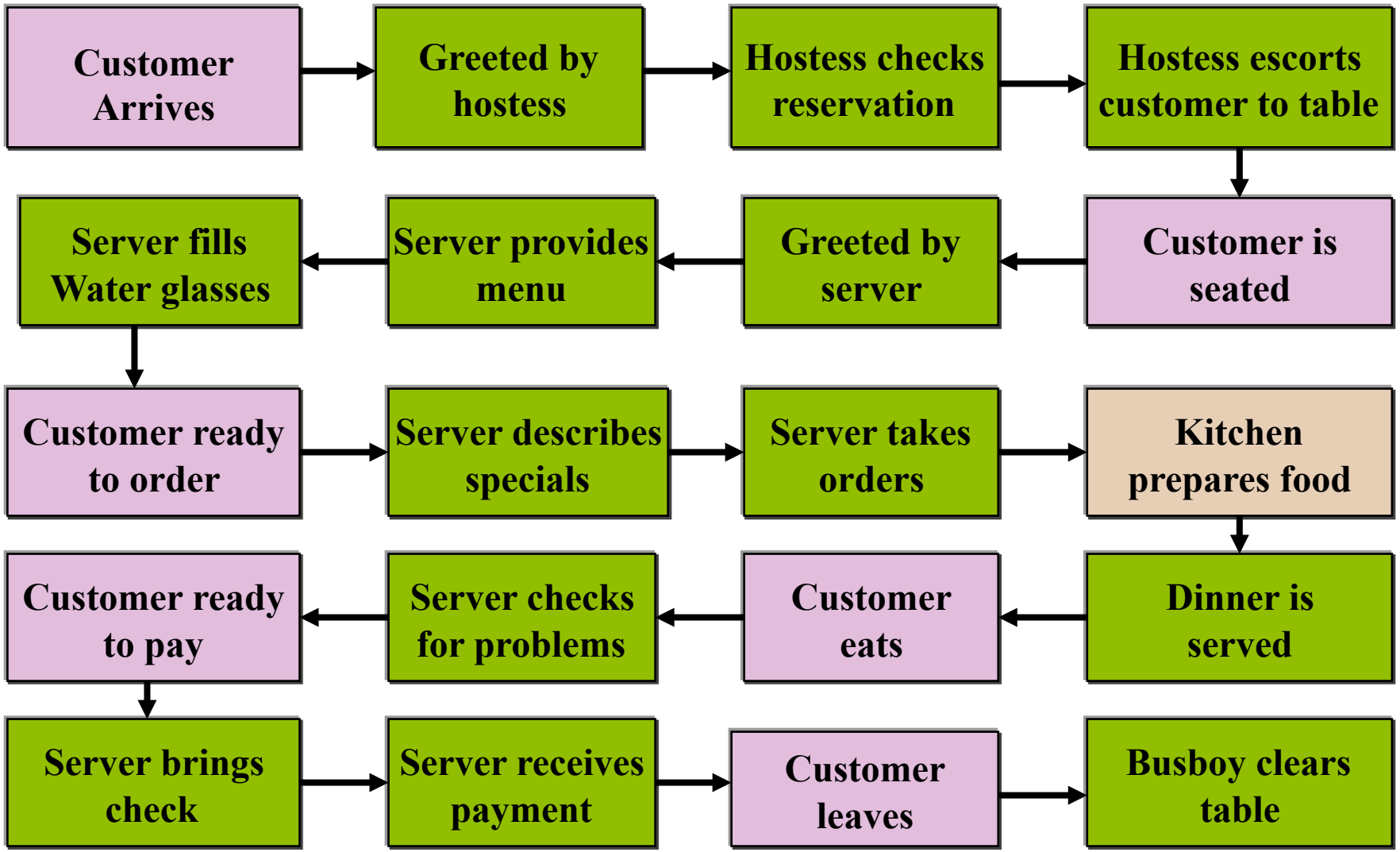
A method used in service design to describe and analyze a proposed service

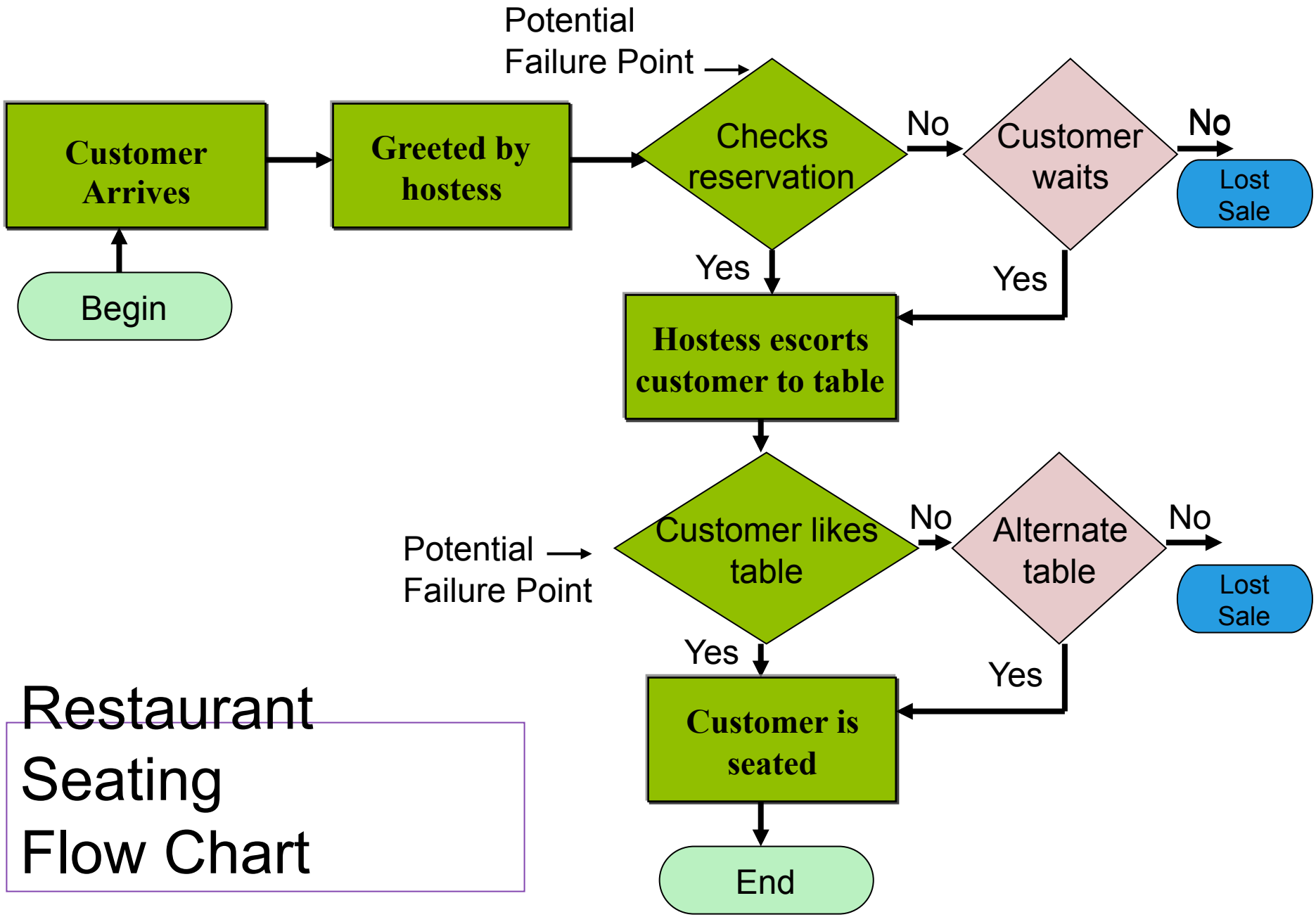
A useful tool for conceptualizing a service delivery system

Steps:

1. Establish boundaries
2. Identify sequence of customer interactions
   - Prepare a flowchart
3. Develop time estimates
4. Identify potential failure points

A Restaurant Example




Potential
Failure Point
Customer Arrives
Greeted by hostess
Checks reservation
No
Customer waits
No
Lost Sale
Begin
Yes
Yes
Hostess escorts customer to table
Potential
Failure Point
Customer likes table
No
Alternate table
No
Lost Sale
Yes
Yes
Customer is seated
End
Restaurant
Seating
Flow Chart

Exercise

- For your service, draw the sequence of customer interactions (Note: imagine you are the customer)
- List all the steps needed by you to move from one interaction to another (Note: now you're the manger☺)
- Differentiate between the steps the customer can see and the steps the customer can't (the backstage)
- For a portion of your process (or for all of it), flow chart your business and identify the Potential Failure Points