

BTG Project Tray Design

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01

THE GAP

Identifying the problem:
Servers' health issues in
workplace

03

THE AUDIENCE

banquet server,
customers, and
managers

02

DESIGN

Ideas and prototypes

04

TEST

Usability test
proposals

THE GAP

Servers working in restaurants and hotels usually must carry heavy stuff with trays in workplace which endangers their health.



Unhealthy behaviors



Carrying loaded trays

Unbalanced trays
Serving beverages



Walking long distances

From supply stations to banquet hall
Carrying heavy loads in the hall

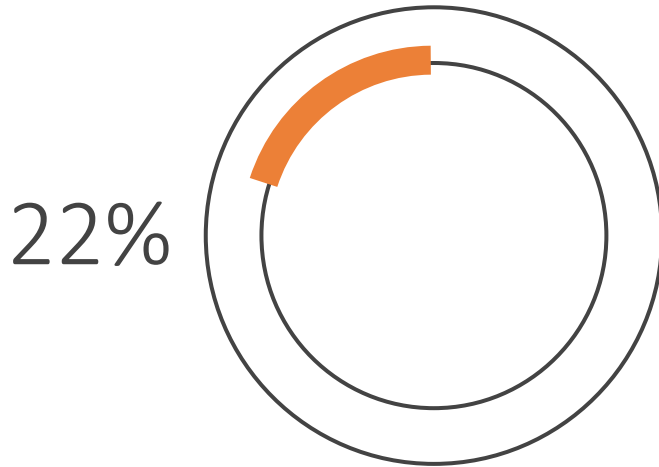


Pushing heavy carts

Large tall carts laden with heavy loads
Push and pull on a daily basis

Health risks

People in food server roles have 22% higher chance of stroke
Huang et al. (2014).



Low loss control

Fast-pace service industry limits ability to control environment

Hazards

Repetitive movements, bad posture, temperature extremes

Extended work days

Long work shifts, standing, moving

Work-Related Health Outcomes - Musculoskeletal disorder

Back & Neck

Frequent bending when lifting heavy objects

Shoulder & Elbow

Frequent, prolonged moving of heavy objects

Finger / Wrist

Continual twisting and frequent vigorous wrist
action

Foot

Standing for long hours

Overload despite basic rights

Federal laws including the National Labor Relations Act(NLRA);the Occupational Safety and Health Act (OSHA) and state laws

Both federal laws and many state laws specifically protect whistleblowers against employer retaliation. The employee who brings their concerns over illegal action needs only a good faith concern. These protections apply to those who complain about discrimination, harassment, workplace safety and health concerns, and employers breaking wage and hour laws.

DESIGN

Behavior

- What does a banquet server need?
- What are the most common pain points in a server role?
- What makes this job stressful?
- What areas of the body are most affected by the stressors of this role?

Environment

- What is the environment?
- What are physical factors in the environment ?
- What are social factors in the environment

Solution



Adjustable Height Carts

Ease of Transportation, reduces amount of lifting, but handle diameter is narrow and heavy carts put a lot of stress on joints.



Shoe Insoles

Relieves pain associated with being upright for long periods of time without requiring shoe replacement



Alternative Wine Glass Tray

Easier to balance and to store, reduces wrist strain, but can't carry as many at one time or quickly put them down on a flat surface

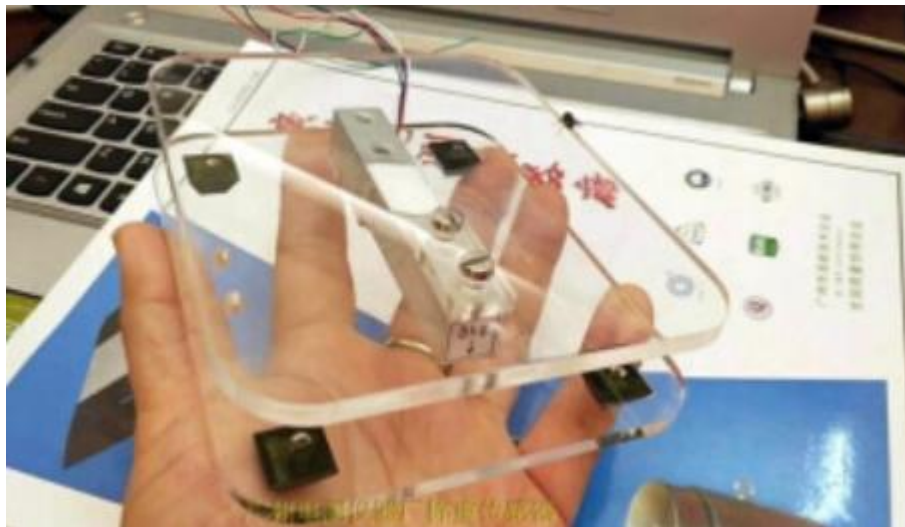
Solution?



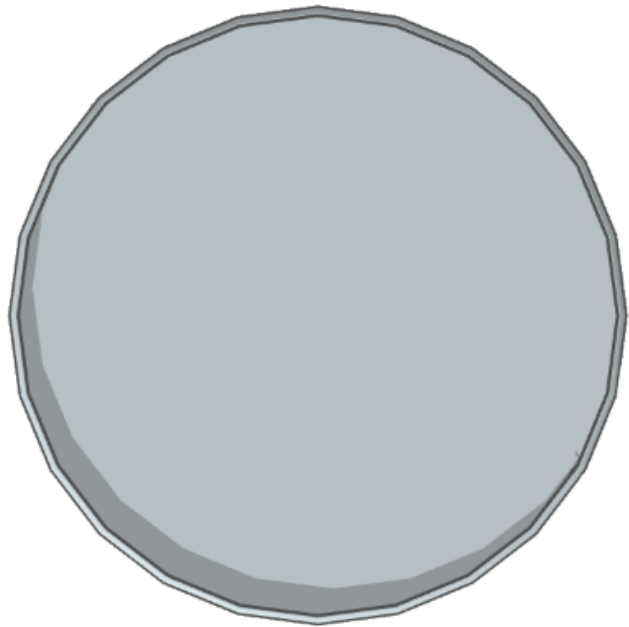
Prevention

Goal: to redesign a banquet server tray that **stops the ergonomic and social issue** at the root, to alert servers to illegal overexertion and **create a safe space** for adaptation, negotiation, and collaboration.

Ideas



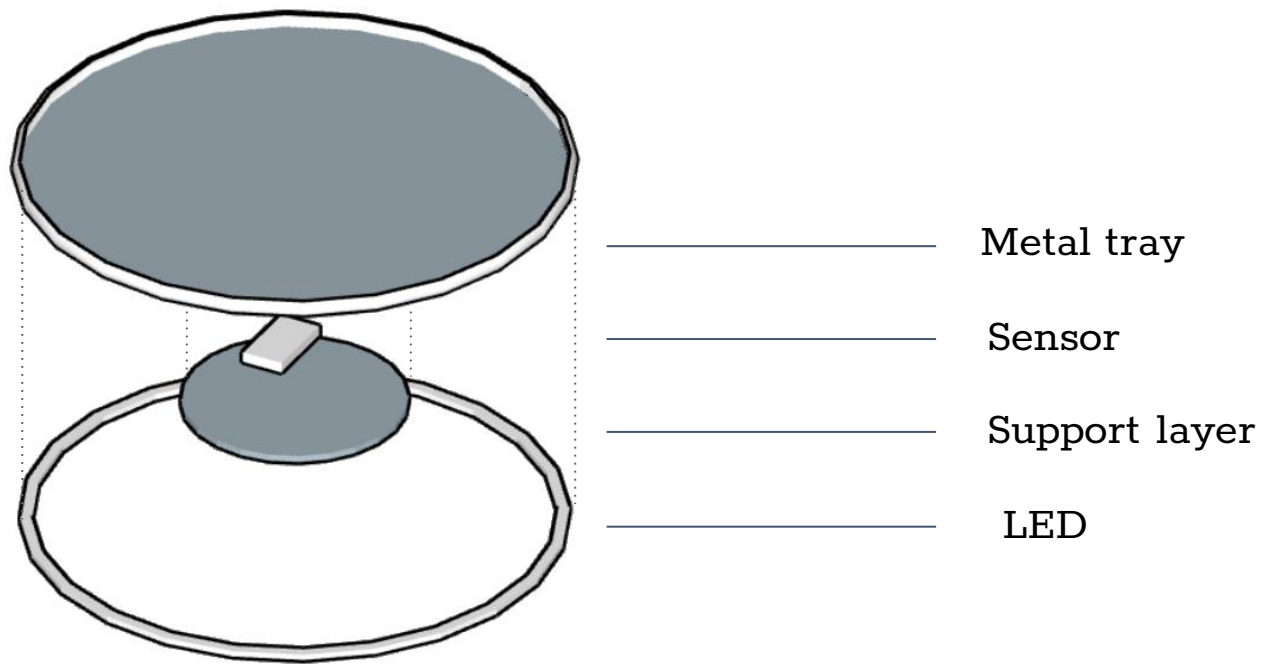
Prototype



Detachable part



Prototype



Prototype



No Light:
Weightless



White Light:
Appropriate Weight

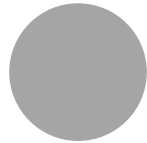


Red Light:
Inappropriate Weight

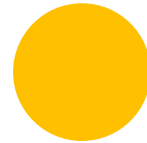
AUDIENCE



The server



The
customer



The
manager

JASON

22 years old

Jason is a part-time banquet server for a small catering company in NYC. He enjoys serving customers but often suffers from serious MSD. Sometimes he is not happy with the heavy loads he carries with his tray, but doesn't want to show that frustration in front of his manager or the customers.



The Server

Efficiency

Pride

Equity

Average Stress Level



Time Spent in Banquet Hall



"I think the new trays are helpful and my colleagues and I feel like this supports our work, the way that's safe. I'm happy with the overall improvement in service after the replacement."

CLAIRE

41 years old

Claire frequents many venues to eat out and attend events where she can speak about her company and network. She likes the food at some of the boutique venues, but she is a little worried that the servers carry a lot on their trays, especially because she herself suffers from arthritis. It seems dangerous if objects fall, and the servers sometimes look exhausted.



Average Stress Level



Time Spent in Banquet Hall



"I think the new trays are eyecatching and the servers look more relaxed."

The Customer

Wellbeing

Honesty

Aesthetics

TIMOTHY

55 years old

Timothy founded the small catering company and manages the banquet servers on a daily basis. His days fly taking care of supplies and engaging with customers and clients. Whenever they aren't satisfied, he pushes the servers to load more onto their tray and neglects feedback. He doesn't know how to improve efficiency in his small business any other way.



Average Stress Level



Time Spent in Banquet Hall



"I think the new trays are actually quite aesthetically pleasing in a banquet environment, and the servers look more relaxed. That makes my employees happy, my clients happy, and that makes a better company."

The Manager

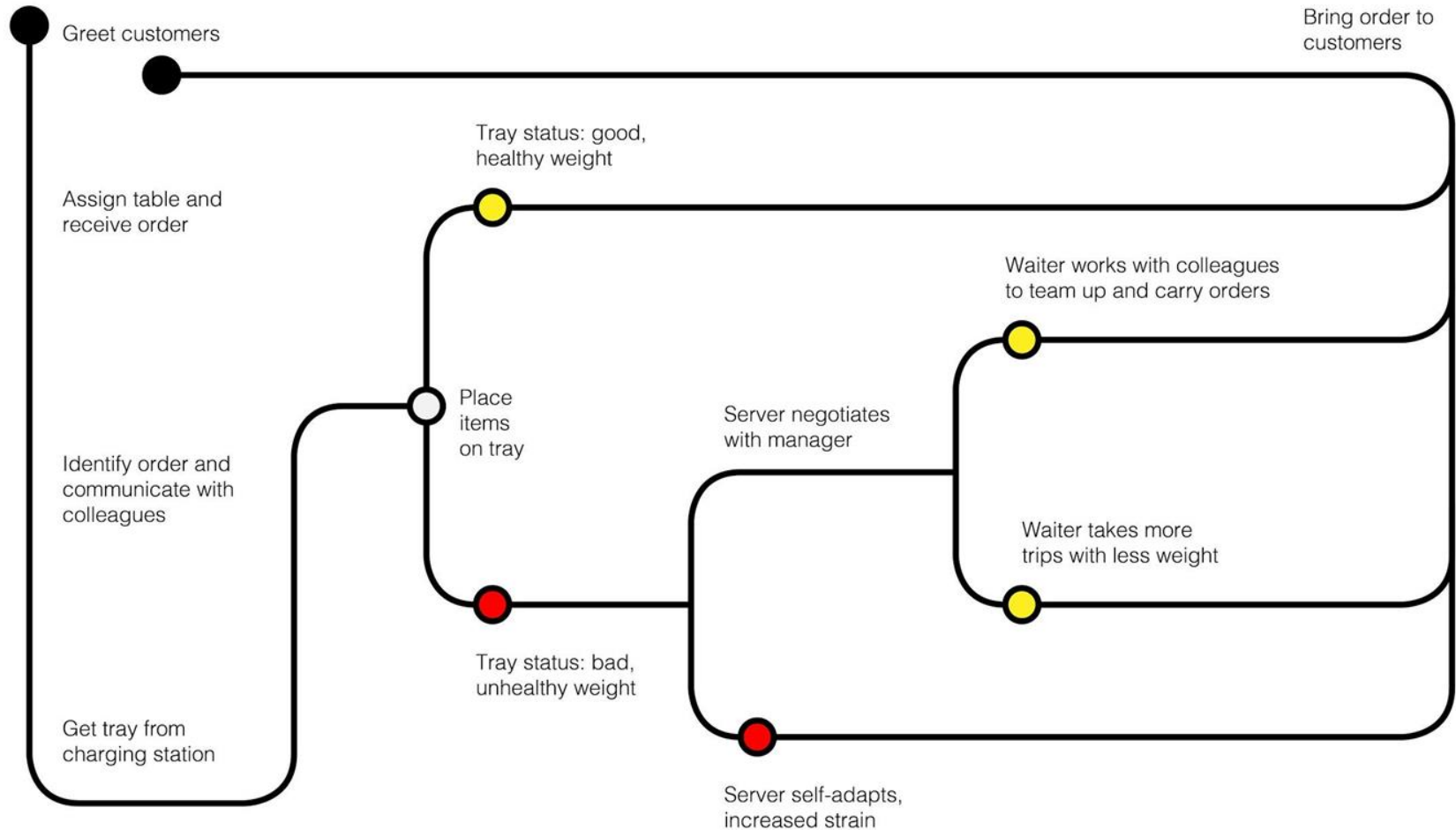
Success

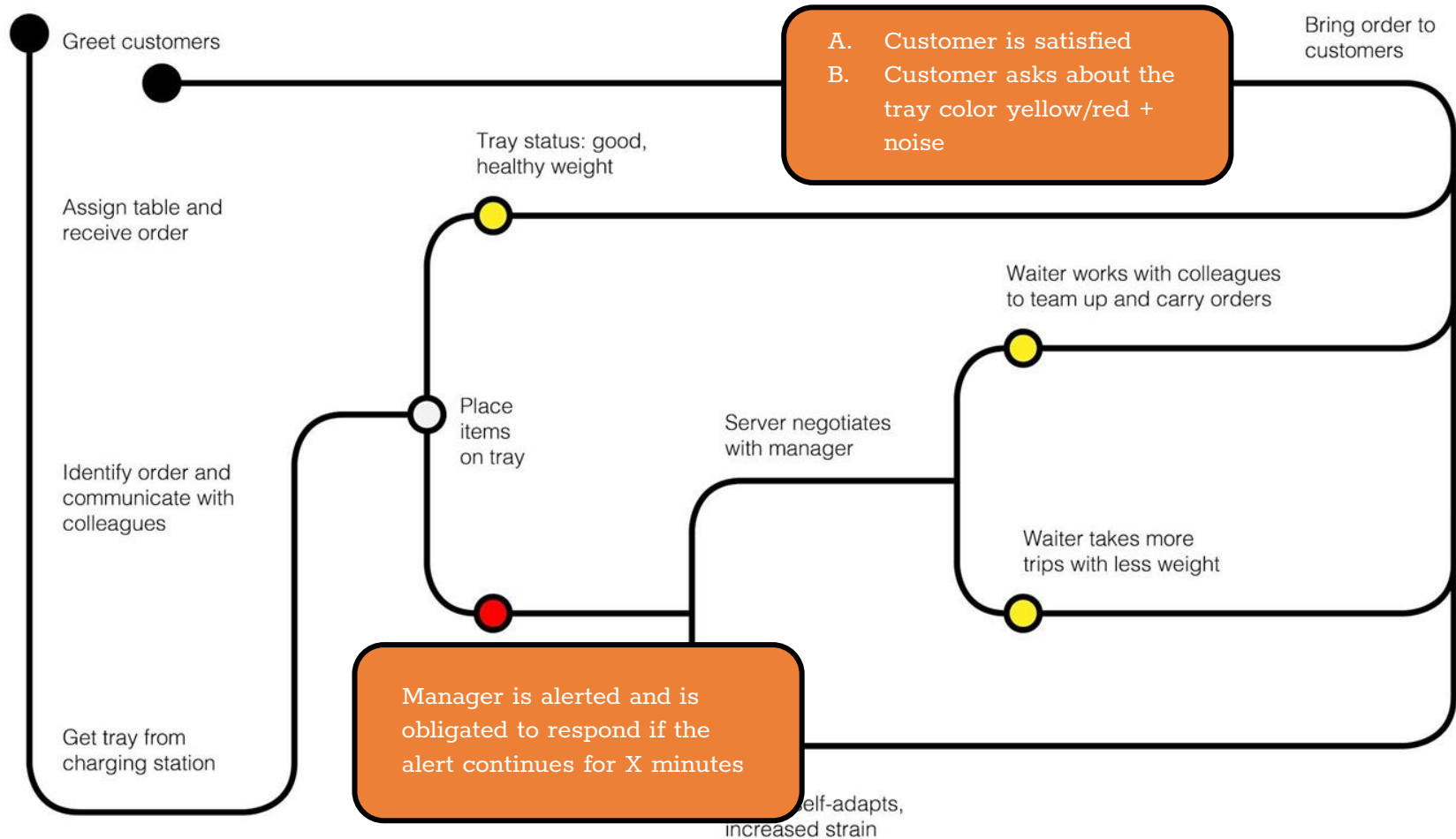
Reputation

Autonomy

TEST

- Considering the end-to-end process
- Decision points
- Similar to a task analysis with distinct choices and impacts
- Interactions between users





QUESTIONS FOR FUTURE INTERVIEWS

- How long should the “overweight” alert ring?
- What is the optimal time considering all user groups?
- How many users would be willing to use a tray that also vibrates when too much weight is put on (extreme)?
- What are customer reactions to a tray that has yellow/red light?
- Where is the optimal location for the trays to be stored and easily accessible. When LEDs need to be charged, how might they be stacked without going off?

EVALUATION AND FEEDBACK

Expert Evaluation (at least 3)

Heuristic Analysis (Nielsen's 10 heuristics)

- Visibility of system status
- Match between system and the world
- User control and freedom
- Consistency and standards
- Error prevention
- Recognition rather than recall
- Flexibility and efficiency of use
- Aesthetic and minimal design
- Help user recognize, diagnose, and recover from errors

EVALUATION AND FEEDBACK

Self-reported metrics from User

- System usability scale

Participant ID: _____ Site: _____ Date: ____/____/____

System Usability Scale

Instructions: For each of the following statements, mark one box that best describes your reactions to the website *today*.

		Strongly Disagree				Strongly Agree
1.	I think that I would like to use this tray frequently.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.	I found this tray unnecessarily complex.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.	I thought this tray was easy to use.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.	I think that I would need assistance to be able to use this tray	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.	I found the various functions in this tray were well integrated.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6.	I thought there was too much inconsistency in this tray	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7.	I would imagine that most people would learn to use this tray very quickly.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8.	I found this tray very cumbersome/awkward to use.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9.	I felt very confident using this tray	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10.	I needed to learn a lot of things before I could get going with this tray	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please provide any comments about this website:

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