



Product Design Session 1 - Introduction

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Teaching Team



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Tuesday Lectures



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Studio Instructor



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TA & Studio Coach
(Wednesdays)



Rose Schlenk
TA & Studio Coach
(Thursdays)



Kevin Paroda
TA & Grader

Need help with course-specific matters? → productdesignwharton@gmail.com
Office hours (see Canvas)

Questions about assignments? → Use Piazza (via Canvas)

Canvas technical issues? → <https://computing.wharton.upenn.edu/>

Registration issues? → Ramon Jones ramjones@wharton.upenn.edu



At your age, in my first design course.

39 years later, now teaching design courses.





Course Composition

- 4 sections of 50-60
- 33% Wharton UG
- 28% SEAS UG
- 16% SEAS Grad
- 12% Wharton MBA
- 7% College UG
- 4% Law, Arch, others

(lots of dual degrees, etc.)



Active Learning Classroom (our Studio) – Vance 112



Enter Here
(off 37th Street Walk)





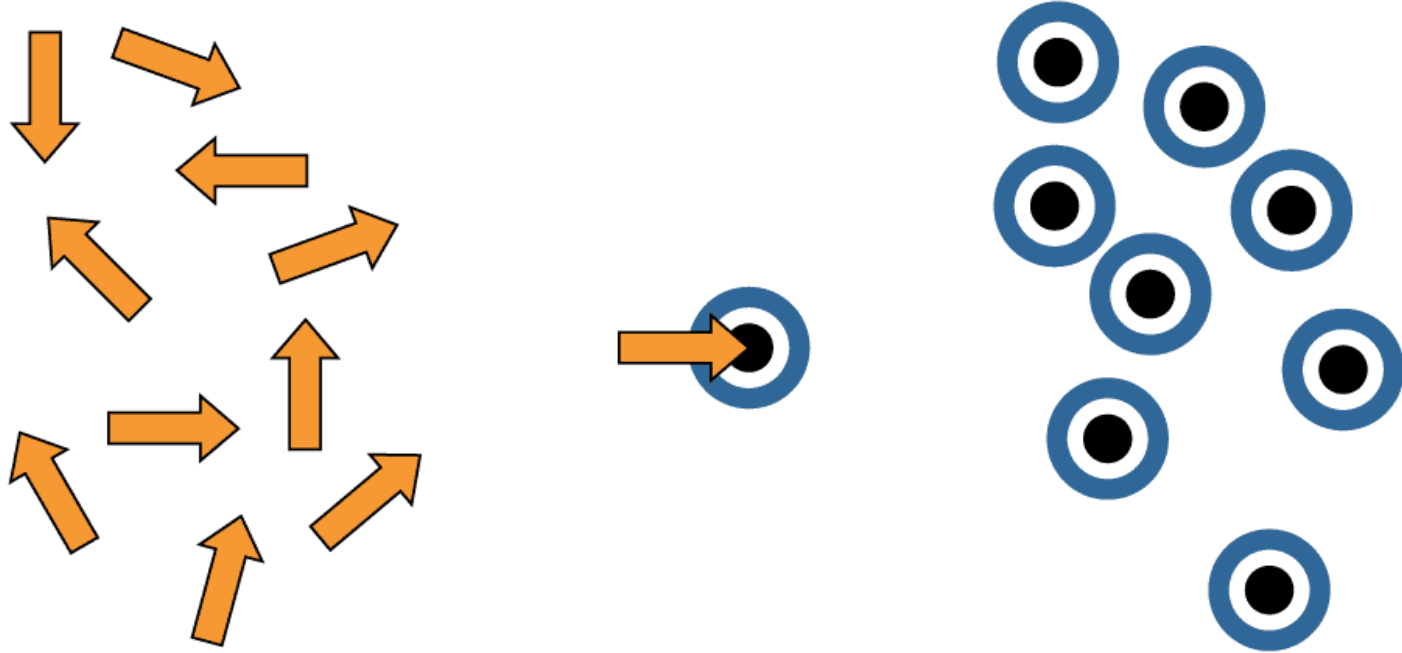
<https://en.wikipedia.org/wiki/Aerogel>





Innovation

A new match between a solution and a need.



Value-Creating Innovation: The Three Key Questions



1. Is the need real?



2. Does the solution meet the need?

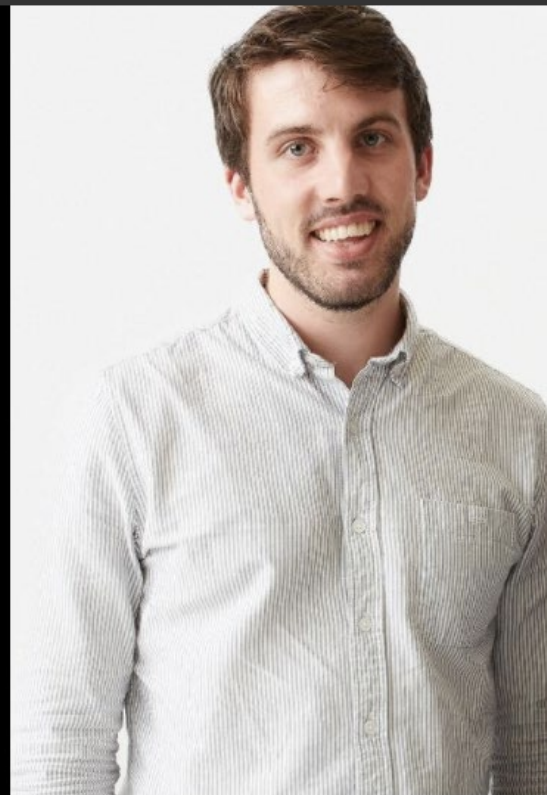


3. Is the user/customer willing to pay more for the solution than it costs you to deliver it?



TemperPack

Sustainable Thermal Packaging



Brian Powers, 24

Cofounder, TemperPack

Powers wants to challenge the ubiquity of Styrofoam. His TemperPack manufacturers insulated packing materials made from recycled burlap sacks (since 2014, it's recycled more than 500,000 pounds)—better for the environment and just as good at keeping things like food cold. After graduating from the University of Pennsylvania, he toiled first as an investment banker before cofounding the company.



plated

RED BELL
PEPPERS

TAMPIL SPAGHETTI



12,194 views | Jan 10, 2019, 09:00am

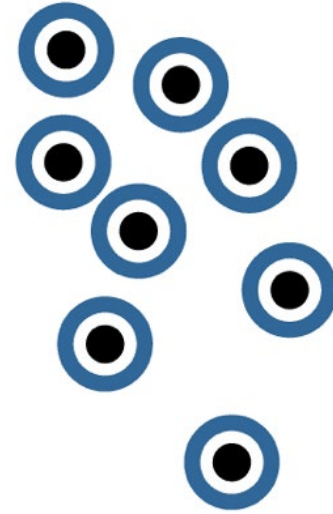
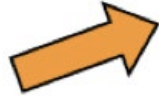
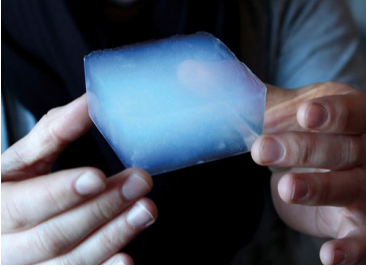
Sustainable Packaging Startup TemperPack Raises \$22.5 Million To Take On Styrofoam



TemperPack cofounders Brian Powers, James McGoff and Charles Vincent stand in front of their headquarters in Richmond, Virginia. TEMPERPACK

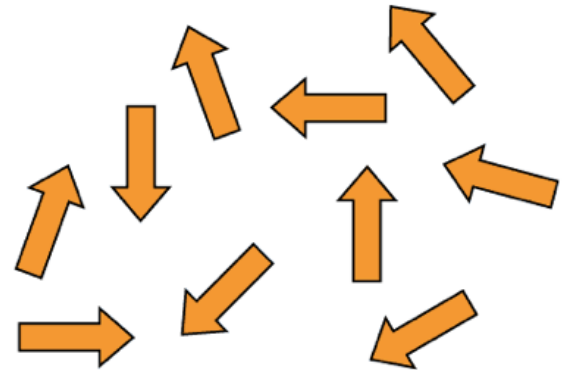
Push

Start with the solution and look for a need it can address.



Pull

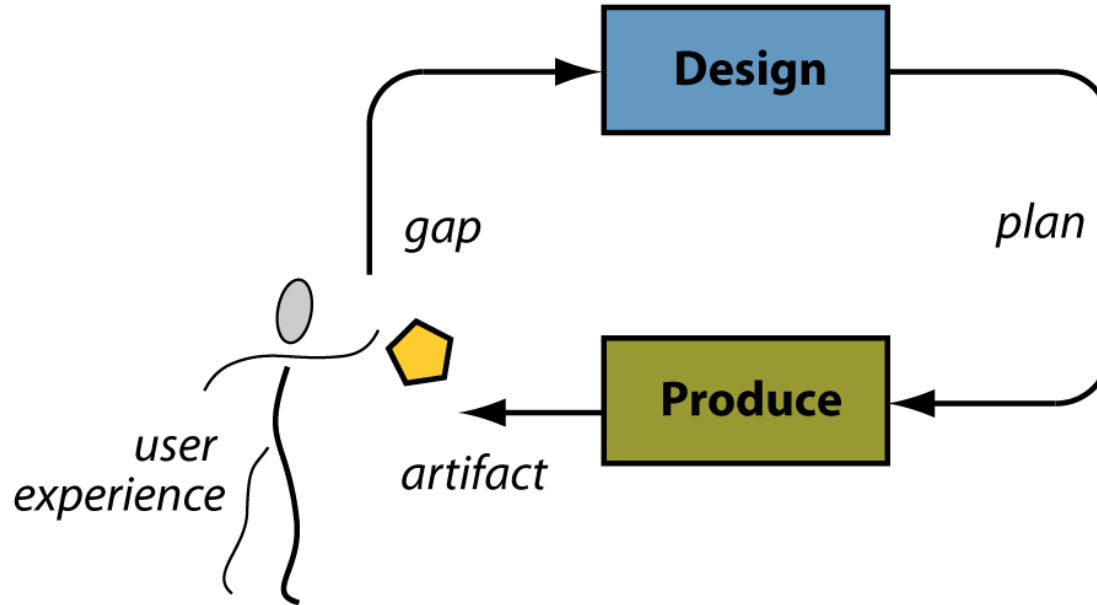
Start with the need and look for a solution to address it.



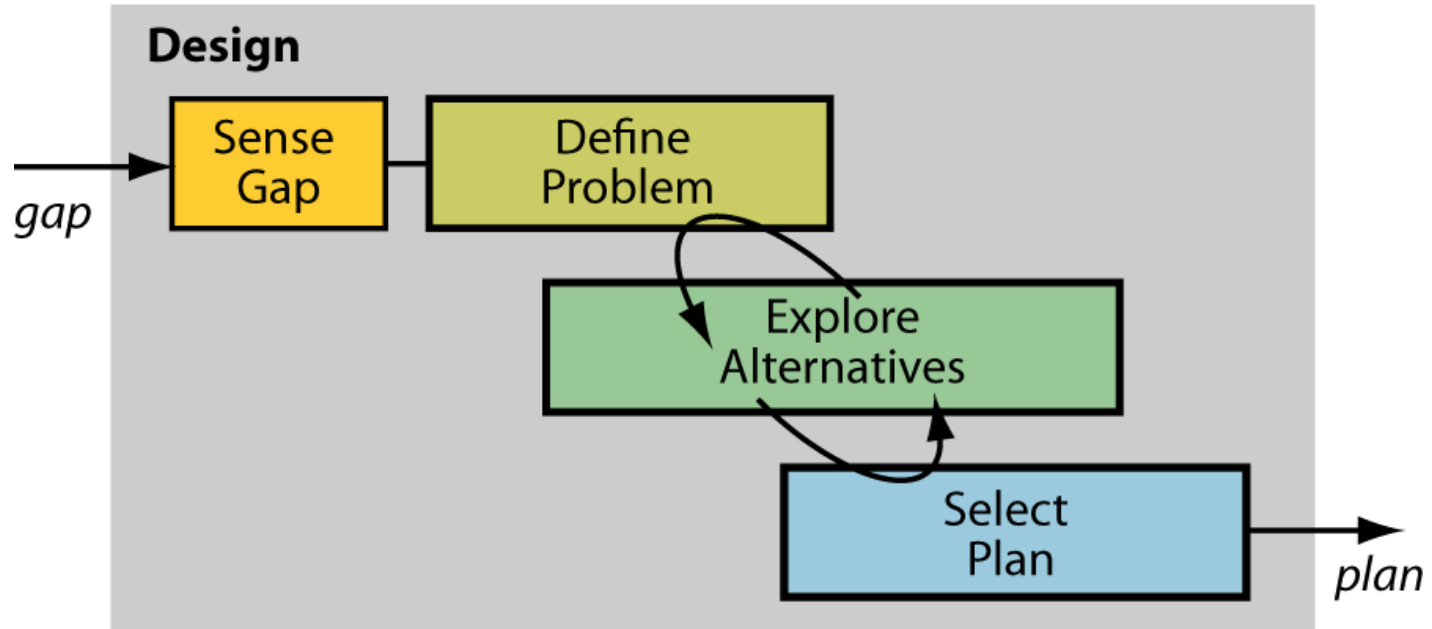
Design is conceiving and giving form to artifacts that solve problems.

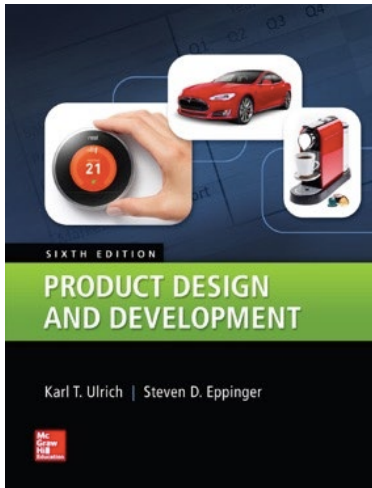
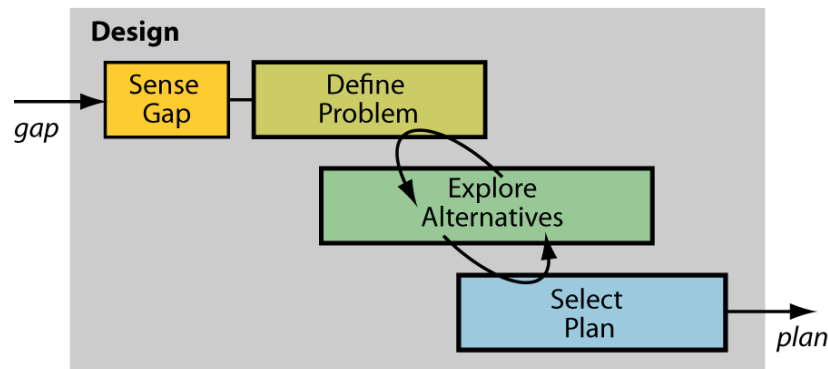
Design is a *pull* innovation process.

Product Design – design of physical artifacts that will be produced repeatedly.



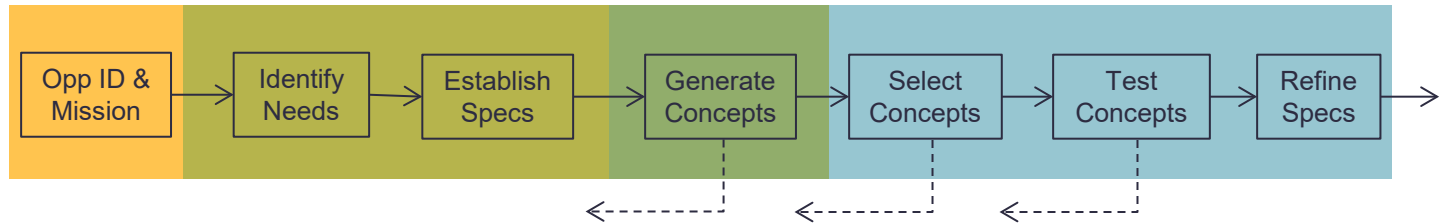
Design Process



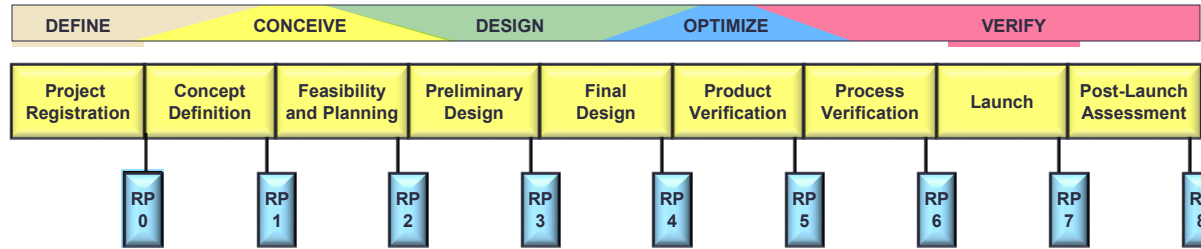


Concept Development Process

What → How



Tyco Product Development Process



Tyco Product Development Process

Rally Point Phase	0. Project Registration	1. Concept Definition	2. Feasibility and Planning	3. Preliminary Design	4. Final Design	5. Product Verification	6. Process Verification	7. Launch	8. Post-Launch Assessment
Primary Goal	Define project and business unit needs	Develop project concept and charter	Create product description	Create preliminary detailed design	Detail and optimize design	Demonstrate product performance	Demonstrate process performance	Launch product	Identify lessons learned
Marketing and Sales	Identify customers and market size	Capture voice of the customer	Develop marketing and sales plans	Review concepts with customer		Initialize field trials	Complete field trials	Finalize pricing and sales forecasts	Solicit customer feedback and satisfaction ratings
	Describe competitive features and benefits	Analyze customer needs	Create phase-in and phase-out plans				Finalize training plans	Complete sales and service training	Measure sales vs. forecast
	Identify target cost and price	Document customer needs							Complete phase-in and phase-out
Engineering	Identify project risks	Identify critical-to-quality specs	Create functional specification and performance metrics	Conduct a preliminary design review	Freeze hardware and software design	Finalize design documentation	Obtain regulatory approvals	Finalize product metrics	
		Develop and select concepts	Review concept selection	Build and test alpha prototypes	Complete engineering documentation	Complete beta prototype and field testing			
		Update project risks	Define product architecture	Assess product failure modes	Draft technical documentation	Apply for regulatory approvals			
			Assess technical failures modes		Secure beta prototypes				
Quality Assurance			Create preliminary test plan		Test beta prototypes for robustness	Complete quality assurance testing	Conduct process verification testing		
Manufacturing				Begin manufacturing process development	Finalize bill of materials (BOM)	Update manufacturing control plans	Run manufacturing pilots		Register obsolete and scrap products
				Conduct a preliminary manufacturing process review	Develop manufacturing control plans		Finalize manufacturing control plans		
Purchasing				Create a supplier participation matrix	Identify long lead-time items		Verify supply chain readiness		
				Assess suppliers for certification					
Legal		Search patents	Identify trade compliance issues	Identify potential patents	Prepare patent applications	Assure trade compliance			
Financial	Prepare preliminary business case	Refine business case	Complete financial package						Monitor return on investment
Project Management	Identify project timing, resources, and capital	Assess team capabilities/skills	Plan integrated product development schedule	Update RP1-2 deliverables	Update RP1-3 deliverables	Update RP1-4 deliverables	Update RP1-5 deliverables	Finalize all deliverables	Document best practices
	Prepare RP0 checklist & submit for approval	Identify development team members	Assign a project manager	Prepare RP3 checklist & submit for approval	Prepare RP4 checklist & submit for approval	Prepare RP5 checklist & submit for approval	Prepare RP6 checklist & submit for approval	Finalize launch plans and documentation	Prepare RP8 checklist & submit for approval
		Select a Rally Point process variant	Update RP1 deliverables					Update RP1-6 deliverables	
		Prepare RP1 checklist & submit for approval	Prepare RP2 checklist & submit for approval					Prepare RP7 checklist & submit for approval	

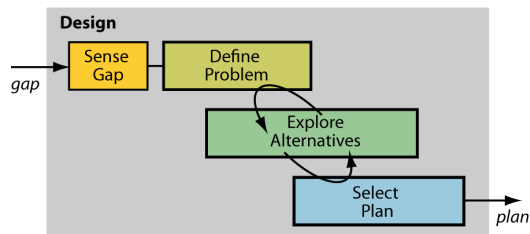
Design and “Design Thinking”

(or maybe just good problem solving?)



<https://www.nngroup.com/articles/design-thinking/>
Shewhart Cycle: <https://en.wikipedia.org/wiki/PDCA>

accurately give credit for attending lecture?



IWWMW = in what way might we...?



What you will learn in *Product Design*

Design Process (Sense>Define>Explore>Select)

Methods

- Tournaments and multi-voting.
- Concept development.
- Naming and branding.

Specific Knowledge and Concepts

- Manufacturing processes.
- Global supply chain, particularly China-to-US.
- Patents and intellectual property.

Maker Skills

- How to sketch by hand.
- 3D digital modeling.
- Quick prototyping.
- 3D printing.
- Portfolio photography and documentation.



Everyone in this course knows some of this content already, and some of you are experts! So, you will also learn a lot from each other.

Pedagogy

We try to use the best learning mechanism for each type of material.

Lecture

- Community building.
- Guest speakers.
- Themes adjacent to doing product design.
- e.g., intellectual property, environmental issues.

Video

- Tools and methods.
- Some material not (yet) in textbook.
- Rich and detailed examples.
- e.g., learning to draw, product naming.

Textbook

- Tools and methods.
- Detailed explanations of methods.
- Reference material.

Studio

- Pitching, voting, and critiquing.
- Coaching on projects.
- Hands-on experiences.
- Forming teams.

Team Project

Guest Speakers and Career Panel

(Guests and Dates TBD)



Team Project

- Physical goods
 - Limits use of “smoke and mirrors.”
 - Forces you to face hard constraints typical of design.
 - Supportive of MEAM and IPD curriculum.
- Simple
 - You must build a working prototype.
 - (Probably not your life’s work.)
- Retail price less than \$50
 - Limits complexity.
 - Allows better apples-to-apples market test.
- Target market is Penn students
 - We have access to potential customers.
 - We can simulate a real market in April.
 - You know the market.
- Differentiated
 - Substantially novel relative to existing products. (Otherwise, what’s the point?)



STABLE

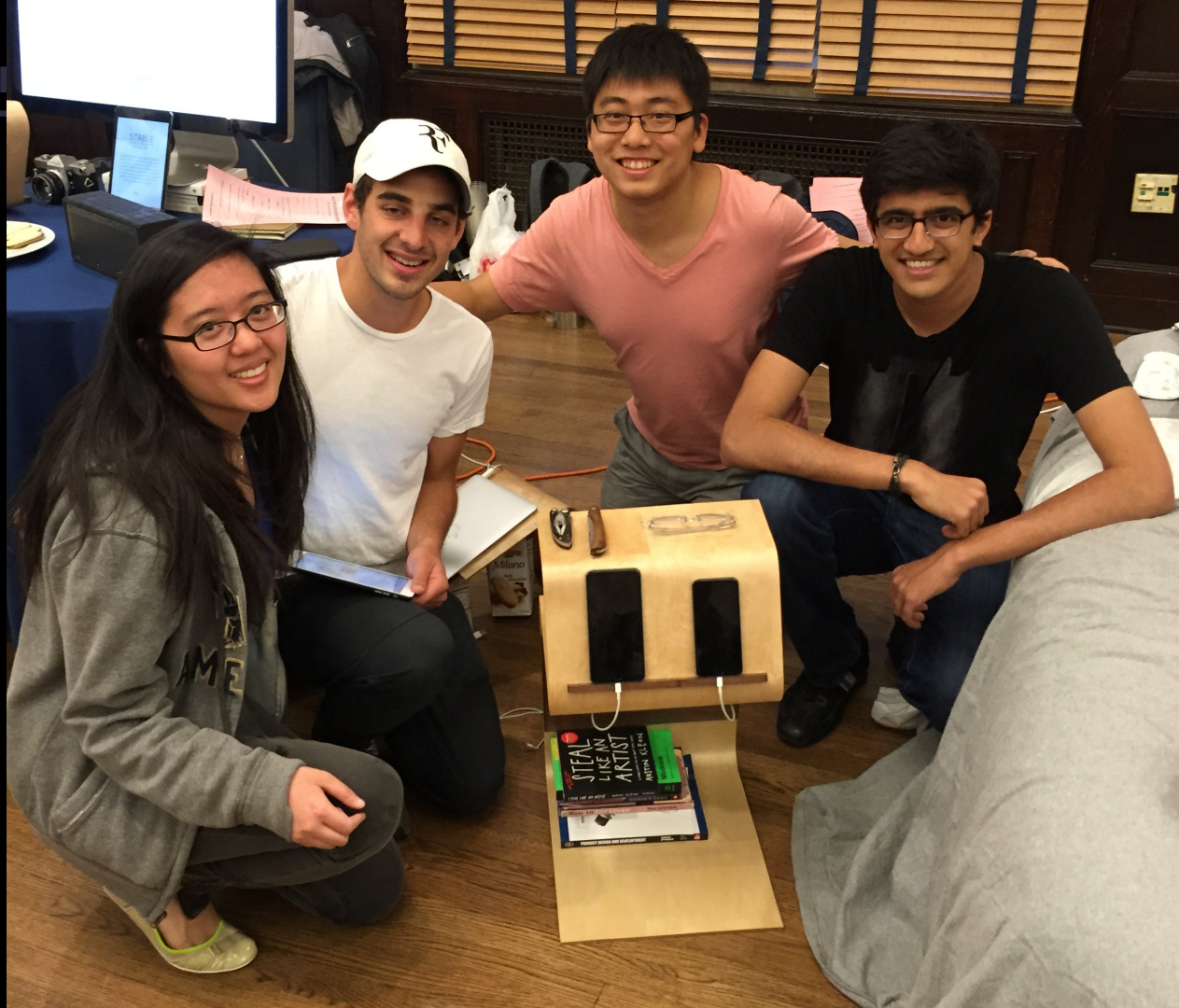
A modern take on the
bedside table.

Stable reinvents the classic bedside table through new functionality and a minimalist design. Not only does Stable provide a dock for electronics that reduces tangled cords, but there is also a hideaway area for valuable essentials to be stored without the typical clutter of a drawer.

\$50

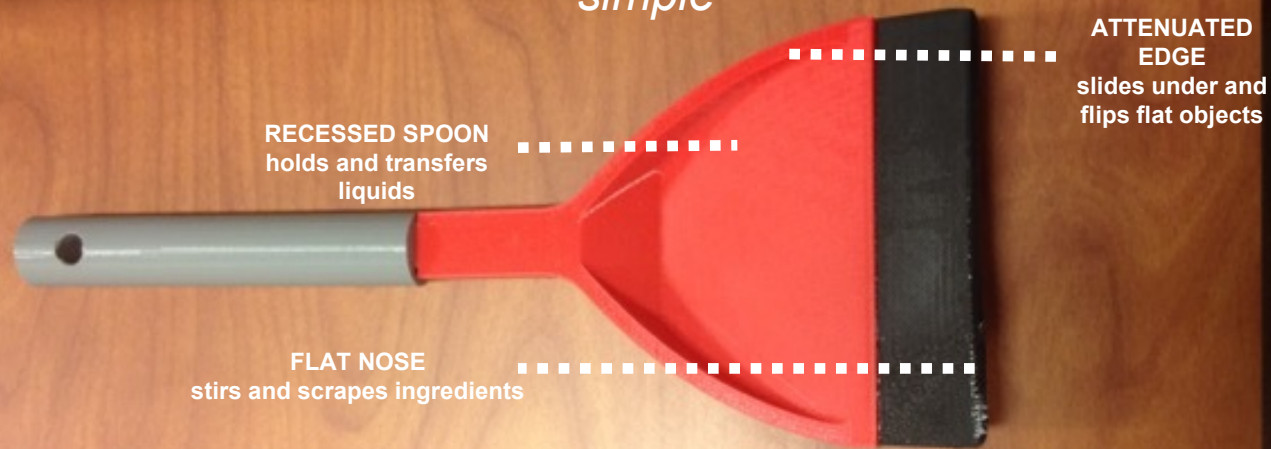


Design Fair
(in lieu of T



OVER-EAZY

*Home cooking made
simple*



\$15

MULTI-
PURPOSE

DISH-
WASHER
FRIENDLY

SPACE-
SAVING



LESS CHAOS, CLUTTER, AND
CLEAN-UP IN YOUR KITCHEN

MORE MONEY IN
YOUR WALLET

• VER-EAZY

Home cooking made simple



MULTI-
PURPOSE

STOVETOP &
OVEN FRIENDLY

SPACE-
SAVING

\$15



gallagher
li
mccann
sonti



Nautilus Shell



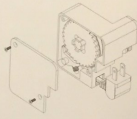
 **NautilusShell**
the spooling macbook charger

snaps right on to your
own macbook charger

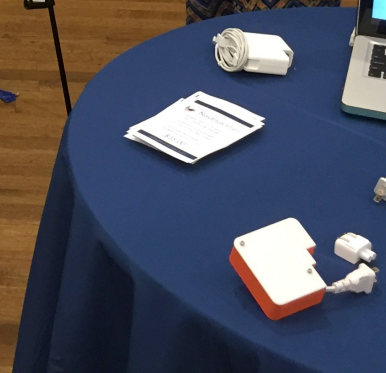
gives you extra length
to reach that last outlet

removes the hassle of
wrapping up your cord



\$35.00

gallagher.li.mccann.sonti



VOLTAMOUNT

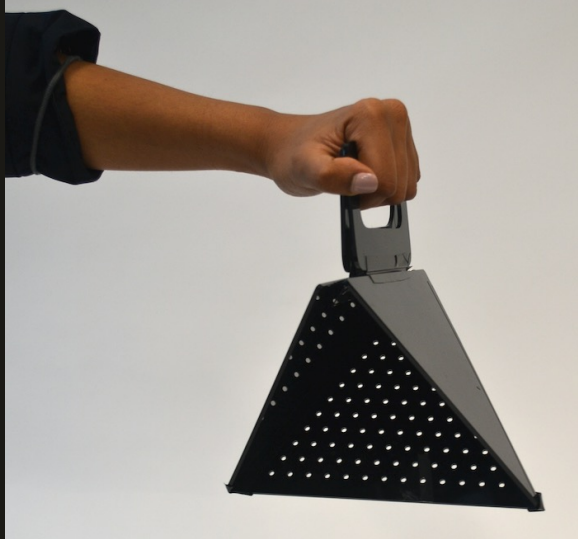
\$19.99

- Organize and charge your devices in one convenient location
- Mounted on wall to save space
- Neatly manage the cords
- Designed to fit smartphones and tablets

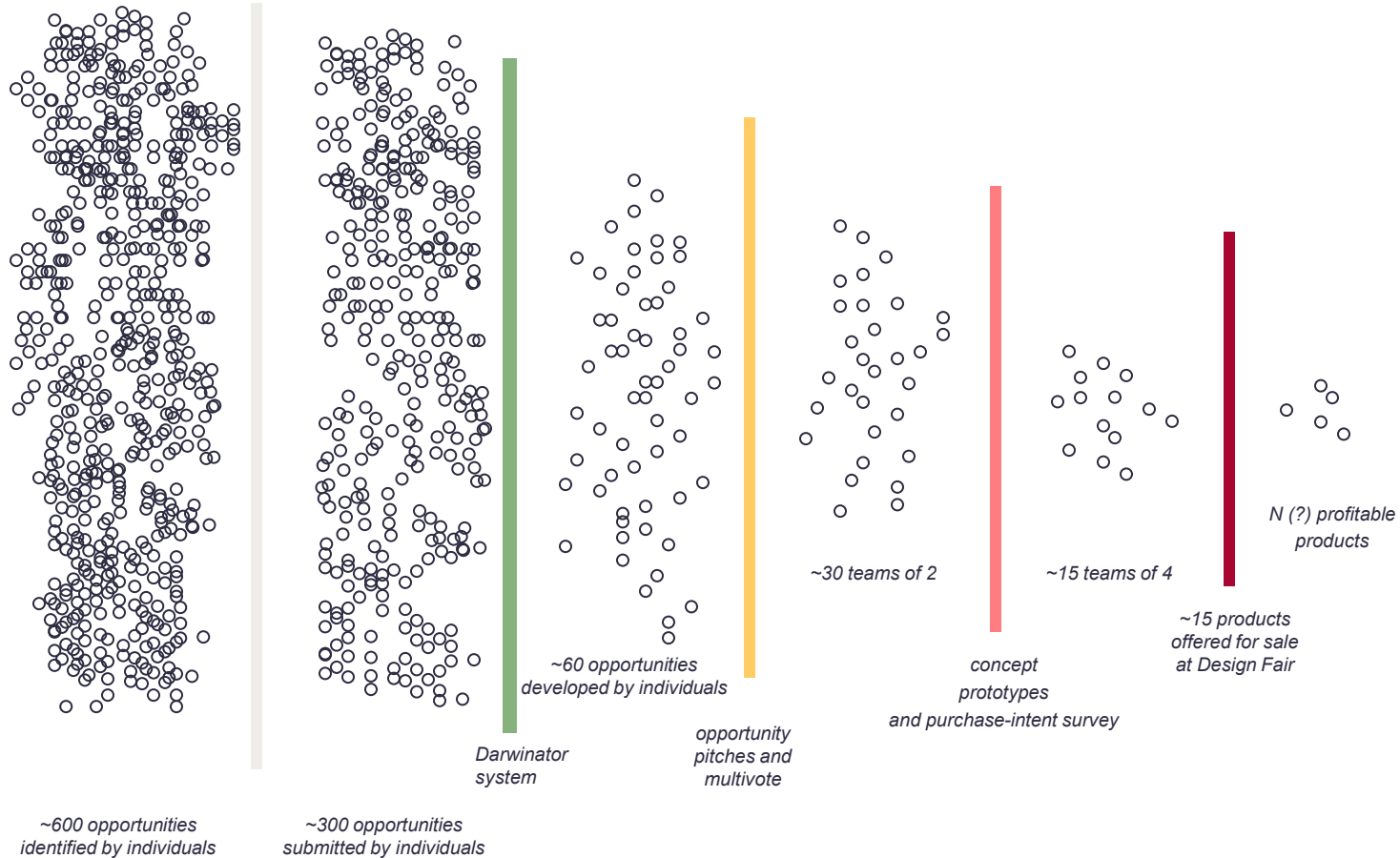




Pingle Li
Sherry Chen
Sahil Mehra
Laura Colagrande



Innovation Tournament (for each studio of 50-60 designers)



What not how!

Look for the pain.

