From Puttering to Prototype:

Using Design Thinking to Build Skills in STEM Studios and Makerspaces

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Slides at http://bit.ly/fontblog

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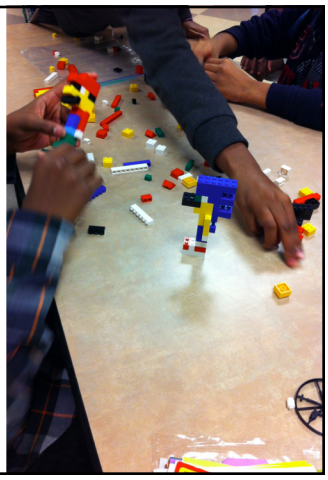
Thanks to the Institute of Museum and Library Services for supporting the Making in Michigan Libraries project (RE-05-15-0021-15), where some of these ideas were developed. Photos courtesy of Michigan Makers unless otherwise noted.

Today, you will:

- Become familiar with design thinking's overarching design and objectives
- Discover some design thinking activities you can use in your library
- Identify useful resources



Flashlight info, Science & Engineering Principles, Design Thinking Game, etc.

http://makinglibraries.si.umich.edu/handbook/

Some Big Things I've Learned Along the Makerspace Journey

MAKERSPACES=

Tools + Support + Community

(Grover

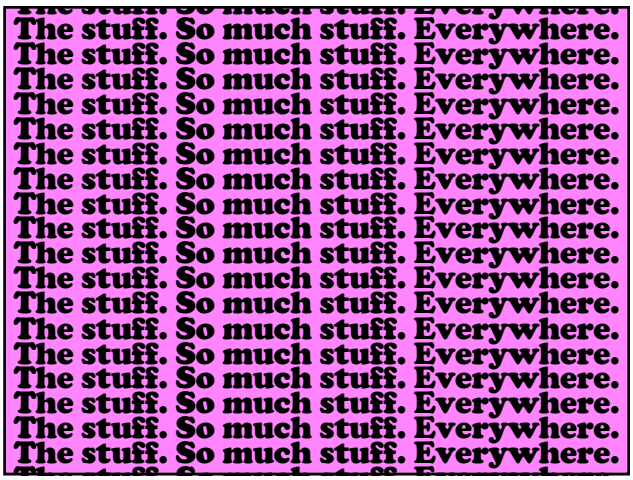
Clearly-articulated, shared

purpose

7 S's

students
stamina
support
sherpas
space
stuff
storage

(Schmidt & Range 2014)

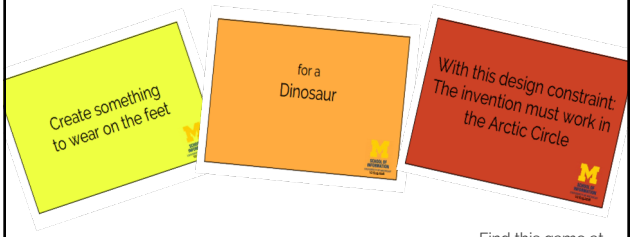


a flexible structure
can help maximize learning.

Let's try this game. Choose one yellow and one orange card per team. Brainstorm what you might invent and why.

Find this game at
http://makinglibraries.si.umich.edu/handbook
(scroll down to "design game")

Let's take it up a notch: add a red card.



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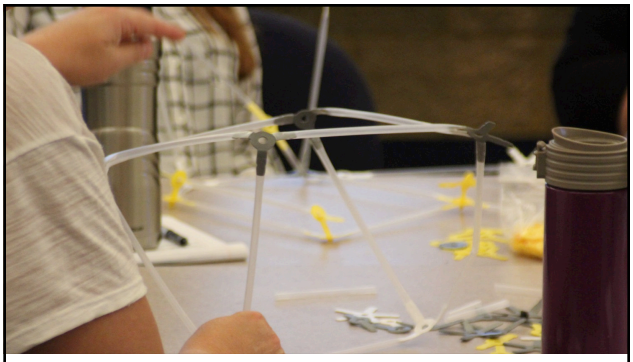
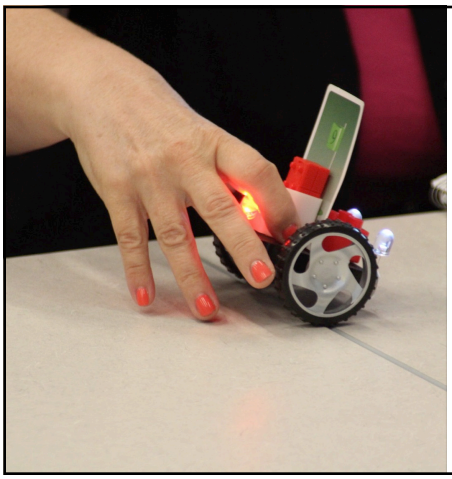
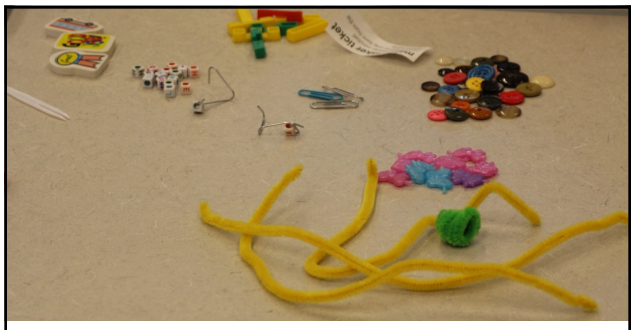


You just practiced part of the design thinking cycle.

But did anybody ask the persona?



Looking beyond one's own knowledge is a key element of design thinking.



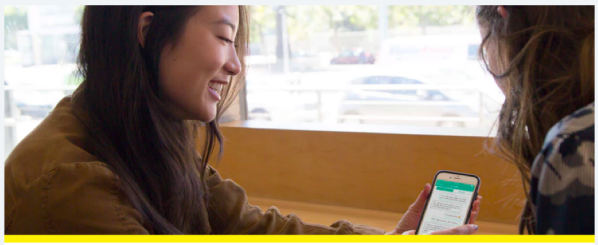
"Do people really want this widget? Am I solving a problem, or just adding to the noise?"

Amy Lamp. "The value of balancing desirability, feasibility, and viability" https://crowdfavorite.com/the-value-of-balancing-desirability-feasibility-and-

If we want future generations to solve real problems, they need real tools. Thinking tools.

IDEO: multidisciplinary teams exploring "how might we …"

http://bit.ly/ideo-2020



CASE STUDY UCSF

Improving Quality of Life for Young Adults with Schizophrenia

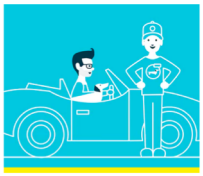
IDEO

CASE STUDY PILLPACK

Launching an Online Pharmacy Startup

CASE STUDY IKEA

Designing the Future Kitchen

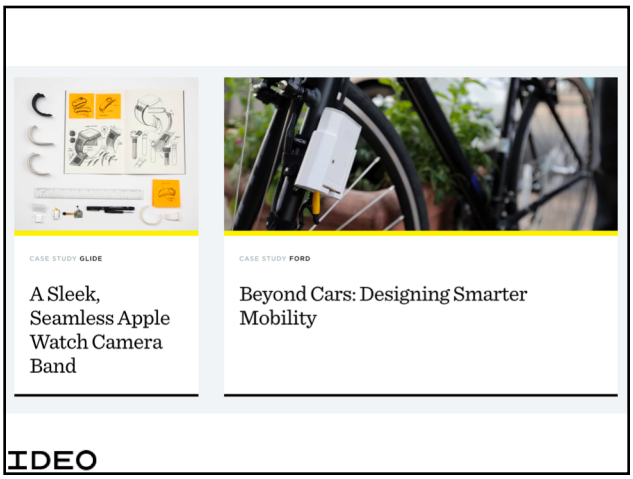


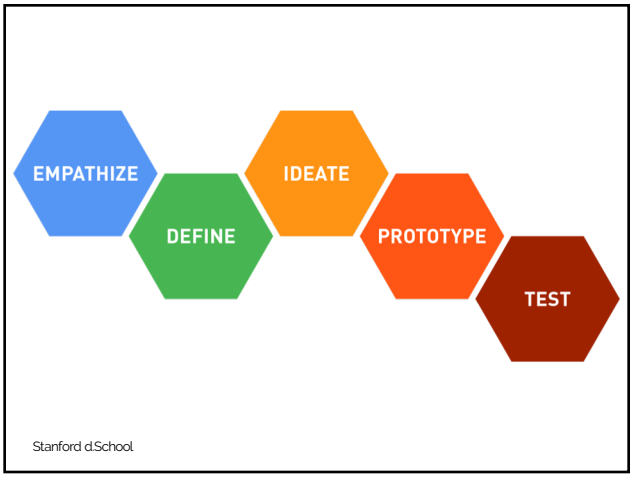
CASE STUDY BOSCH

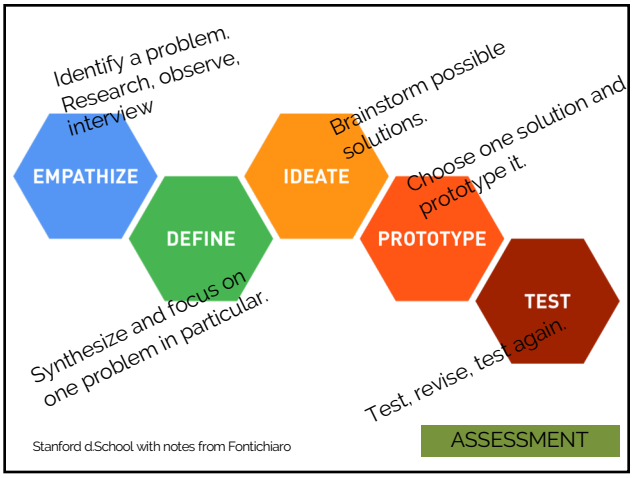
The Future of Car Servicing

IDEO


CASE STUDY CENTER FOR NYC NEIGHBORHOODS
Preparing New Yorkers for Future Flooding
IDEO


CASE STUDY GLIDE
A Sleek, Seamless Apple Watch Camera Band
CASE STUDY FORD
Beyond Cars: Designing Smarter Mobility
IDEO


EMPATHIZE
DEFINE
IDEATE
PROTOTYPE
TEST
Stanford d.School


Identify a problem. Research, observe, interview
EMPATHIZE
DEFINE
IDEATE
PROTOTYPE
TEST
Brainstorm possible solutions.
Choose one solution and prototype it.
Synthesize and focus on one problem in particular.
Test, revise, test again.
Stanford d.School with notes from Fontichiaro
ASSESSMENT


This design thinking exercise was developed by Kamya Sarma as part of the Making in Michigan Libraries project
1. Identify a problem.
How might we improve the experience of driving a car?


2. Research, observe, interview.
Public domain. https://pixabay.com/en/laptop-apple-macbook-computer-2560


2. Research, observe, interview.
Public domain. https://pixabay.com/en/travel-tour-car-steering-wheel-2724331/


2. Research, observe, interview.
Mercedes-Benz
Public domain. https://pixabay.com/en/travel-tour-car-steering-wheel-2724331/

3. Synthesize & focus on one problem in particular.

Seek many ideas.

IDEO mantras:
- Defer judgment
- Build on the thinking of others.

3. Synthesize & focus on one problem in particular.

"women choose cars based on the cup holder."

"I can't see the dials when I have my distance glasses on."

"I have no idea how to turn on the back wipers."

"I love the energy efficiency display!"

"When cars come in for servicing, 99% of the time, the radio is on when we turn on the car."

Woman didn't know how to turn on overhead light.

Seat too deep for petite woman, not deep enough for overweight man

4. Brainstorm possible solutions.

Windshield wiper contr

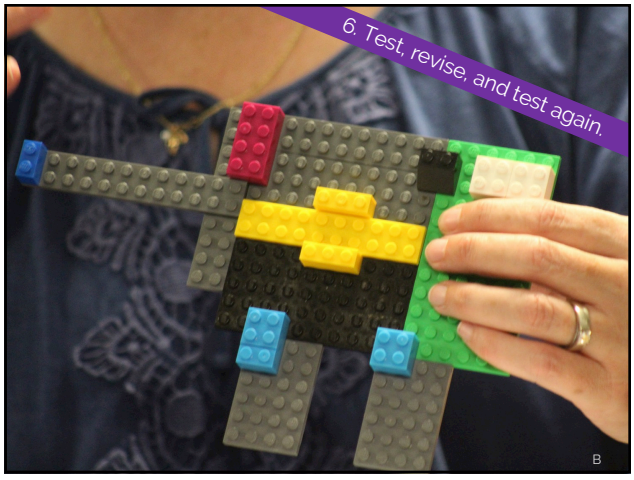
- Voice activated
- Touch screen instead of buttons on a rod?
- Add a rod instead of doubling up with cruise control rod?
- Moisture sensors to turn on wipers automatically?
- Default to on when start car; driver must manually turn them off while still safely in parking lot/garage/driveway?

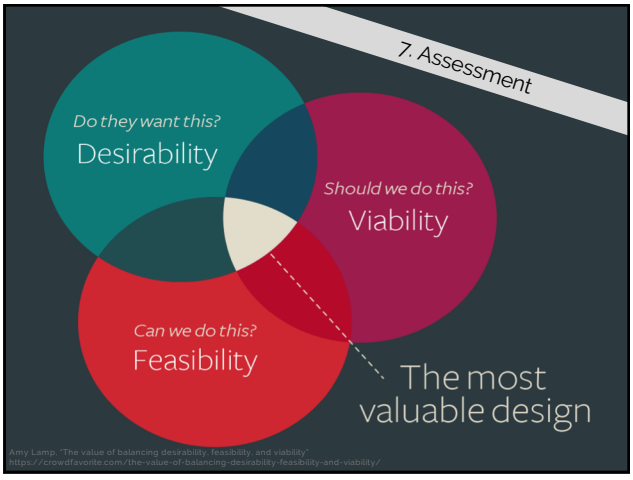
5. Choose one solution and prototype it.

Pro Tip:

5. Choose one solution and prototype it.

- Prototyping = quick physical representation of an idea
- Use materials that can be easily changed or reconfigured (e.g., LEGO, Strawbees, play dough, cardboard, LittleBits, recycled materials)
- Beware of preciousness





7. Assessment

Desirability

- Will this solution fill a need?
- Will it fit into people's lives
- Will it appeal to them?
- Will they actually want it?

Amy Lamp, "The value of balancing desirability, feasibility, and viability" https://crowdfavorite.com/the-value-of-balancing-desirability-feasibility-and-

7. Assessment

Feasibility

- Is the technology needed to power the design available or within reach?
- How long will this take?
- Can the organization actually make it happen?

Amy Lamp, "The value of balancing desirability, feasibility, and viability" https://crowdfavorite.com/the-value-of-balancing-desirability-feasibility-ar

7. Assessment

Viability

- Will the design solution align with the business [school, family, organization, library] goals?
- Does this solution honor the organization's budget?
- What will the return on the investment look like?

Amy Lamp, "The value of balancing desirability, feasibility, and viability" https://crowdfavorite.com/the-value-of-balancing-desirability-feasibility-and-viability/

7. Assessment

ASSESSMENT STRATEGIES

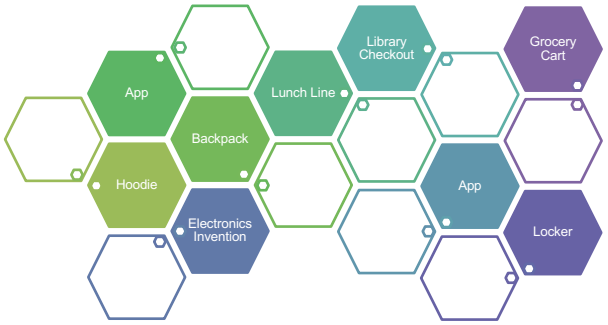
- Commercials
- Pitches
- Process Journals
- Written memo to manufacturer/funder
- Promotional video/poster/podcast

There's a chapter on this in the book!

Sample DT questions

- How might we design a better community playground?
- How might we design a maker corner that works better in our library/classroom?
- How might we improve how we move from place to place in the school? The after-school pick-up line?
- How might we improve our pets' care when we are at school?
- How might we improve how people carry water during the day?
- How might we improve storage at school for kids?
- How might we help people with Parkinson's eat more independently?
- How might we make the library friendlier for people in wheelchairs?
- How might we get kids to eat healthier or get more exercise?

Design a Better …



CherryLakePublishing.com

What other DT questions might you pose in your setting

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Final thoughts:

1. Design thinking can help level the playing field by getting some kids out of putter mode.
2. Having a flexible process lowers teacher anxiety while maximizing student creativity.
3. Assessing writing/promotion of the product (and not the product itself) can maximize students' tolerance for risky creations.