HARRISBURG UNIVERSITY
OF SCIENCE AND TECHNOLOGY

Boxes, Bumps & Breakfasts

Object lessons for teaching human-centered research and analysis

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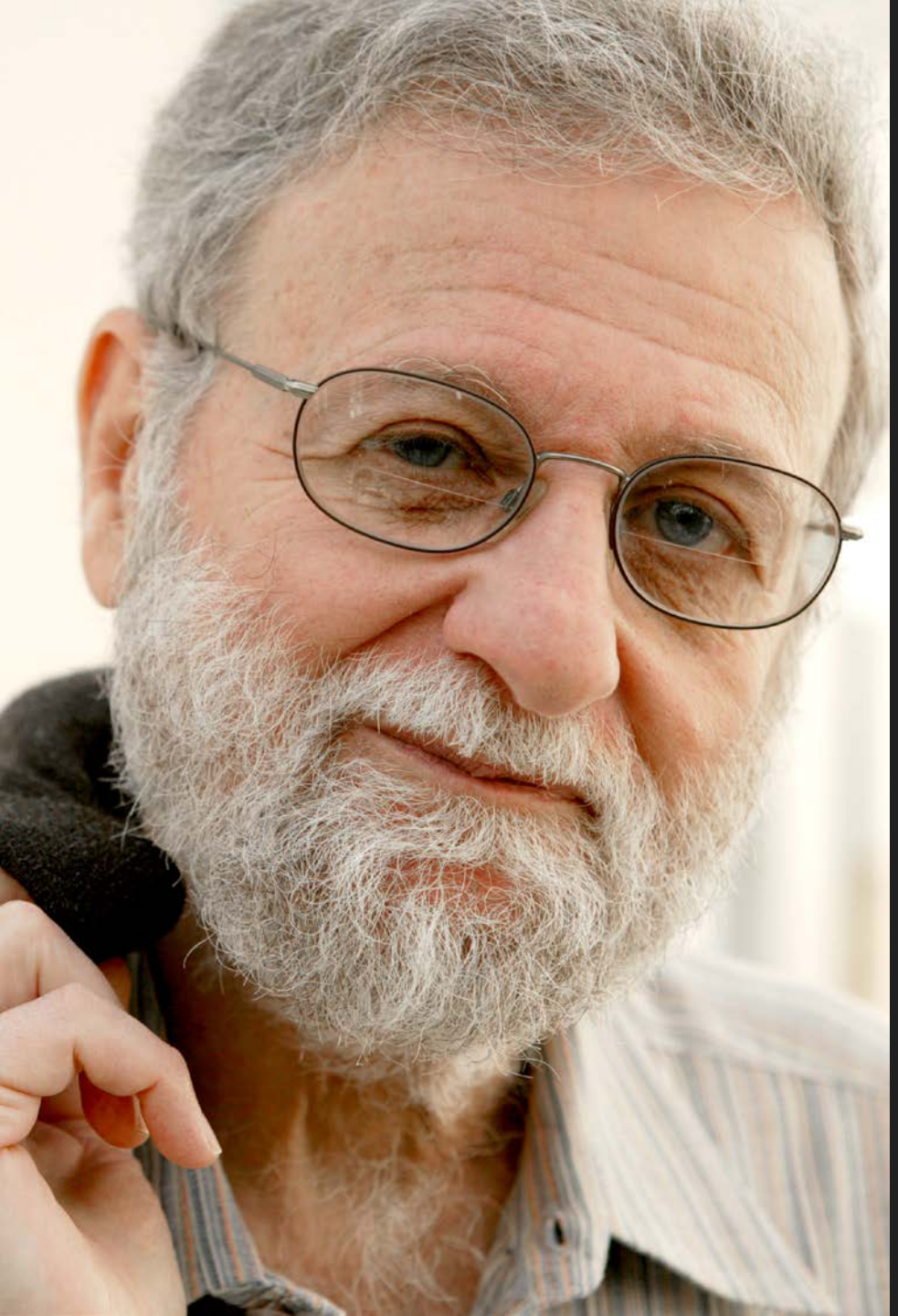
Overview of Harrisburg University

- Private not-for-profit institution
- Founded in 2001; Chartered in 2005
- Student population: 4,900
- 100% of accepted undergraduate students receive scholarships
- Undergraduates are 47% female & 65% minority
- Student/Faculty ratio: 13 to 1
- 92% of graduating students are in family-sustaining careers in their fields of study within 6 months of graduation.

Bachelor of Science (B.S.) degrees awarded in Analytics, Biotechnology and Biosciences, Computer and Information Sciences, Management and eBusiness, Geospatial Technology, Interactive Media, and Integrative Sciences

Master of Science (M.S.) degrees awarded in Analytics, Information Systems Engineering and Management, Project Management, and Learning Technologies



Don Norman on Design

"Design is concerned with how things work, how they are controlled, and the nature of the interaction between people and technology."

Evidence-based design ('EBD')

"a process for the conscientious, explicit, and judicious use of current best evidence from research and practice in making critical decisions, together with an informed client, about the design of each individual and unique project"

Hamilton, D. K. & Watkins, D.H. (2009). Evidence-based design for multiple building types. Hoboken, NJ: John Wiley & Sons, Inc

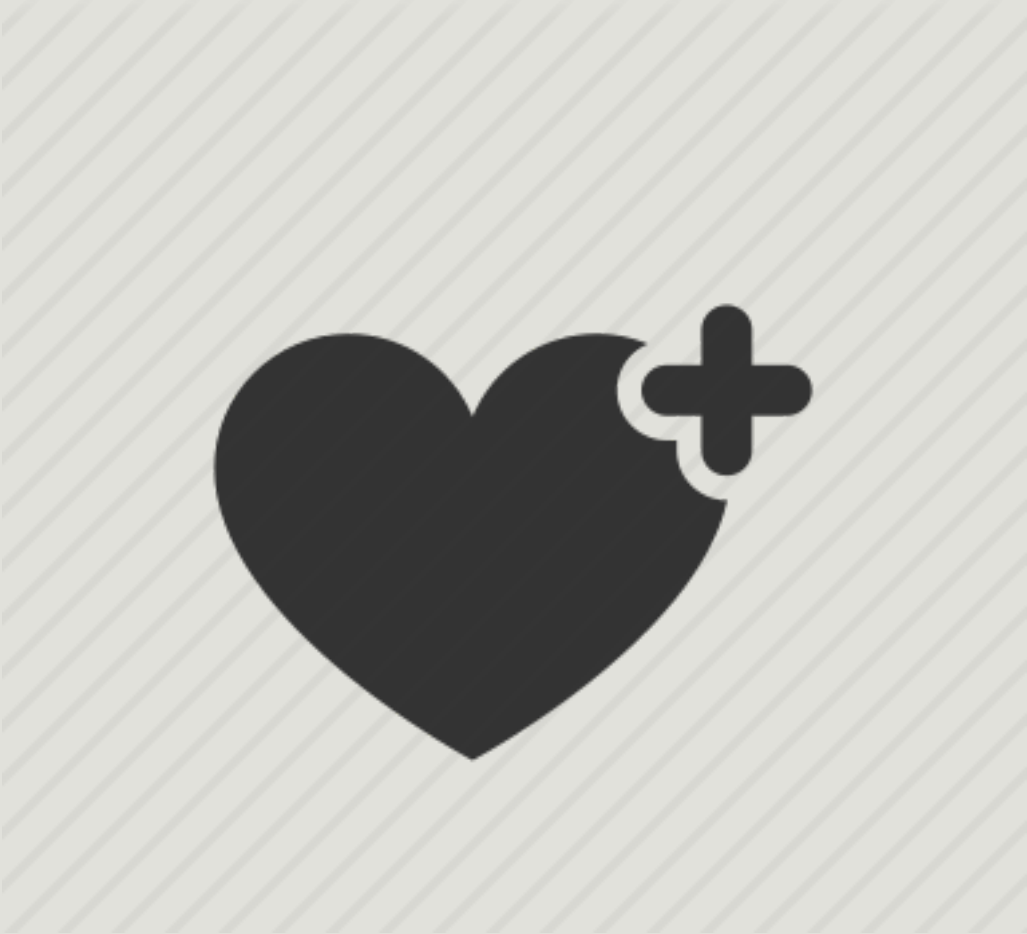
EBD Process Tasks & Activities

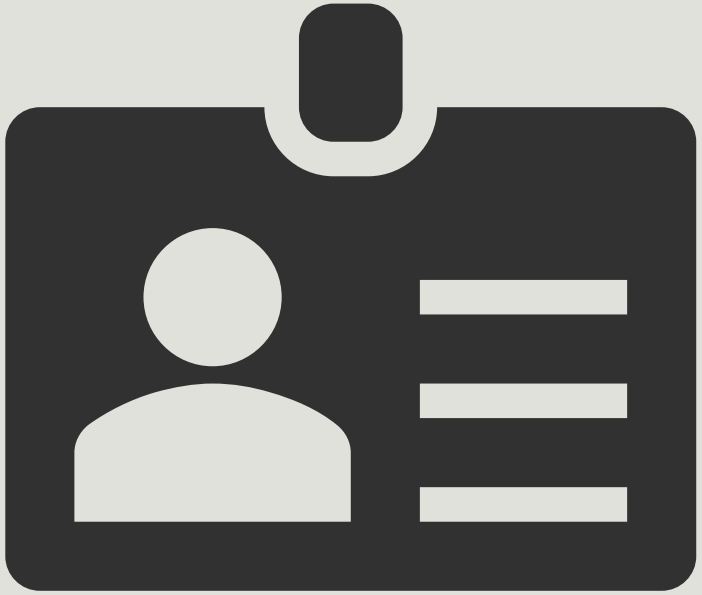
Table 1: Evidence-Based Design Process.

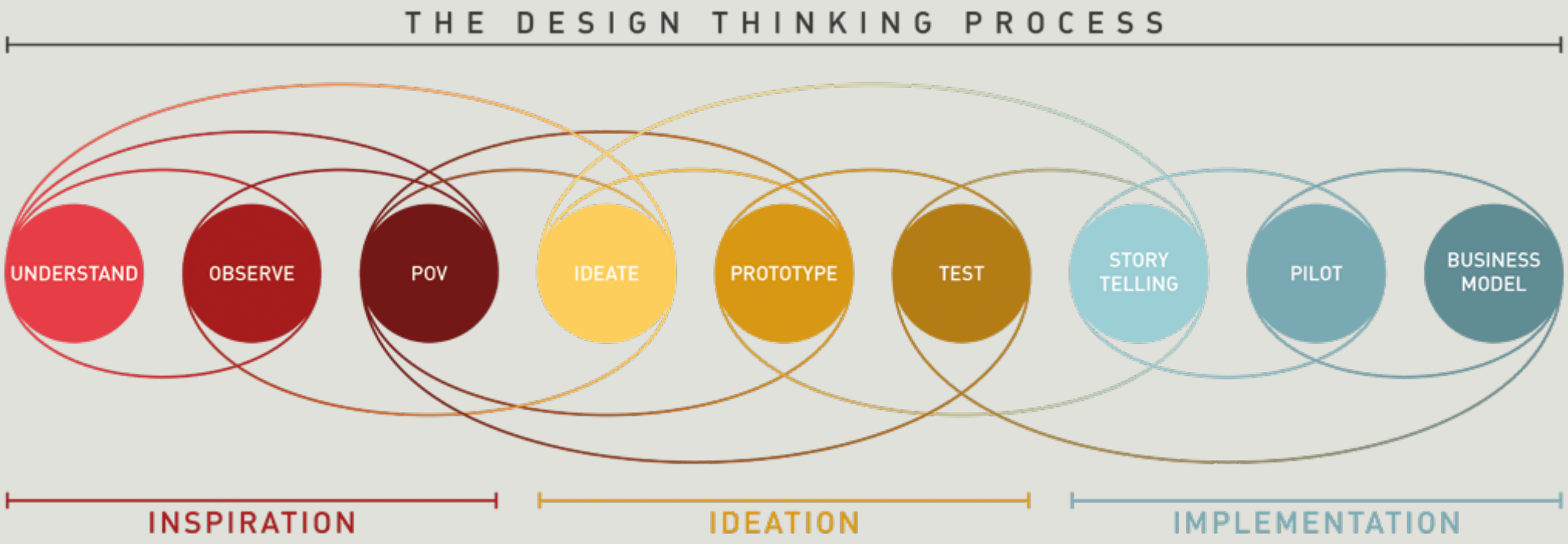
	Task	Activity
1	Identify the Client's Goals	Note most important and facility-related global and project-based goals
2	Identify the Firm's Goals	Understand the firm's strategic, project and evidence-based design objectives
3	Identify the Top 3-5 Key Design Issues	Narrow the possible choices; work on high impact decisions
4	Convert Design Issues to Research Questions	Reframe statement of design issues to become research topics
5	Gather Information (Benchmark Examples, Literature, Sources, Internal Studies)	Infinite possibilities must be narrowed; limited perspectives must be expanded
6	Critical Interpretation of the Evidence	No direct answers; requires open-minded creativity, balance, and critical thinking
7	Create Evidence-Based Design Concepts	Based on creative interpretation of the implications of research findings
8	Develop Hypothesis	Predict the expected results of the implementation of your design
9	Select Measures	Determine whether your hypothesis is supported

Source: From Evidence-Based Design for Multiple Building Types (p. 210), by D.K. Hamilton and D.H. Watkins, 2009, New Jersey: John Wiley & Sons, Inc.

From Hobbyists…to Professionals







Difference between the?

RATIONALE CHOICES GROUNDED IN EVIDENCE,
SITUATED IN BEST PRACTICES OF METHOD AND PROCESS

The pedagogical challenge?

Students *make* things,
but they don't *think*
about the practice of *making*

They lack the research skills
and analytical mindset

Exercise

The Playful Box

A group-based experiment

Part 1:
Build your box

You will receive 1 cardboard box, & access to craft supplies during today's class.

Your client has asked you to redesign this box to make it more **interactive**.

Specifically, your box should invite a stranger walking past it to do all three of the following:

- ***Grab*** the box
- ***Turn*** the box
- ***Rub*** the box

Easy right? But wait…

Your client is worried about international folks.

Therefore you'll have to get people to do these actions without explicitly instructing them to do so.

That means:

- NO words, arrows, or text indicating what to do with the box
- NO supplementary instruction sheets
- NO helpful people standing by box providing encouragement or instruction

Part 2:
Conduct an Experiment

Your team will conduct an experiment to test if your box functions as intended.

- Select a location on or near campus to place the box
- Leave it there for 15-20 minutes,
- Observe what happens when people walk past it.

***You cannot talk to people who interact with it, or otherwise direct people to notice it.*

Data Collection

You will need 2 members of your team to be **observers** during the experiment**.** The job of the observers is to stay within visual range of the box and take notes about what happens. The observers should be far enough away that a passerby would not notice their presence.

The **observers** should record with **pencil and paper**:

- At what time does each person in the area pass the box?
- A brief description of the person
- Does the person notice the box?
- Does the person interact with the box?
- If so, how? If not, are there clues that suggest why not?

Data collection instrument

Something that can help make data collection easier is a structured note taking sheet.

Here is an example

Date/Time	Description of passerby	Notice box?	Interacted with box?	Interaction description	Anything else of note
8/15 3:33pm	female, early 20s, carrying a coffee in one hand and a large bag in the other. Hurried pace.	N	N	Did not interact	
8/15 3:34pm	Male child and mother. Child appears to be 5 years old. Mother looks to be 25-30. They are standing in the lobby waiting for someone.	Y (child)	Y	Child sees box, points, and exclaims "what's that? Mommy, look!" He runs over to the box and picks it up. He shakes the box while jumping up and down.	Mother scolds child for picking up the box.

Students are welcome to recreate this sheet, or make something that works better for their process.

- Team Member names & distribution of effort
- Box design photo and rationale
- Methods
- Results
- Discussion
- Limitations
- Implications for design
- Impact on plans for solo project

DELIVERABLE: Lab report

Part 3:

Present Lab Report

Report should contain:

- Team Member names & distribution of effort
- Box design photo and rationale
- Methods
- Results
- Discussion
- Limitations
- Implications for design
- Impact on plans for solo project

Group One Box

Group Two Box

Playful Boxes:

An object lesson in planning and research

Think before making!

- Understand the problem
- Research the users and the context of use
- Plan the process of making, including conscious choices of supplies
- Sketch out ideas and come to a group consensus
- Test sketches out on real people first

= Deconstruct, research, plan, ideate, test

A good problem statement is…

- user-centered
- broad enough for creative freedom
- narrow enough to be manageable

While we call them *statements*, they are actually best worded as *questions*

Uses clear objective **FACTS**	Instead of subjective **OPINIONS**
When? Where? *Who? How?* *Why does it matter?*	*Broken; noisy; ugly;* *bad quality; defective*

“Often the problem is that we don’t understand the problem”

Wrong mousetrap problem:

“How can we design a better, faster, louder mousetrap?”

Right mousetrap problem:

“How do we design a mousetrap that holds the bait no matter the time of day, catches rodents effectively, and notifies users when it has something trapped?”

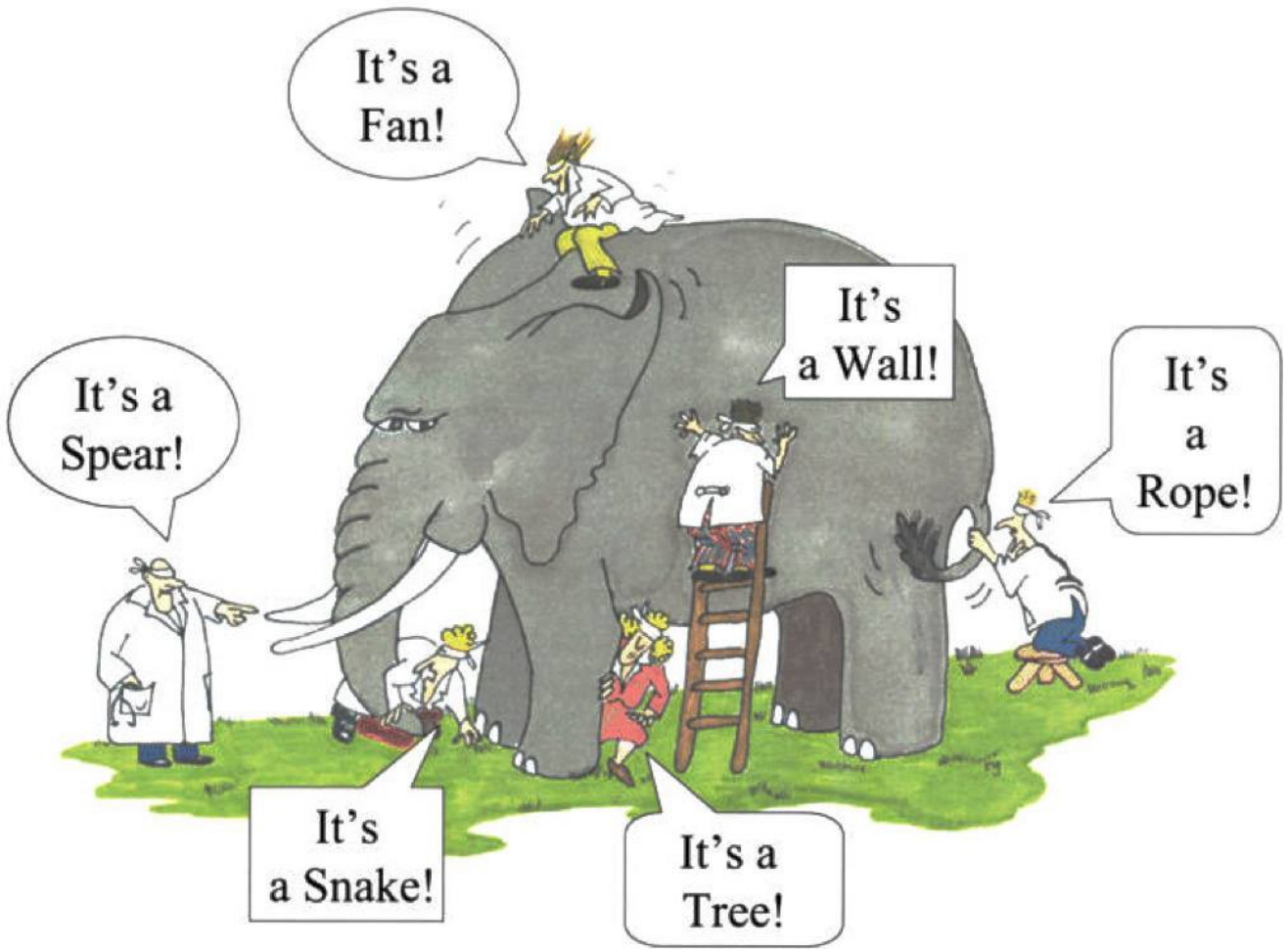
Three reasons to frame the problem before researching or designing

1

Avoiding designing the perfect yet wrong thing

Three reasons to frame the problem before researching or designing

2 Discovering problems can point to opportunities



Three reasons to frame the problem before researching or designing

3 Turn isolated assumptions into a common commitment.

“29 reasons Why…” Exercise:

What bothers people about speed bumps?

In groups of three people, brainstorm as many problems about speed bumps as you can think of.

You have two minutes.

Don’t worry about solutions or fixing the bumps – just identify/ clarify/ define problems.

Driving/Traffic:

1.Cause Traffic Jams/ backups
2.Slow-down traffic
3.Cause tailgate and other accidents
4.Cars drive in bike-lanes to avoid them
5.Not convenient for bicycles
6.Driving hazard in winter – can cause spin-outs

Driver:

7.Sometimes invisible/ confusing (weather conditions, reflections)
8.May surprise drivers
9.Annoying and frustrating
10.Bad for the human body – shocks joints/muscles; causes tensing up
11.Tall drivers may hit their heads
12.Blind on-coming traffic (at night)
13.Cause drink spills
14.Reward fast drivers (cars with excellent shock-absorbers are not affected much at high speeds)
15.Upsets dog passengers
16.Knocks phone out of cradle/holder/off seat

Cost

17.May be too expensive to build/maintain
18.Causes traffic delays when built/ maintained

Environment

19.More noise and pollution due to deceleration/ acceleration
20.Animals may not like the noise made by decelerating/accelerating cars
21.Low vision or disabled may trip over them walking through the lot or across the street

Car damage

22.Causes music to skip;
23.damage fragile items
24.Damage suspension/ bottom of car/ alignment
25.Wear brakes/ clutch

Emergency

26.Slow down ambulances/ fire trucks
27.May injure patients inside ambulances

Law enforcement

28.Slow them down in emergency situations
29.Less tickets given out (… a “good problem” for drivers)

How many of the “29 Reasons Why…” did your team get?

Bumpy Roads:

An object lesson in breaking down a big thing

Picking the right problem focus

- Understand the problem in all its parts
- Pick an area of focus
- Match ideas and project goals to problems
- Fix the *right* problem

= Identify, deconstruct, and select appropriate problems

Making Breakfast:
An exercise in the power of teamwork

PHASE 1

- Draw the process of making breakfast on post-its – one sticky per action item
- Arrange it on a whiteboard space

PHASE 2

- Rotate clockwise
- Review your colleague's work; draw then add a missing step or detail – move notes to accommodate added sticky
- Continue until full circle
- Regroup and discuss

Phase 1 Learning Outcome

- A method of deconstruction
- A type of process modelling
- A way to use scribble sketching
- A method to do rapid storyboarding
- A method to gather stories
- A process of representing and sharing stories
- A method of rapid task/action sequencing

Phase 2 Learning Outcome

- All methods and processes will be incomplete - something is always missing
- Two heads are better than one
- Assumptions about processes and actions will frequently differ - negotiation is critical
- Everyone may have different mental models about the same object, process or activity
- Everyone may have different ways of organizing and presenting material = okay/fine
- "Just In Time" Manufacturing ("J.I.T") or rapid work is okay in early stages of projects
- Iterate, Iterate, Iterate
- Accept errors and omissions, nothing will be perfect the first time and that's ok

Building Breakfast:

An object lesson in teamwork & mental models

Modelling action means modelling process

- Breaking down action sequences into their steps
- Understanding that beginning and end are arbitrary
- Different people have different mental models of action
- Reach a consensus before designing

= Draw, share, discuss, adjust, iterate

Three object lessons

Boxes — Think, Plan and Research before Making

Bumps — Break down a problem into small parts

Breakfast — Work in teams to better understand the scope