HOW TO APPROACH PROTOTYPING

CSE 599 Prototyping Interactive Systems | Lecture 10 | May 2

Jon E. Froehlich • Jasper O'Leary (TA)

DESIGN USE BUILD

MAKEABILITY LAB

PAUL G. ALLEN SCHOOL
OF COMPUTER SCIENCE & ENGINEERING

UNIVERSITY of WASHINGTON

LEARNING GOALS

PROTOTYPING PROCESS: HOW TO APPROACH PROTOTYPING

Ideation and getting the **design right** and the **right design**

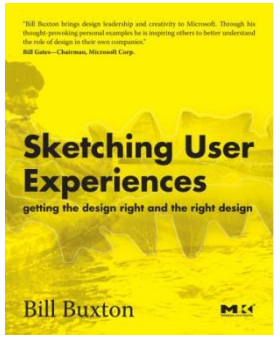
Ideation process as a **tree** and process of **elaboration+reduction**

When to **prototype: ABP**

How to **prototype**: **best practices**

“Getting the **design right** and the **right design**.”

Bill Buxton
Designer, Scientist, Author



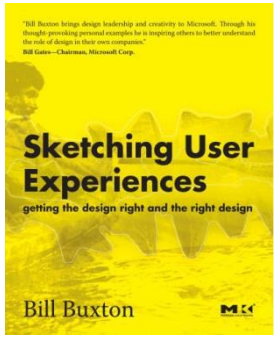
Source: Greenberg *et al.,* Sketching User Experiences: The Workbook, 2012

The best version of the best possible idea

The best possible idea

“Getting the **design right** and the **right design**.”

Bill Buxton
Designer, Scientist, Author



Source: Greenberg *et al.,* Sketching User Experiences: The Workbook, 2012

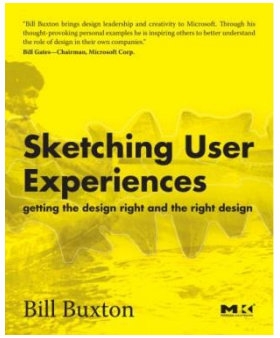
Well, ok… **but how** do you do that?

Step 1: Generate as many ideas as possible for a problem space

Getting the **design right** and the **right design**.

Step 2: For the top N ideas, evolve, improve, develop. Push those ideas to their potential.

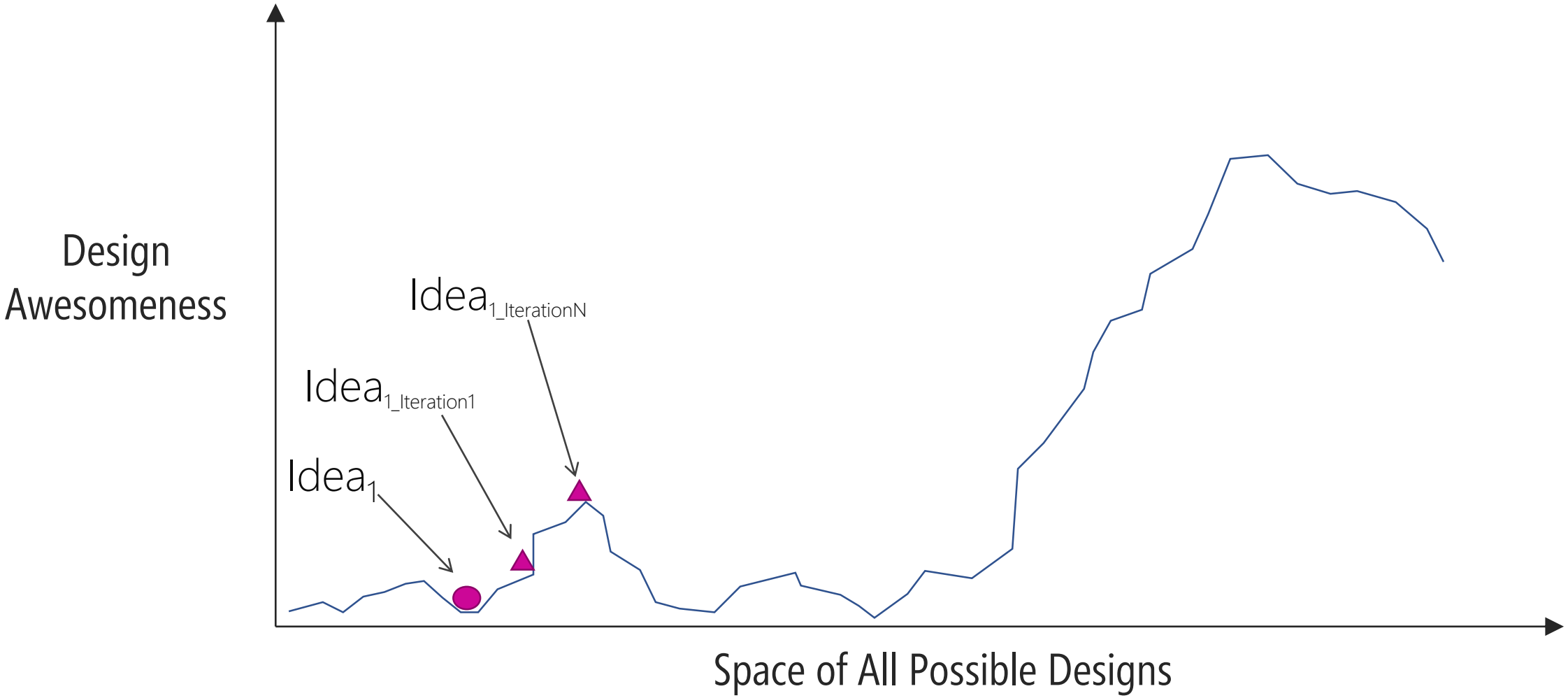
Bill Buxton
Designer, Scientist, Author



Source: Greenberg *et al.,* Sketching User Experiences: The Workbook, 2012

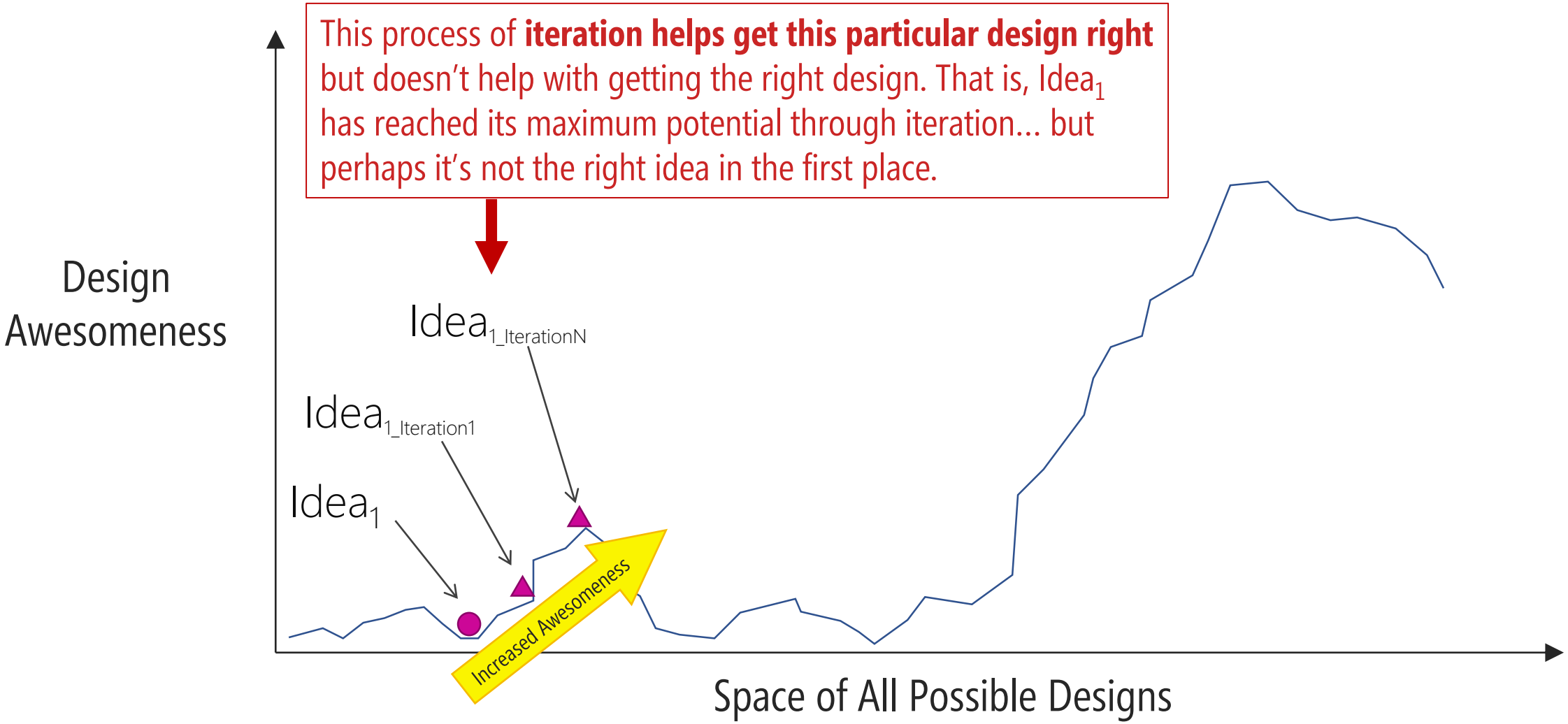
WHY PROTOTYPE?

GETTING THE DESIGN RIGHT & THE RIGHT DESIGN



Adapted from: Dix *et al.,* Human-Computer Interaction, 3rd edition, 2004, p 221.

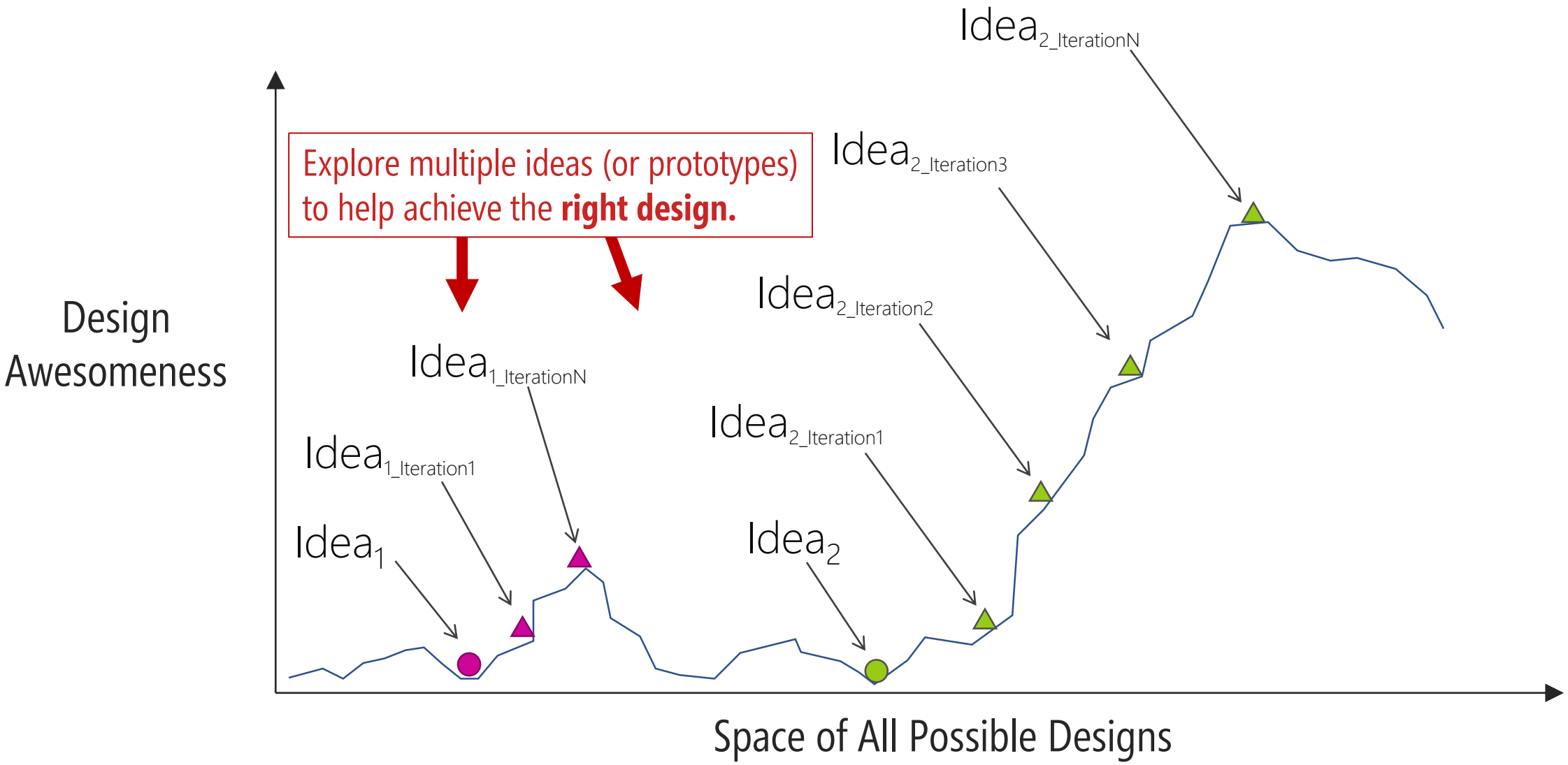
GETTING THE DESIGN RIGHT & THE RIGHT DESIGN



Adapted from: Dix *et al.,* Human-Computer Interaction, 3rd edition, 2004, p 221.

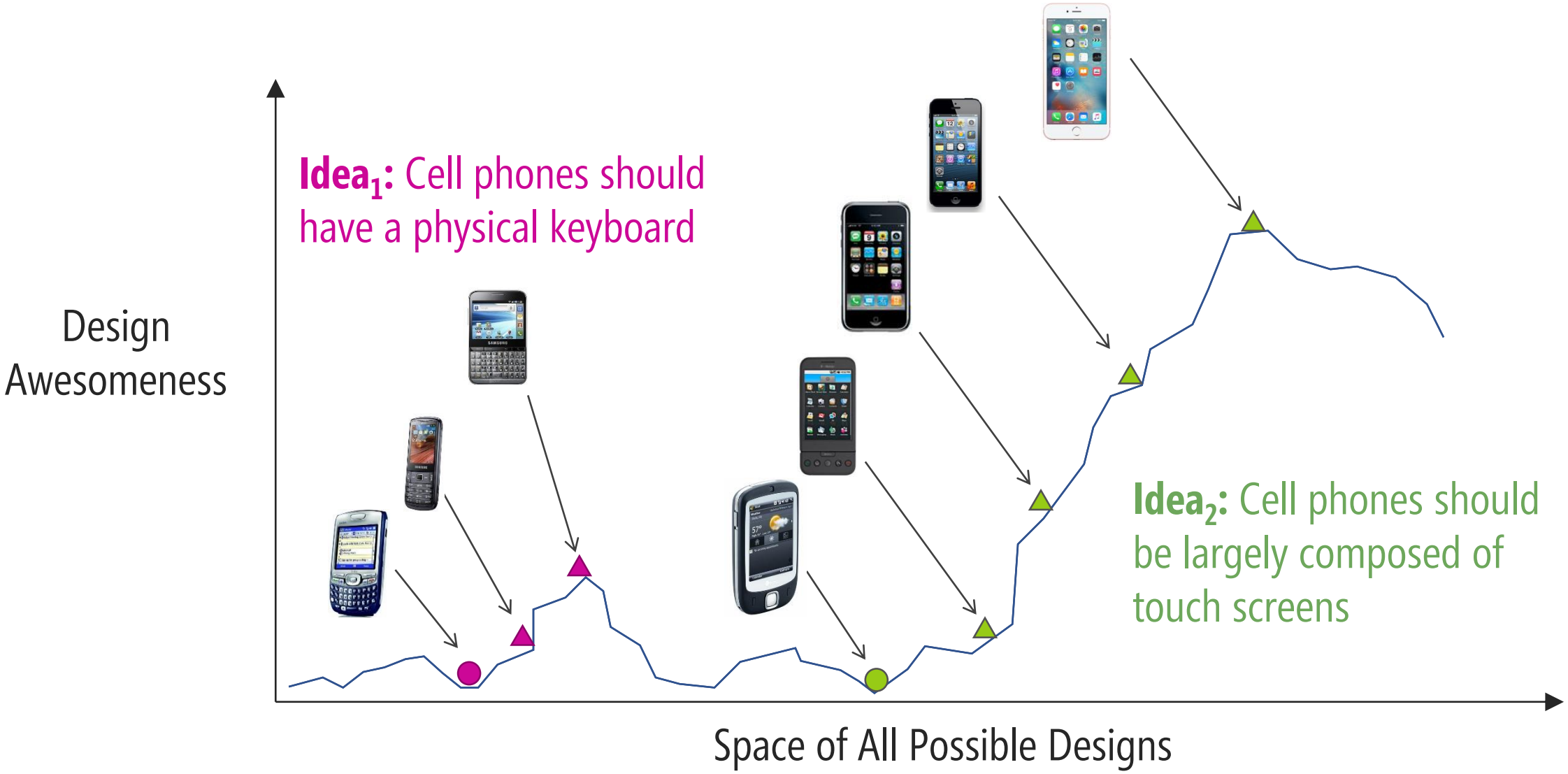
WHY PROTOTYPE?

GETTING THE DESIGN RIGHT & THE RIGHT DESIGN



Adapted from: Dix *et al.,* Human-Computer Interaction, 3rd edition, 2004, p 221.

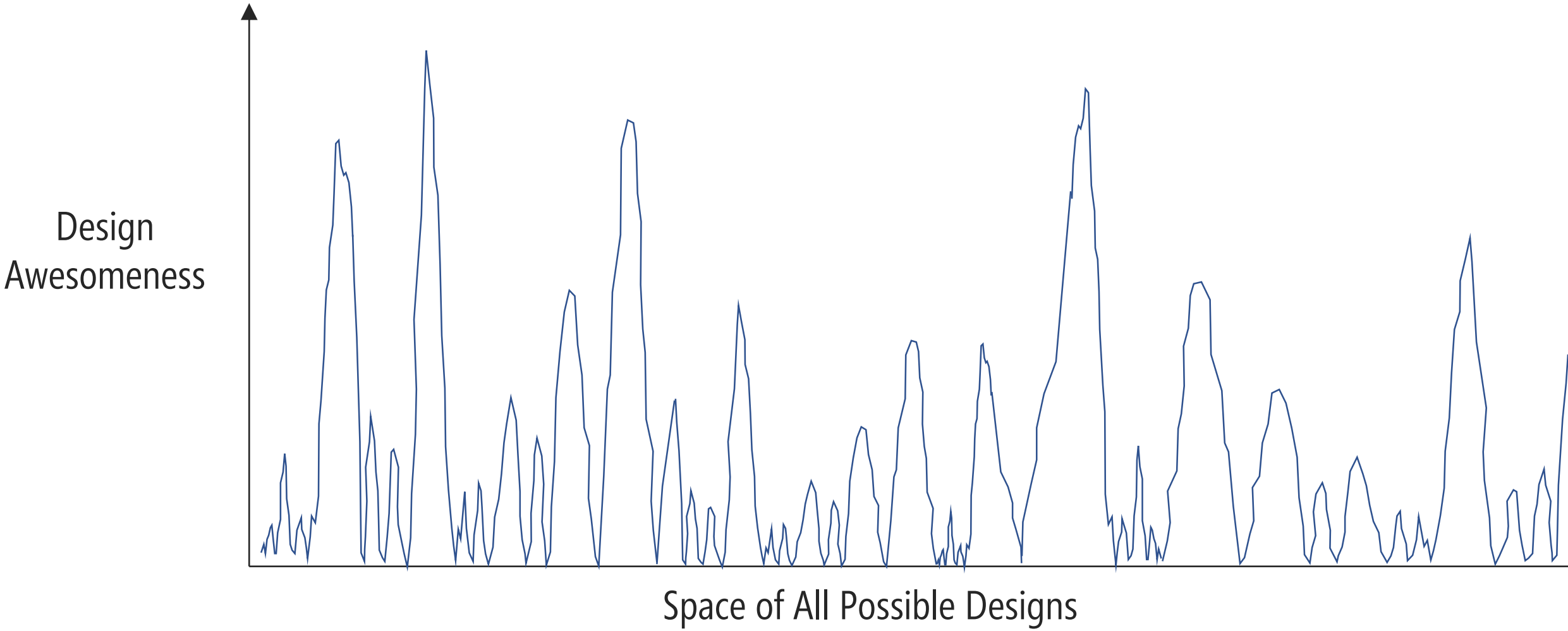
GETTING THE DESIGN RIGHT & THE RIGHT DESIGN



Adapted from: Dix *et al.,* Human-Computer Interaction, 3rd edition, 2004, p 221.

WHY PROTOTYPE?

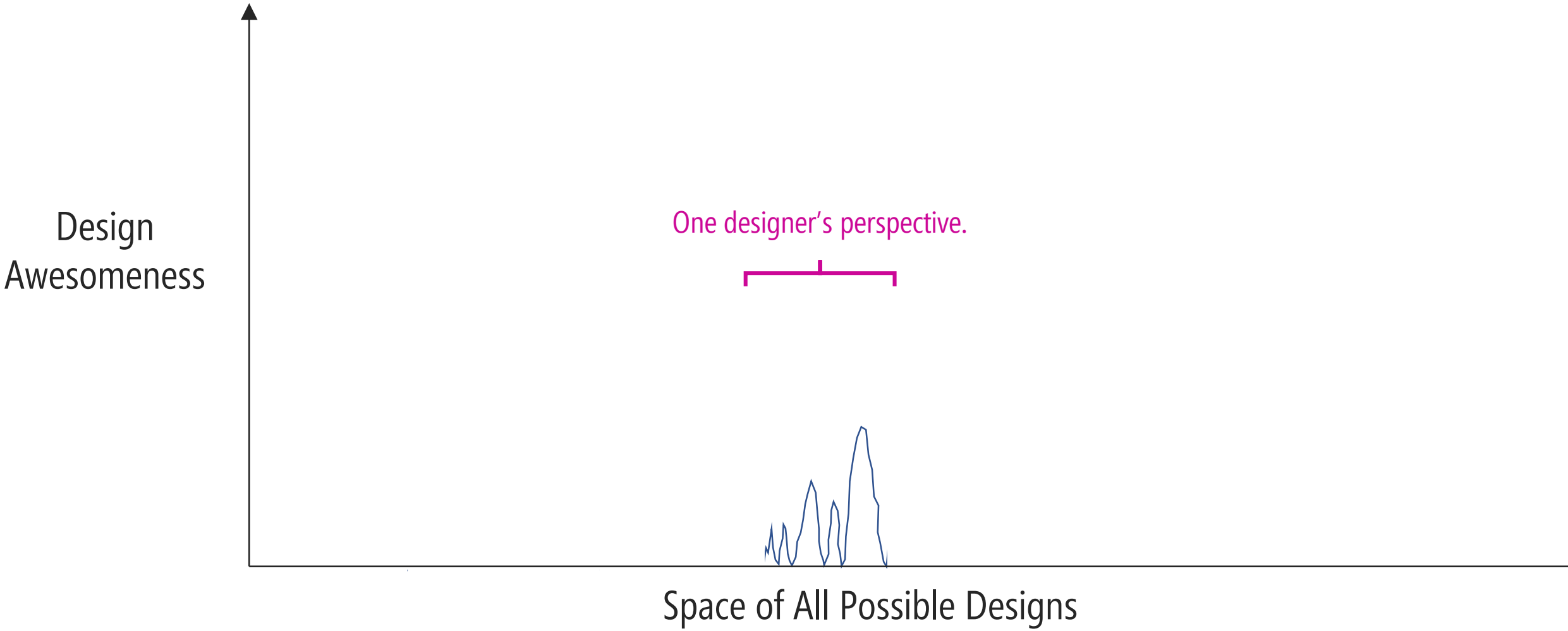
GETTING THE DESIGN RIGHT & THE RIGHT DESIGN



Adapted from: Dix *et al.,* Human-Computer Interaction, 3rd edition, 2004, p 221.

WHY PROTOTYPE?

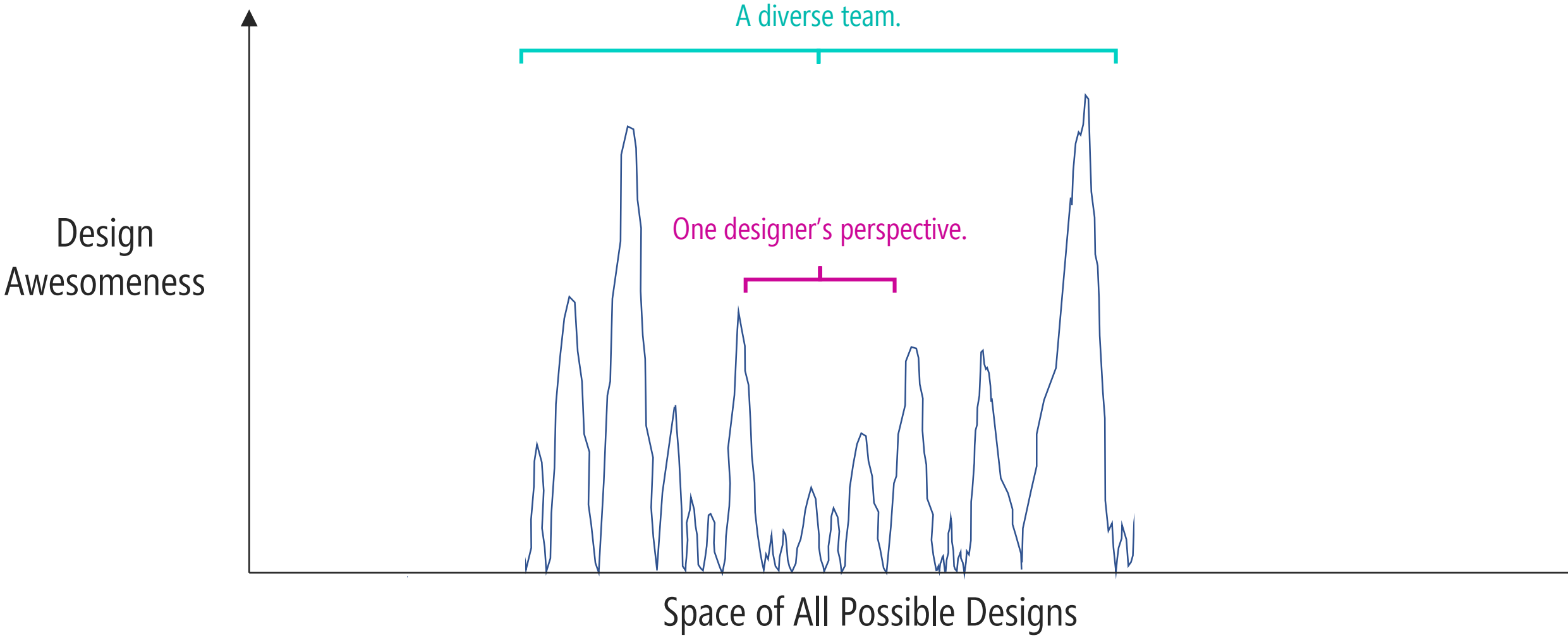
GETTING THE DESIGN RIGHT & THE RIGHT DESIGN



Adapted from: Dix *et al,* Human-Computer Interaction, 3rd edition, 2004, p 221; See also May-Li Khoe's talk: https://vimeo.com/151277883

WHY PROTOTYPE?

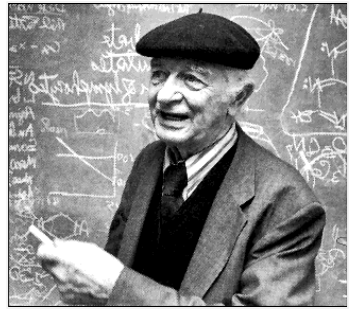
GETTING THE DESIGN RIGHT & THE RIGHT DESIGN



Adapted from: Dix *et al.,* Human-Computer Interaction, 3rd edition, 2004, p 221; See also May-Li Khoe's talk: https://vimeo.com/151277883

“The best way to have a good idea is to **have lots of ideas**”

Linus Pauling
Professor of Chemistry
Caltech, UC San Diego, Stanford
Only person awarded two unshared Nobel Prizes



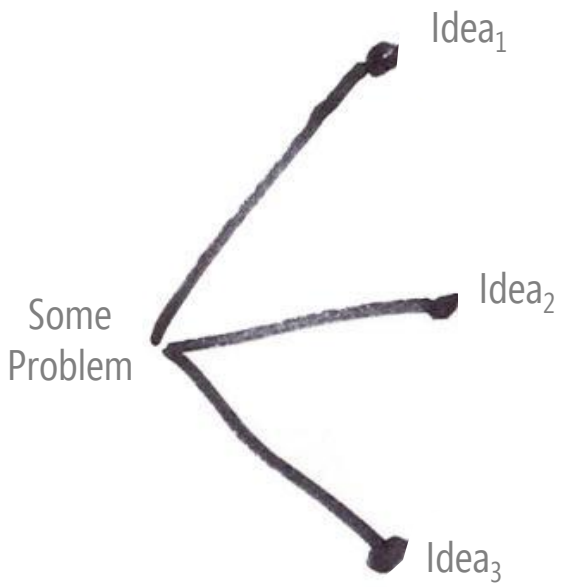
“…a designer that pitched only one idea would probably be fired. I'd say **5 is an entry point** for an early formal review (distilled from **100's**).”

Alistair Hamilton
VP Design, Symbol Corp.

Source: Tohidi *et al.,* Getting the Right Design and the Design Right, *CHI2006*

WHY PROTOTYPE?

IDEATION PROCESS AS A TREE

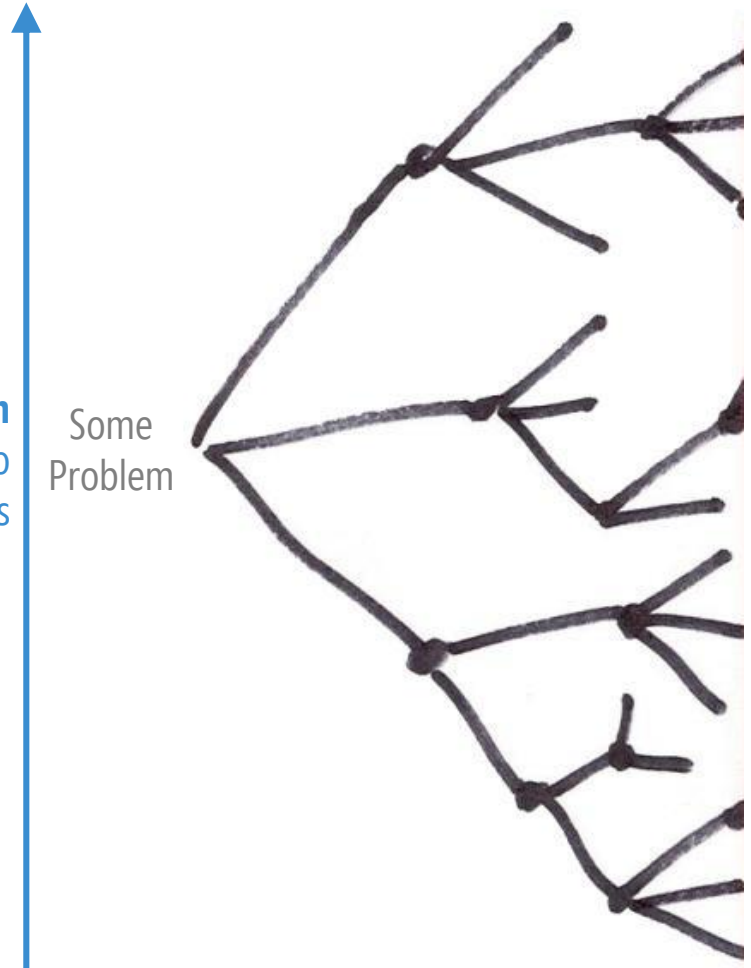


Source: Greenberg *et al.,* Sketching User Experiences: The Workbook, 2012

WHY PROTOTYPE?

IDEATION PROCESS AS A TREE

Getting the Right Design
Tree width corresponds to breadth of ideas



Ideas beget other ideas—this is the **generative aspect** of ideation & prototyping.

Getting the Design Right
Tree depth corresponds to iteration of ideas

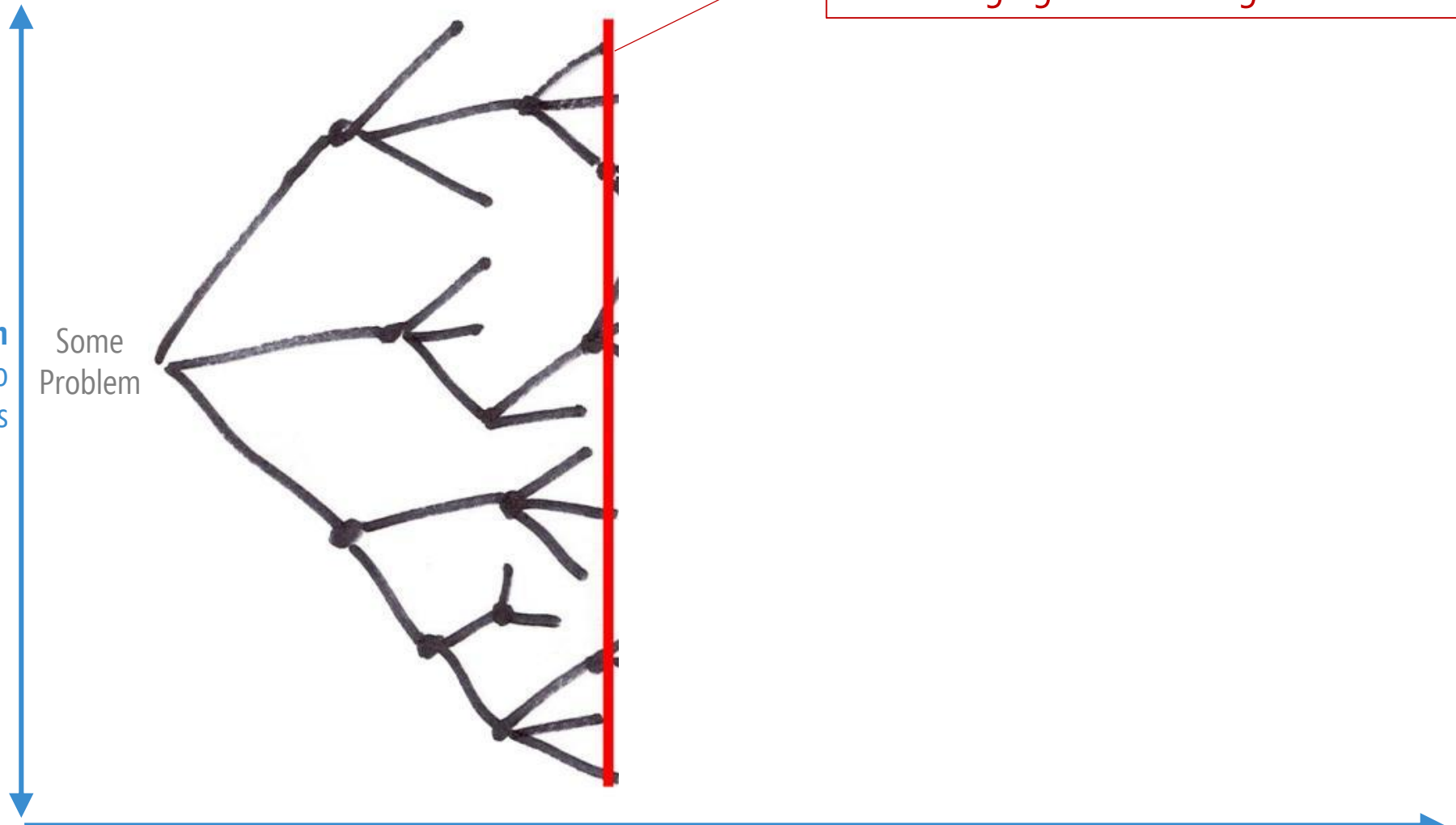
Source: Greenberg *et al.,* Sketching User Experiences: The Workbook, 2012

WHY PROTOTYPE?

IDEATION PROCESS AS A TREE

At some point—through user testing, design critiques, *etc.*—you switch from broadening ideas to converging and iterating on the best N ideas.

Getting the Right Design
Tree width corresponds to breadth of ideas

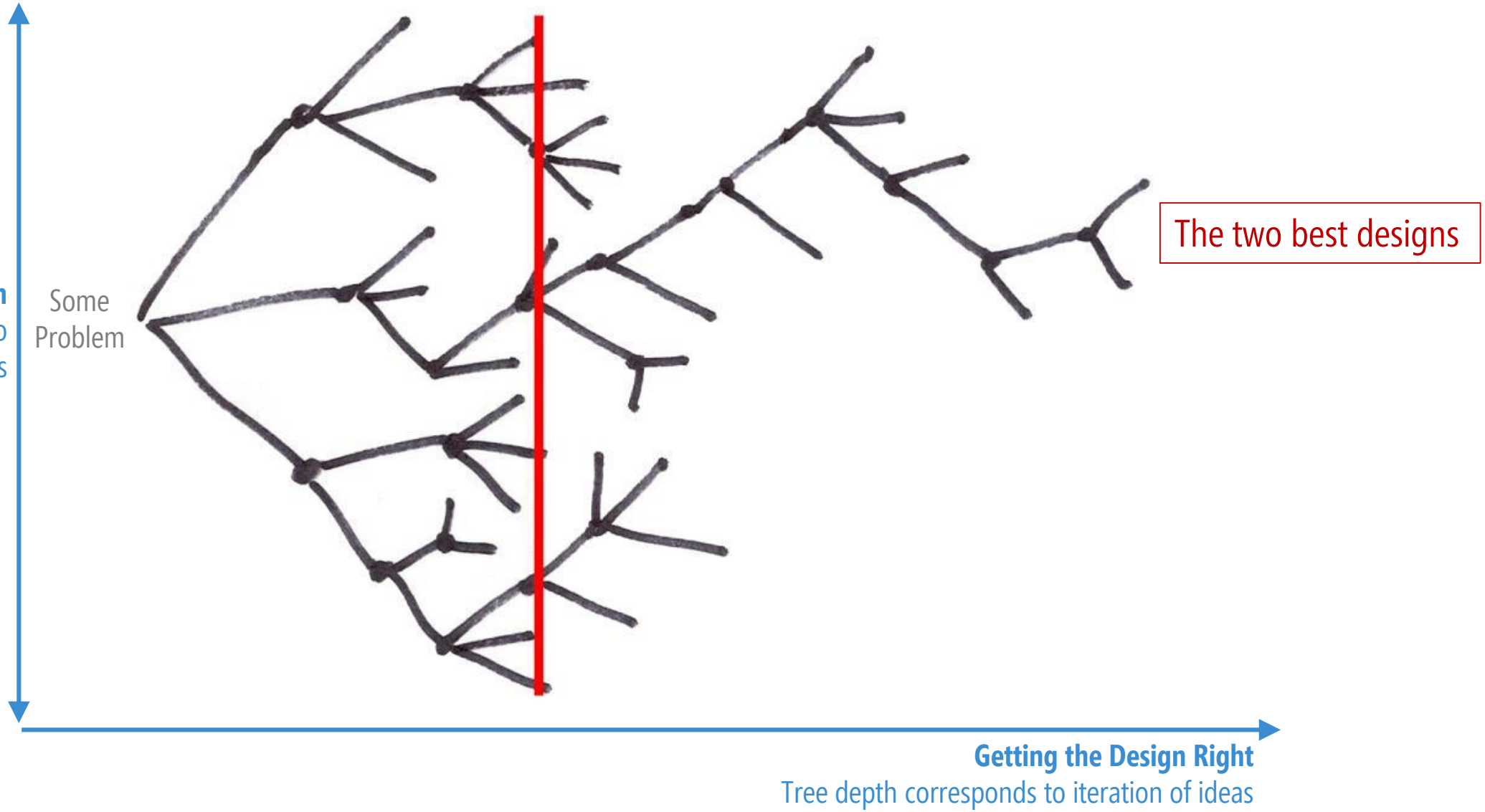


Getting the Design Right
Tree depth corresponds to iteration of ideas

Source: Greenberg *et al.,* Sketching User Experiences: The Workbook, 2012

WHY PROTOTYPE?

IDEATION PROCESS AS A TREE

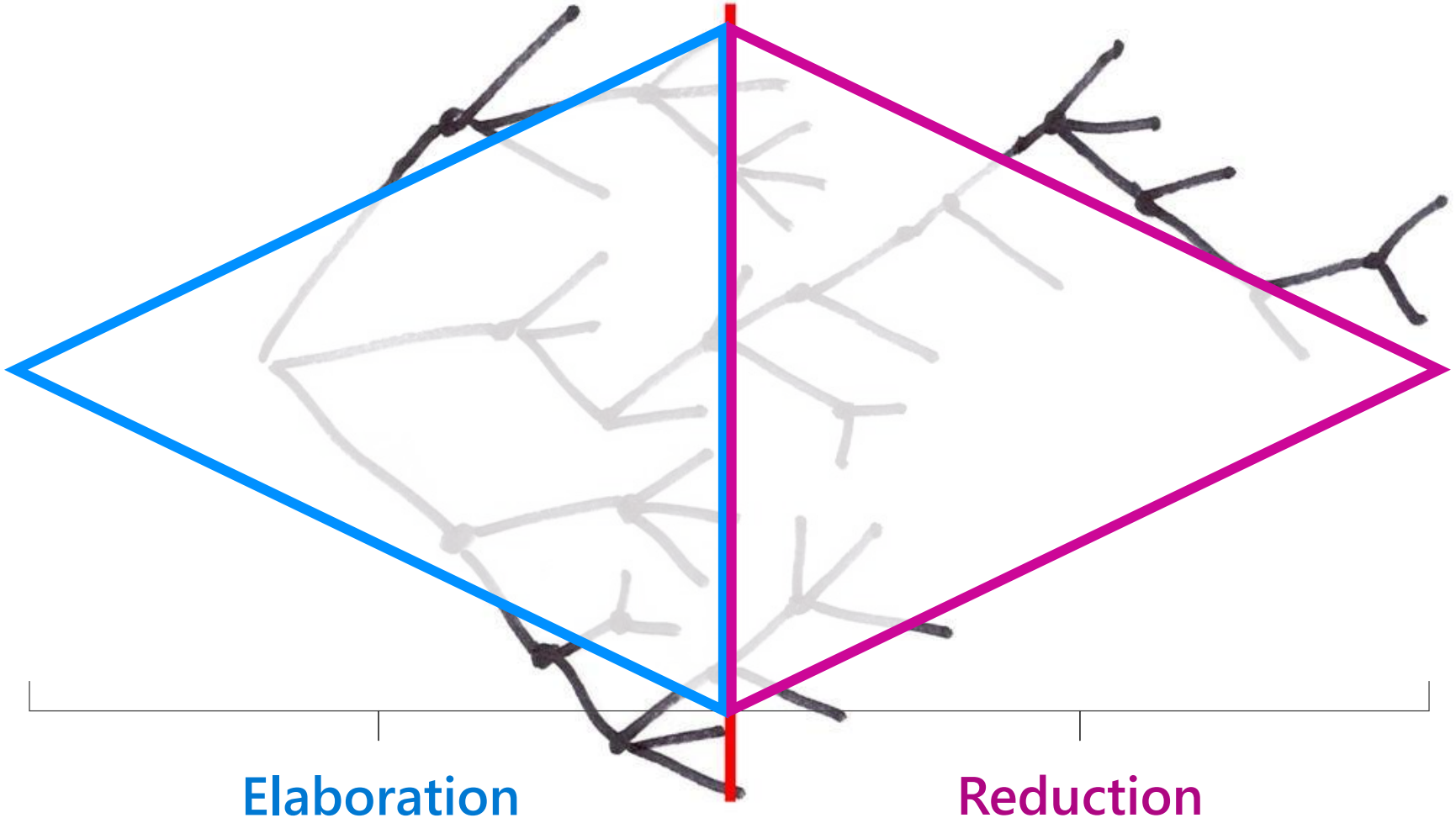


Source: Greenberg *et al.,* Sketching User Experiences: The Workbook, 2012

WHY PROTOTYPE?

ELABORATION & REDUCTION

Paul Laseau (1980) describes this process as a symbiotic relationship between idea elaboration and reduction.



Elaboration

Generate ideas. These are opportunities

Reduction

Determine ideas worth pursuing, iterate, & refine

Source: Greenberg *et al.,* Sketching User Experiences: The Workbook, 2012

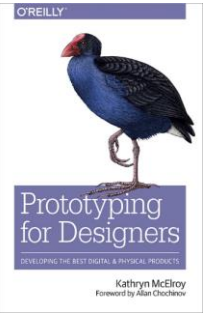
WHEN TO PROTOTYPE?

A.B.P.

Inspired by Zach Liberman's *Poetic Computation* talk at AIGAdesign, Nov 2017: https://youtu.be/bmztlO9_Wvo

> To get the most out of prototyping, you must incorporate it into **every part of your process**, and constantly be looking for feedback.

Prototyping for Designers
Kathryn McElroy

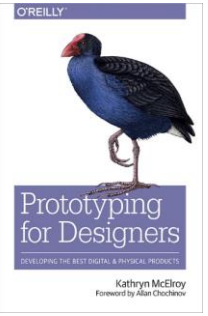


Source: Kathryn McElroy, *Prototyping for Designers,* 2017, p5-6

To get the most out of prototyping, you must incorporate it into **every part of your process**, and constantly be looking for feedback.

Everything can be prototyped, and everything is a prototype. There can always be a better, improved version of what you are creating…

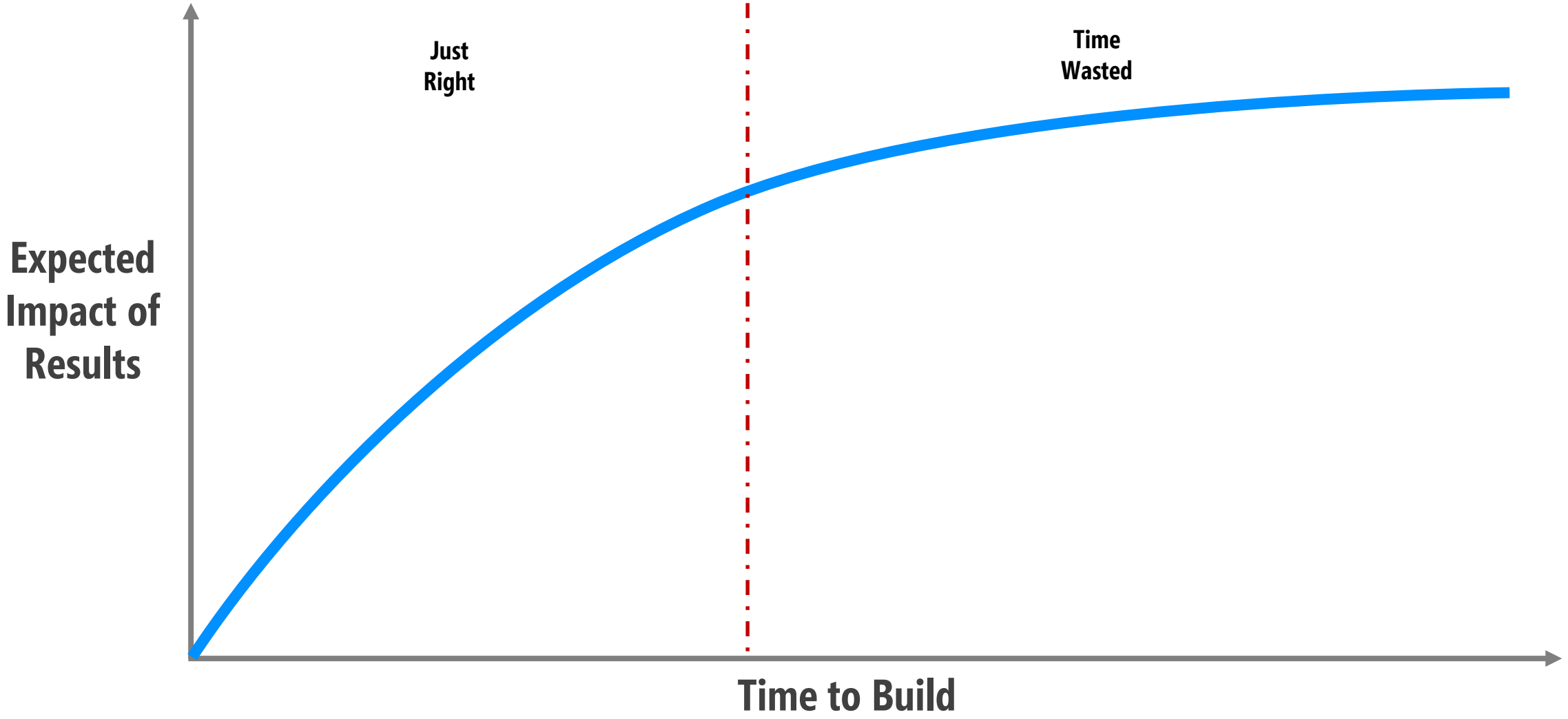
Prototyping for Designers
Kathryn McElroy



Source: Kathryn McElroy, *Prototyping for Designers,* 2017, p5-6

WHEN TO PROTOTYPE?

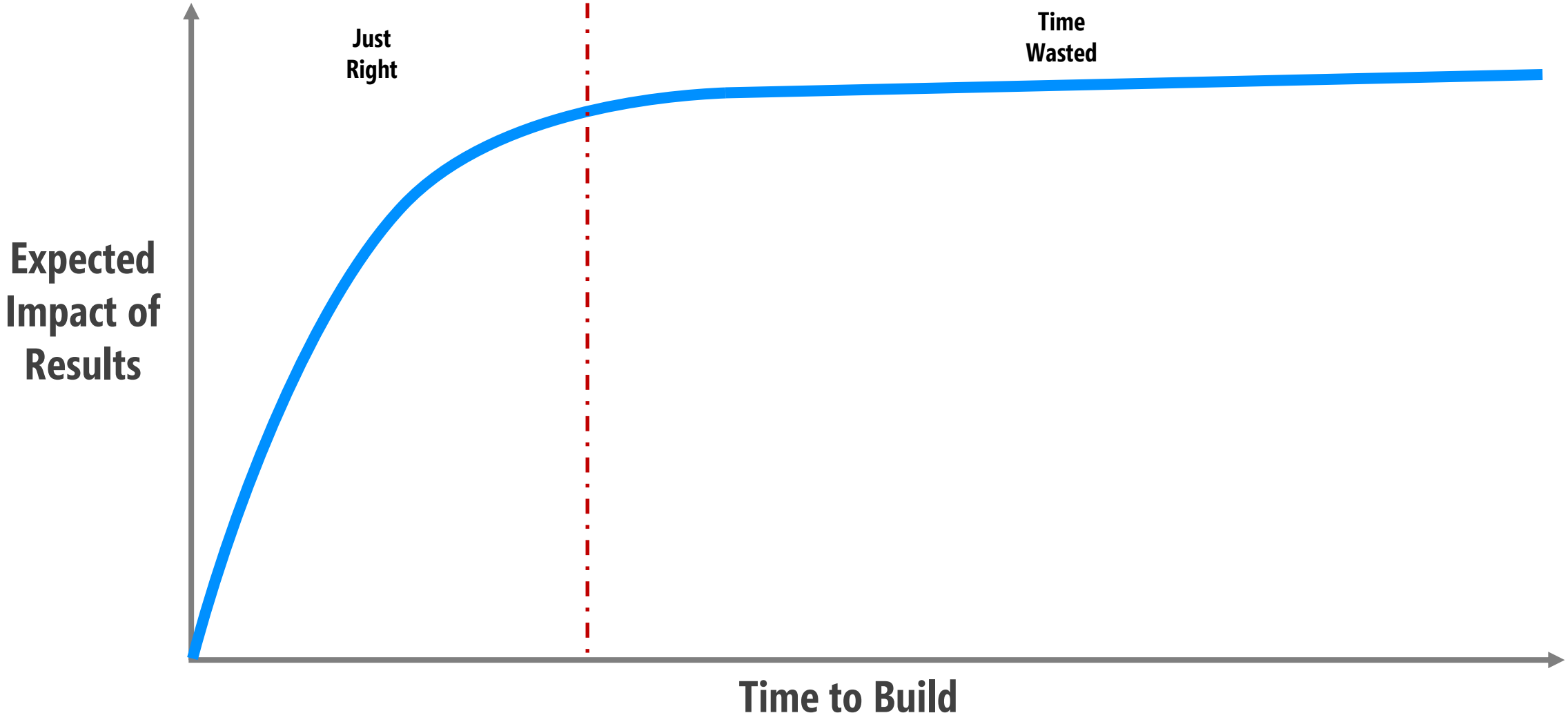
PROTOTYPING TIME VS. REWARD



Source: Kathryn McElroy, *Prototyping for Designers,* 2017, p40

WHEN TO PROTOTYPE?

PROTOTYPING TIME VS. REWARD



Source: Kathryn McElroy, *Prototyping for Designers,* 2017, p40

WHAT TO PROTOTYPE?

Focus on the **key elements** needed for feedback at current stage in design process.

“Selecting **the focus of a prototype** is the art of identifying the most important open design questions.

What do Prototypes Prototype?
Stephanie Houde & Charles Hill, Apple Computer

Source: Houde, S., and Hill, C., What Do Prototypes Prototype?, in Handbook of Human-Computer Interaction (2nd Ed.), M. Helander, T. Landauer, and P. Prabhu (eds.): Elsevier Science B. V: Amsterdam, 1997.

HOW DO YOU CHOOSE WHAT TO PROTOTYPE?

What is the key **goal of the prototype**—to demonstrate viability, to highlight new key interaction, to show user flow?

Who will you show it to and in **what setting**?

What do you **expect to learn** from building & showing/testing the prototype?

How will you **evaluate** that **learning**? (*i.e.*, what are your key measures and how will you analyze this data?)

HOW TO PROTOTYPE

(BEST PRACTICES SUPPORTED BY RESEARCH AND INDUSTRY)

PROTOTYPING: BEST PRACTICES

The importance of **exploring a breadth of ideas**

Focus on **rapidly building prototypes** to explore design space

Perceived fidelity of prototypes can impact **responses**

Iteration is critical

Prototype **multiple designs in parallel**

Show/test multiple prototypes to enable comparison

PROTOTYPING: BEST PRACTICES

The importance of **exploring a breadth of ideas**

Focus on **rapidly building prototypes** to explore design space

Perceived fidelity of prototypes can impact **responses**

Iteration is critical

Prototype **multiple designs in parallel**

Show/test multiple prototypes to enable comparison

HOW TO PROTOTYPE

THE IMPORTANCE OF IDEA QUANTITY/BREADTH

A ceramics teacher divided a class into two groups: those on the left side of the studio would be graded solely on the quantity of their work; those on the right solely on the quality of their work.

QUANTITY GROUP

Graded solely on the quantity of work they produced

QUALITY GROUP

Graded solely on the quality of work they produced

Source: Bayles and Orland, Art & Fear: Observations On the Perils (and Rewards) of Artmaking, 2001; As found in Buxton, Sketching User Experiences, 2011

HOW TO PROTOTYPE

THE IMPORTANCE OF IDEA QUANTITY/BREADTH

A ceramics teacher announced that he was dividing the class into two groups: those on the left side of the studio would be graded solely on quantity of work; those on the right solely on its quality.

QUANTITY GROUP

Graded solely on the quantity of work they produced

QUALITY GROUP

Graded solely on the quality of work they produced

WHICH GROUP PRODUCED HIGHER QUALITY WORK?

Source: Bayles and Orland, Art & Fear: Observations On the Perils (and Rewards) of Artmaking, 2001; As found in Buxton, Sketching User Experiences, 2011

THE IMPORTANCE OF IDEA QUANTITY/BREADTH

A ceramics teacher announced that he was dividing the class into two groups: those on the left side of the studio would be graded solely on quantity of work; those on the right solely on its quality.

QUANTITY GROUP

Graded solely on the quantity of work they produced

"It seems that while the **quantity group** was busily churning out piles of work — and **learning from their mistakes** — the **quality group** had sat theorizing about perfection, and in the end **had little more to show** for their efforts than grandiose theories and a pile of dead clay."

- Bayles and Orland, 2001, p.29

Source: Bayles and Orland, Art & Fear: Observations On the Perils (and Rewards) of Artmaking, 2001; As found in Buxton, Sketching User Experiences, 2011

PROTOTYPING: BEST PRACTICES

The importance of **exploring a breadth of ideas**

Focus on **rapidly building prototypes** to explore design space

Perceived fidelity of prototypes can impact **responses**

Iteration is critical

Prototype **multiple designs in parallel**

Show/test multiple prototypes to enable comparison

RAPID PROTOTYPES ARE PREFERRED ESPECIALLY EARLY IN DESIGN PROCESS

> Besides speeding up that process of experimentation, prototypes are easy to **throw away when they fail**. Creativity requires cycling lots of ideas. The more you invest in your prototype and the closer to "final" it is, the harder it is to let go of a concept that's not working.

Tom and David Kelley

From: *Why Designers Should Never Go to a Meeting Without a Prototype*, Slate 2013

Keep in mind that **rapid doesn’t necessarily mean lo-fi**.

GUILLAUME ARDAUD, APPLE DESIGNER | WWDC 2017

EXAMPLE: RAPID PROTOTYPING AT APPLE

Source: https://developer.apple.com/videos/play/wwdc2017/818/

DESIGN TASK: REDESIGN TIMER APP

HOW WOULD YOU BUILD THIS PROTOTYPE?


HOW LONG DID IT TAKE TO BUILD THIS PROTOTYPE?

HOW LONG DID IT TAKE TO BUILD THIS PROTOTYPE?

60 SECS | BUILT USING KEYNOTE


MAKING THINGS FAST ENABLES EXPLORING MANY IDEAS

PROTOTYPING: BEST PRACTICES

The importance of **exploring a breadth of ideas**

Focus on **rapidly building prototypes** to explore design space

Perceived fidelity of prototypes can impact **responses**

Iteration is critical

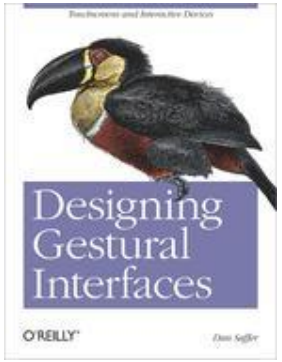
Prototype **multiple designs in parallel**

Show/test multiple prototypes to enable comparison

PERCEIVED FIDELITY OF PROTOTYPES CAN INFLUENCE REACTIONS

> The **more refined the prototype** is, the **more refined the response** to it will likely be.

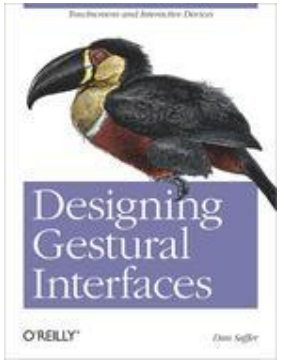
Dan Saffer
Chapter 6: Prototyping Interactive Gestures
Designing Gestural Interaction, 2008



PERCEIVED FIDELITY OF PROTOTYPES CAN INFLUENCE REACTIONS

> Oddly, **refined feedback can be a bad thing**. A high-fidelity, working prototype could engender lots of comments about the colors used or typefaces involved, not about the concept, features, gestures, and system flow, which may be what you really care about (and should care about in the early stages of prototyping).

Dan Saffer
Chapter 6: Prototyping Interactive Gestures
Designing Gestural Interaction, 2008



PROTOTYPING: BEST PRACTICES

The importance of **exploring a breadth of ideas**

Focus on **rapidly building prototypes** to explore design space

Perceived fidelity of prototypes can impact **responses**

Iteration is critical

Prototype **multiple designs in parallel**

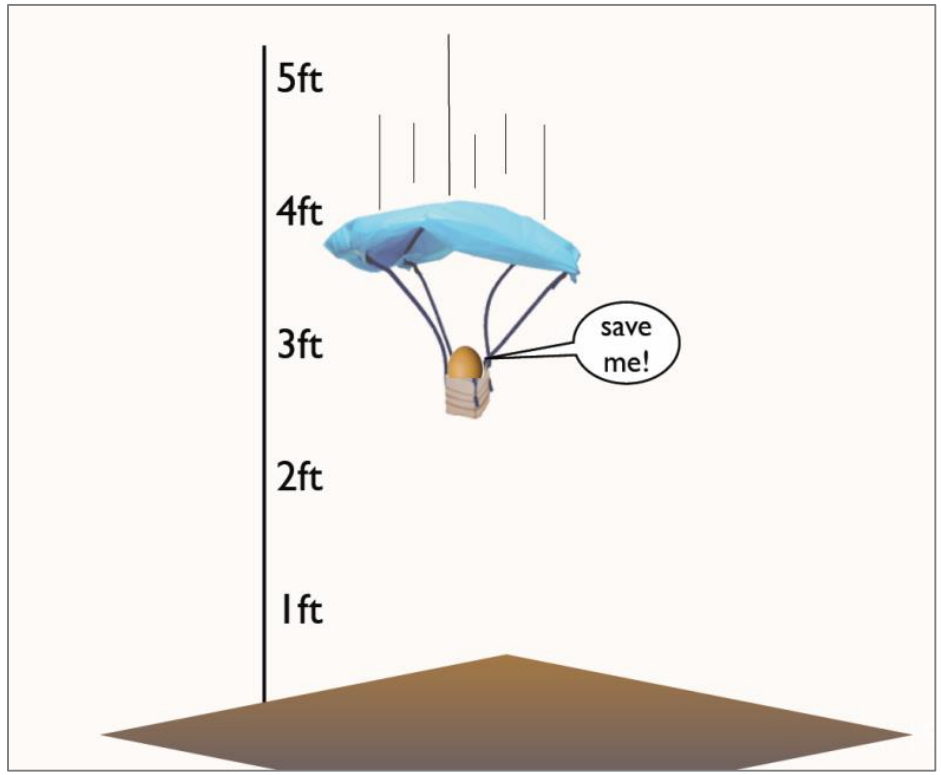
Show/test multiple prototypes to enable comparison

DOW ET AL., ACM TOCHI 2010

DESIGN ITERATION EXPERIMENT: EGG DROP STUDY

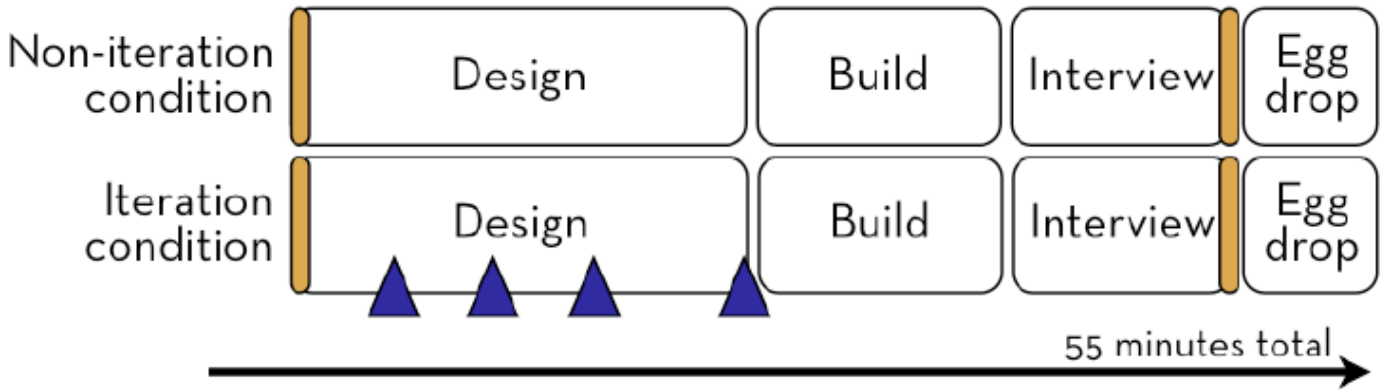
Design task selection

DESIGN ITERATION EXPERIMENT: EGG DROP STUDY



STUDY TASK

Design a robust egg drop vessel that maximizes the height of the drop without breaking the egg.

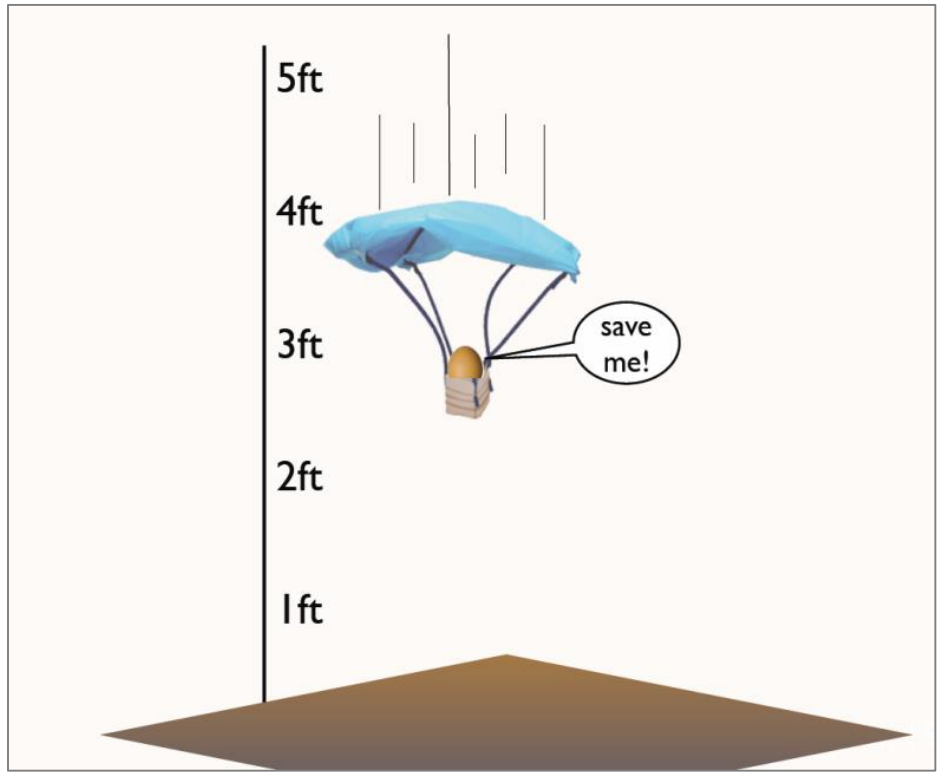


EXPERIMENTAL DESIGN

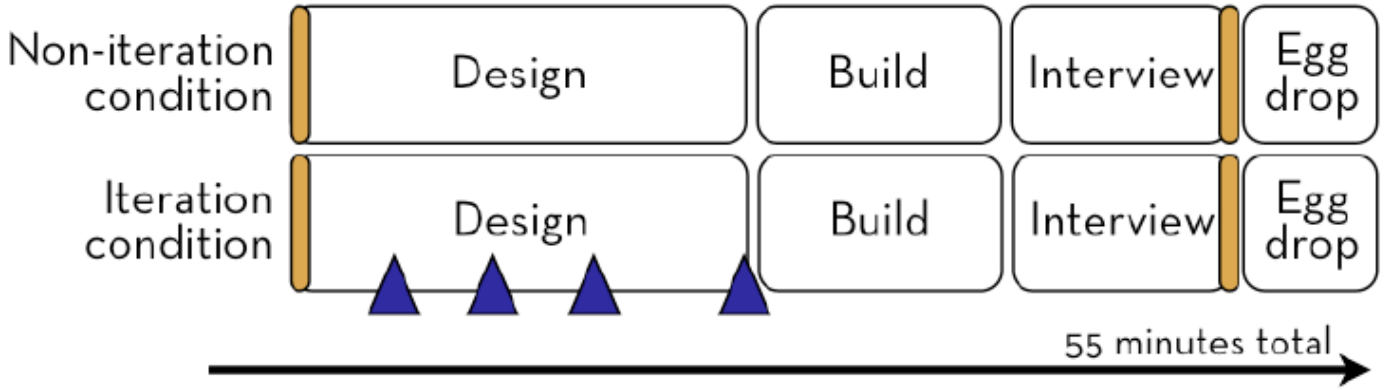
Study had two groups (between subjects design): one group given a full carton of eggs and encouraged to conduct test drops (iteration group). The other group was given only one egg, which was used the final egg drop.

Source: Dow *et al.,* The Efficacy of Prototyping Under Time Constraints, *Creativity and Cognition, 2009*

DESIGN ITERATION EXPERIMENT: EGG DROP STUDY



WHICH GROUP DID BETTER?



STUDY TASK

Design a robust egg drop vessel that maximizes the height of the drop without breaking the egg.

EXPERIMENTAL DESIGN

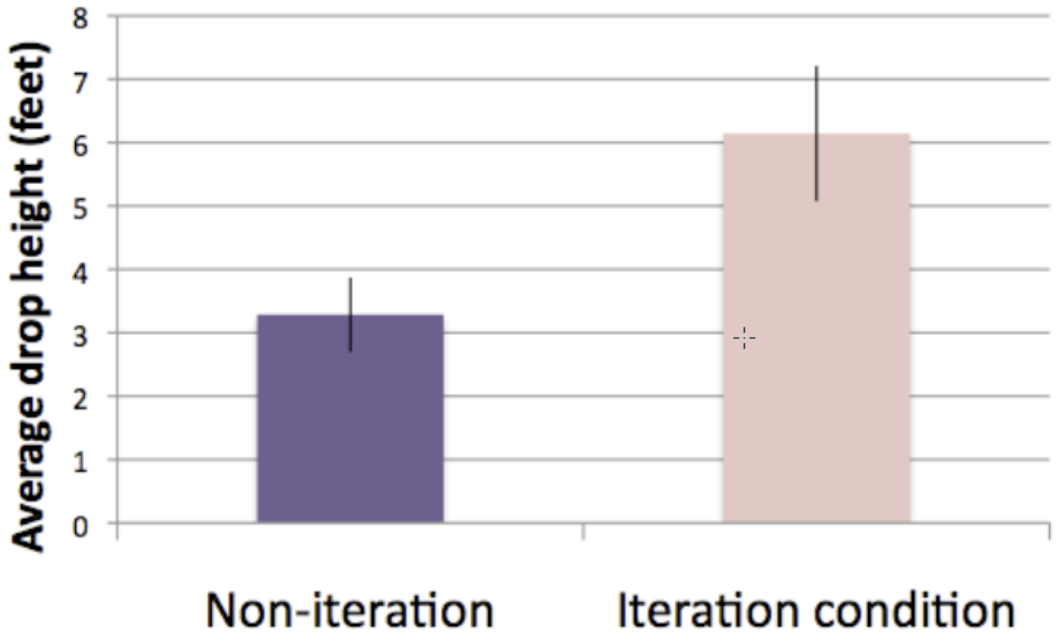
Study had two groups (between subjects design): one group given a full carton of eggs and encouraged to conduct test drops (iteration group). The other group was given only one egg, which was used the final egg drop.

Source: Dow *et al.*, The Efficacy of Prototyping Under Time Constraints, *Creativity and Cognition, 2009*

IMPORTANCE OF ITERATION

RESULT SUMMARY

Iteration group outperformed non-iteration group & gained more confidence while designing.



PRIMARY RESULT

Participants in the iteration condition significantly outperformed the non-iteration condition in the egg drop design task.

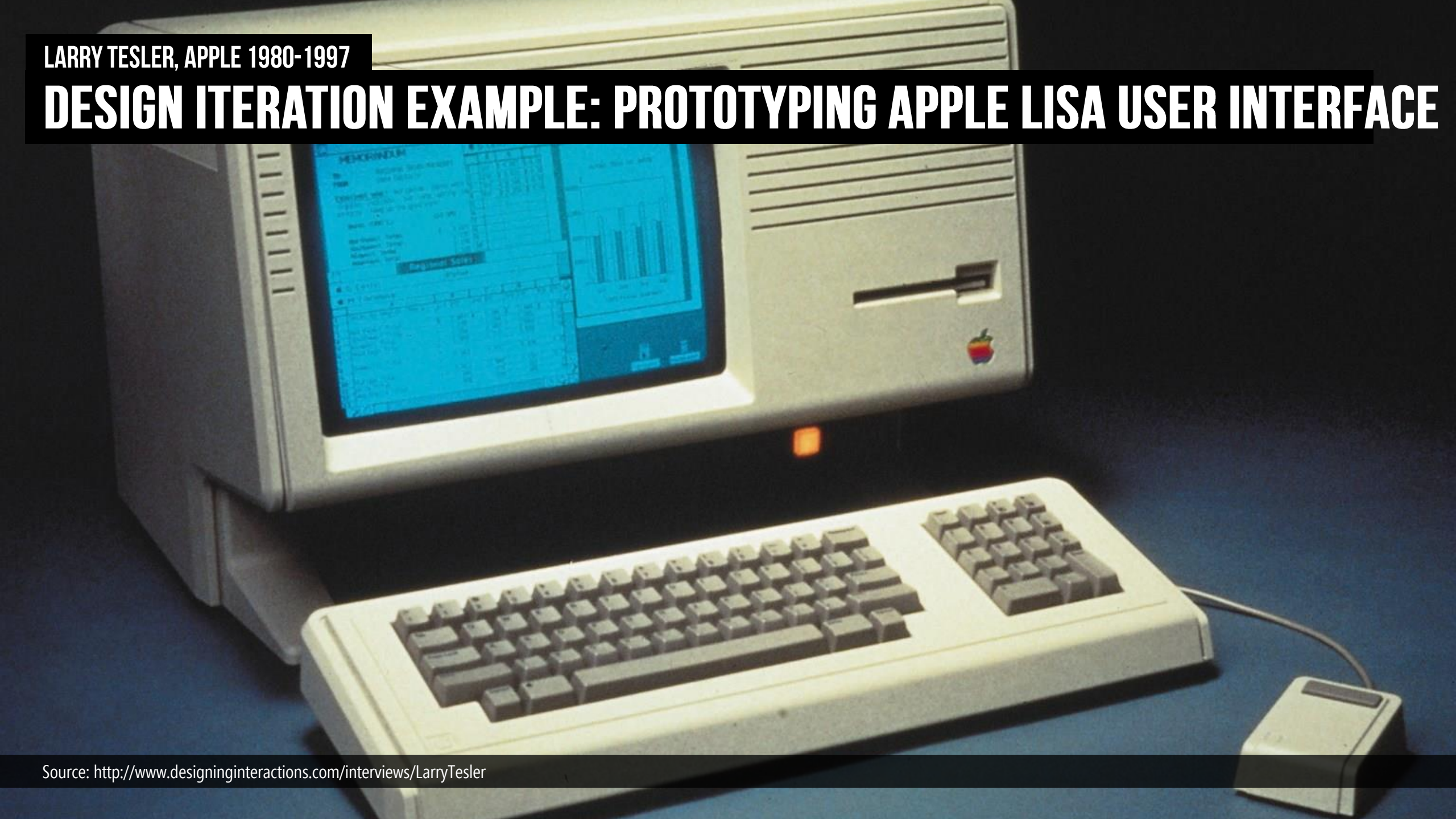
Source: Dow *et al.,* The Efficacy of Prototyping Under Time Constraints, *Creativity and Cognition, 2009*

This study also nicely highlights **design fixation** and **getting stuck in local maxima**.

Participants learn through experimentation

LARRY TESLER, APPLE 1980-1997

DESIGN ITERATION EXAMPLE: PROTOTYPING APPLE LISA USER INTERFACE



Source: http://www.designinginteractions.com/interviews/LarryTesler

Bill Atkinson

Apple Computer
20525 Mariani Avenue
Cupertino, Calif. 95014
USA
(19)(1)(408)996-1010

Make

Learn

Show

PROTOTYPING: BEST PRACTICES

The importance of **exploring a breadth of ideas**

Focus on **rapidly building prototypes** to explore design space

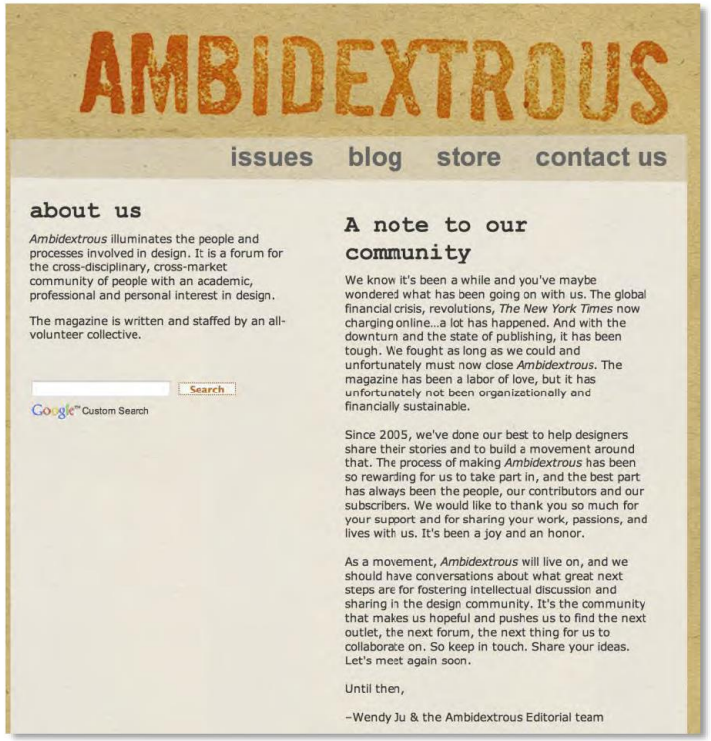
Perceived fidelity of prototypes can impact **responses**

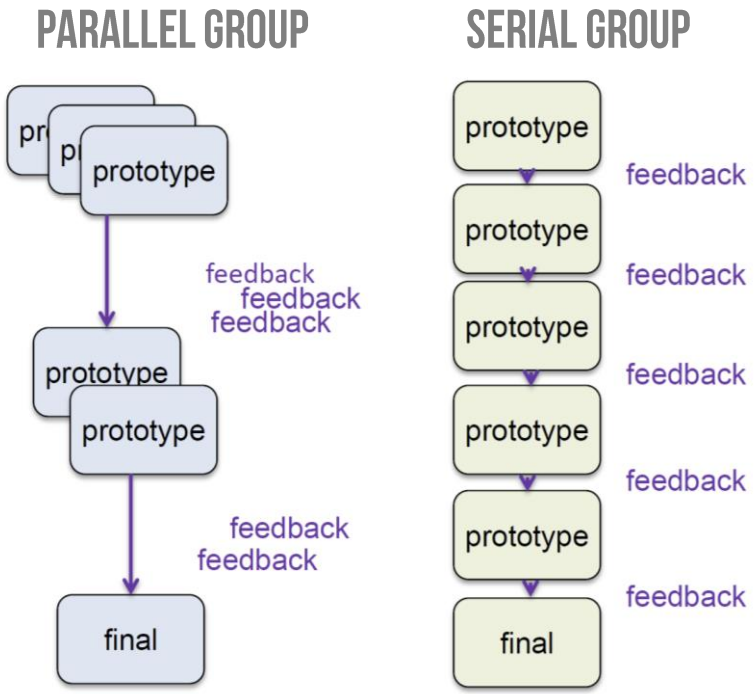
Iteration is critical

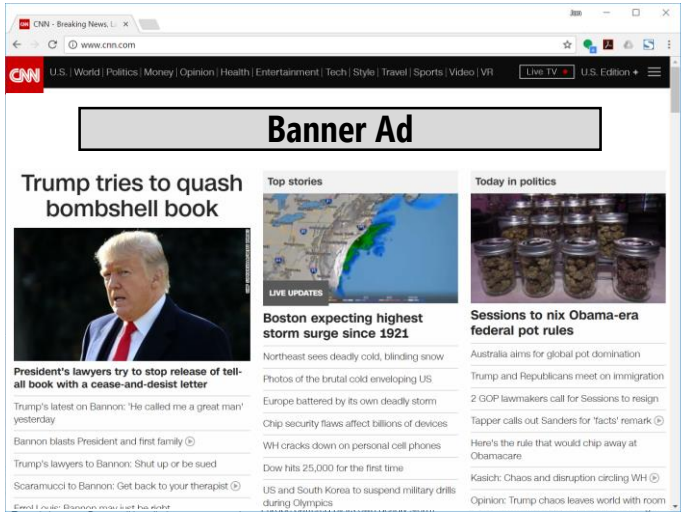
Prototype **multiple designs in parallel**

Show/test multiple prototypes to enable comparison

IMPORTANCE OF CREATING MULTIPLE PROTOTYPES IN PARALLEL







STUDY TASK

Create a web banner ad for Ambidextrous magazine

STUDY DESIGN

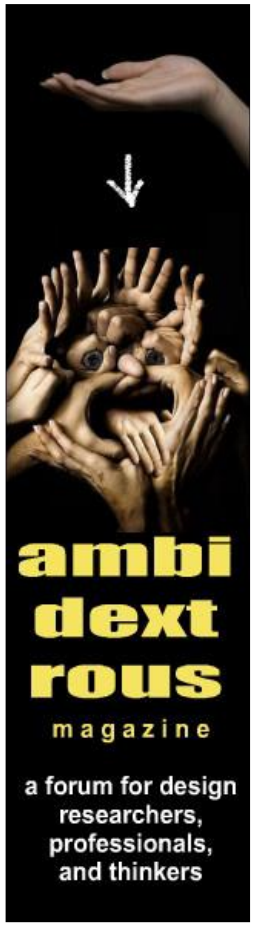
Two study groups (again, between subjects). One group was the parallel prototyping group that was told to prototype multiple designs in parallel. The other, the serial group, was told to produce one design and iterate.

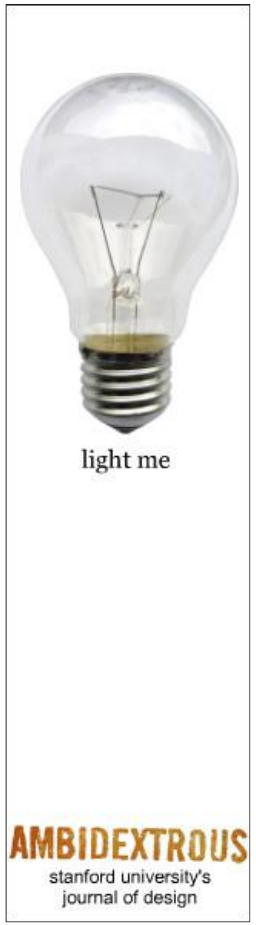
MEASURES

They deployed the ads and actually measured click-through rates. Also received novice and expert critiques

Source: Dow *et al.,* Parallel Prototyping Leads to Better Design Results, More Divergence, and Increased Self-efficacy, *Design Thinking Research* 2011

SOME EXAMPLE FINAL ADS: WHICH IS YOUR FAVORITE?

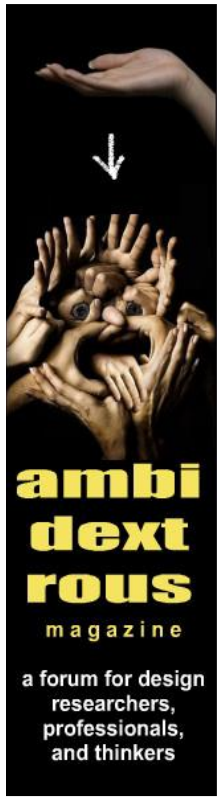




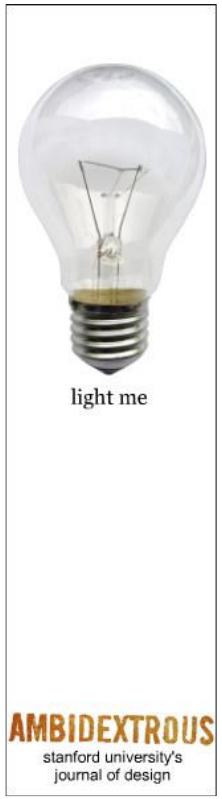
Source: Dow *et al.,* Parallel Prototyping Leads to Better Design Results, More Divergence, and Increased Self-efficacy, *Design Thinking Research* 2011

SOME EXAMPLE FINAL ADS: WHICH IS YOUR FAVORITE?

PARALLEL PROTOTYPING CONDITION



CLICK-THROUGH RATE: 1ST
EXPERT RATING: 6TH



CLICK-THROUGH RATE: 9TH
EXPERT RATING: 1ST

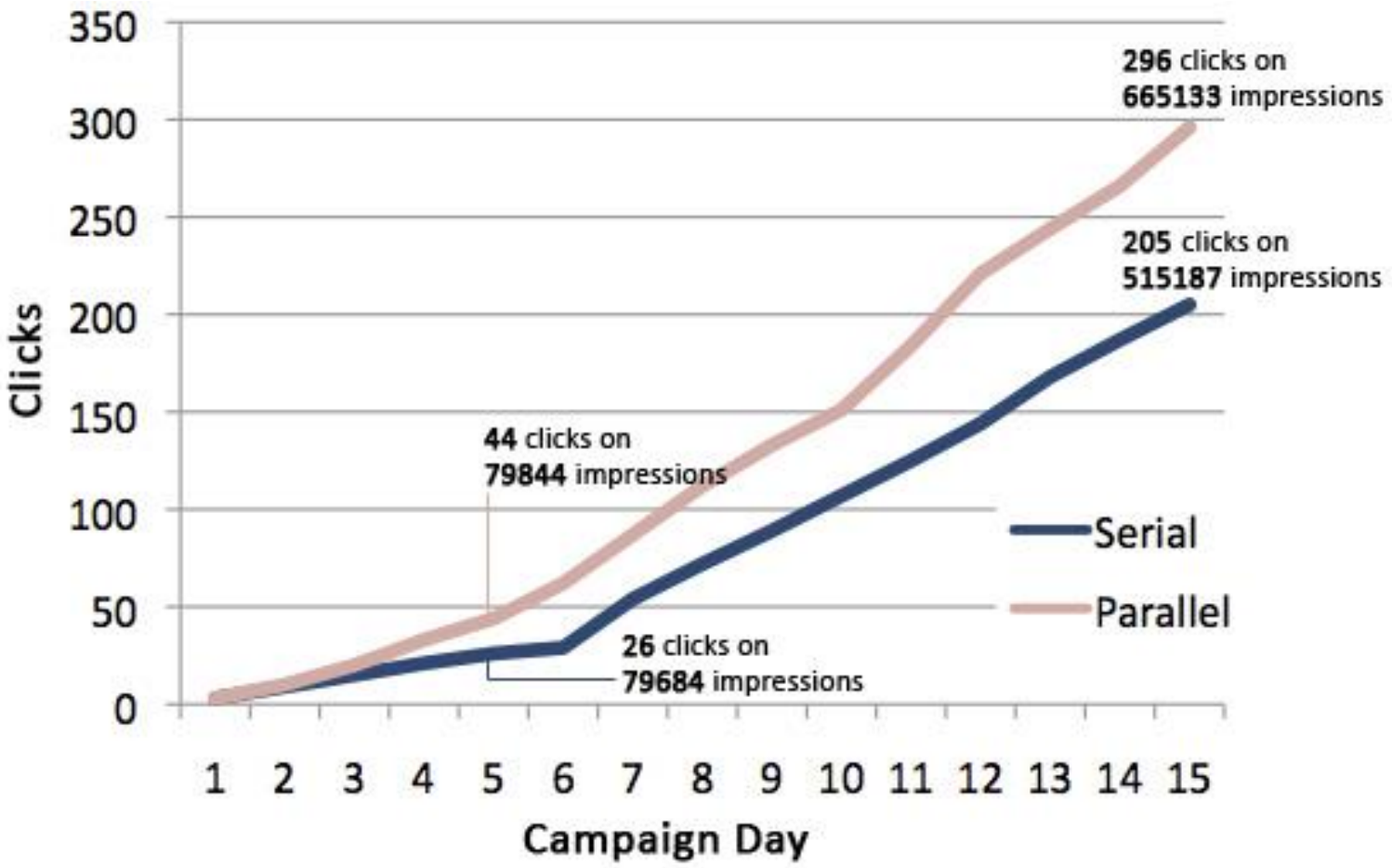
SERIAL PROTOTYPING CONDITION

CLICK-THROUGH RATE: 4TH
EXPERT RATING: 32ND

Source: Dow *et al.,* Parallel Prototyping Leads to Better Design Results, More Divergence, and Increased Self-efficacy, *Design Thinking Research* 2011

OVERALL RESULTS: CLICK-THROUGH RESULTS

Parallel ads received more clicks—and more clicks per impression—than serial ads during 15-day campaign.

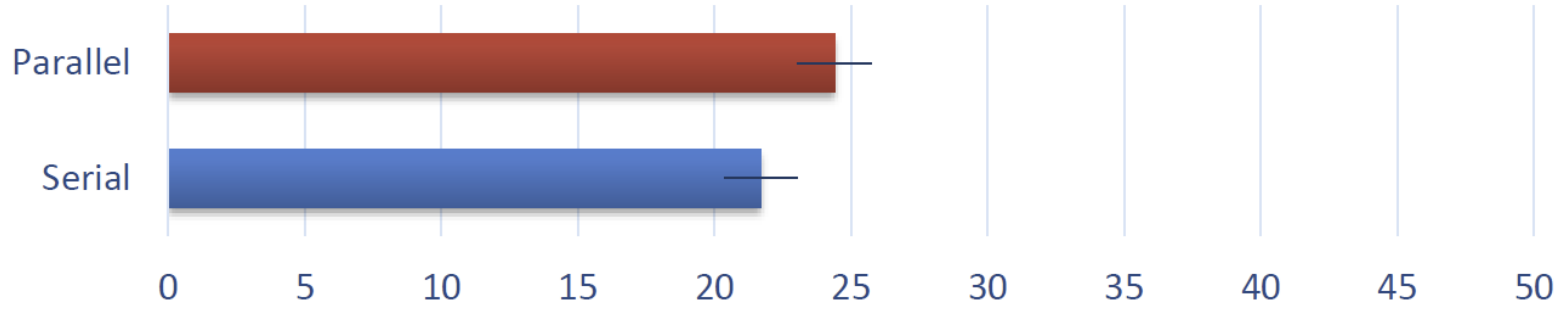


Source: Dow *et al.,* Parallel Prototyping Leads to Better Design Results, More Divergence, and Increased Self-efficacy, *Design Thinking Research* 2011

OVERALL RESULTS: SUBJECTIVE RATINGS

EXPERT QUALITY RATING

Scale of 0-50; 50 is best



Experts rated ads produced in parallel group as significantly better than ads in serial group. Importantly, the experts did not know how the ads were produced.

Source: Dow *et al.,* Parallel Prototyping Leads to Better Design Results, More Divergence, and Increased Self-efficacy, *Design Thinking Research* 2011

PROTOTYPING: BEST PRACTICES

The importance of **exploring a breadth of ideas**

Focus on **rapidly building prototypes** to explore design space

Perceived fidelity of prototypes can impact **responses**

Iteration is critical

Prototype **multiple designs in parallel**

Show/test multiple prototypes to enable comparison

IMPORTANCE OF TESTING MULTIPLE PROTOTYPES TOGETHER

Source: Wiklund, Thurrot, & Dumas, Proc. Human Factors Society'92

IMPORTANCE OF TESTING MULTIPLE PROTOTYPES TOGETHER

> We have found **subjects reluctant to be critical of designs** when they are asked to assign a rating to the design. In our usability tests, we see the same phenomenon **even when we encourage subjects to be critical**.

Wiklund, Thurrot, & Dumas
Human Factors Society 1992

Source: Wiklund, Thurrot, & Dumas, Proc. Human Factors Society'92

IMPORTANCE OF TESTING MULTIPLE PROTOTYPES TOGETHER

> We have found **subjects reluctant to be critical of designs** when they are asked to assign a rating to the design. In our usability tests, we see the same phenomenon **even when we encourage subjects to be critical**. We speculate that the test subjects feel that giving a low rating to a product gives the impression that they are "negative" people, that the ratings **reflect negatively on their ability** to use computer-based technology… or that they **don't want to hurt the feelings of the person conducting the test**.

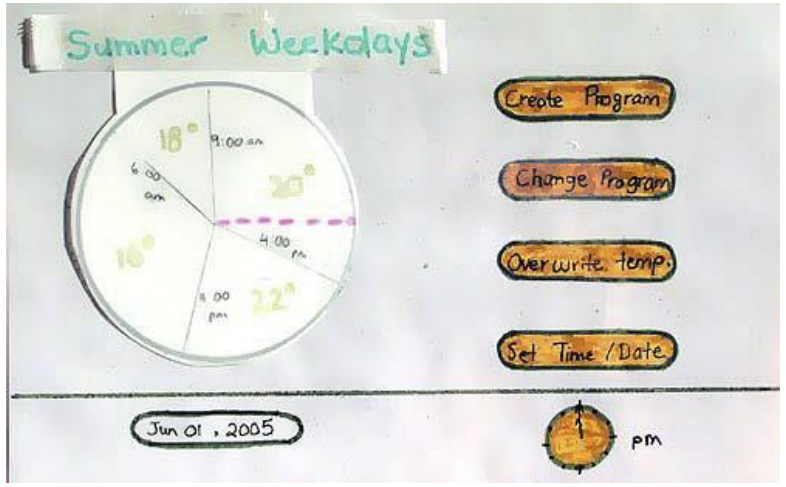
Wiklund, Thurrot, & Dumas
Human Factors Society 1992

Source: Wiklund, Thurrot, & Dumas, Proc. Human Factors Society'92

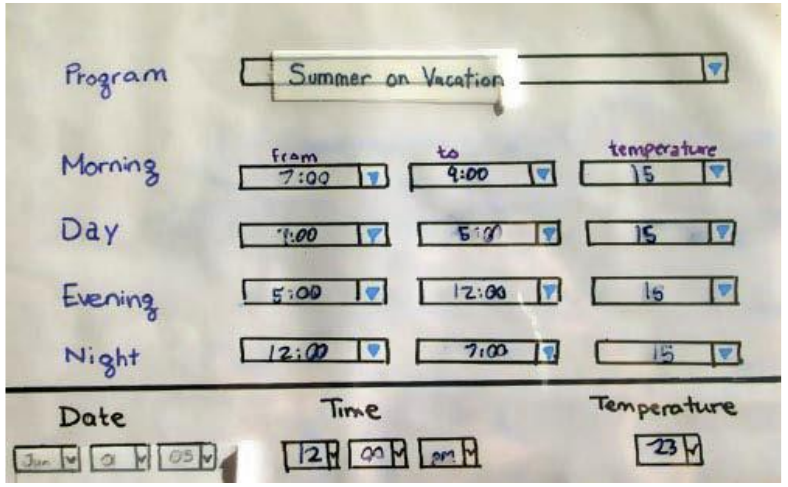
TESTING MULTIPLE PROTOTYPES TOGETHER: AN EXPERIMENT

Developed three lo-fi prototypes. All designed by same team. Tried to ensure that all three designs were consistent in terms of fidelity, functionality, and quality

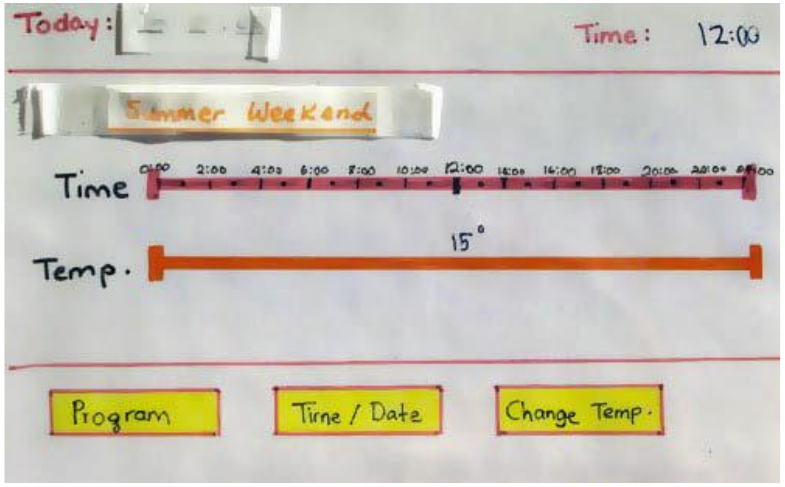
CIRCULAR PAPER PROTOTYPE



TABULAR PAPER PROTOTYPE



LINEAR PAPER PROTOTYPE



STUDY DESIGN

48 participants. Two groups (between subjects design). One group only used one prototype. Other group used all three.

STUDY TASKS

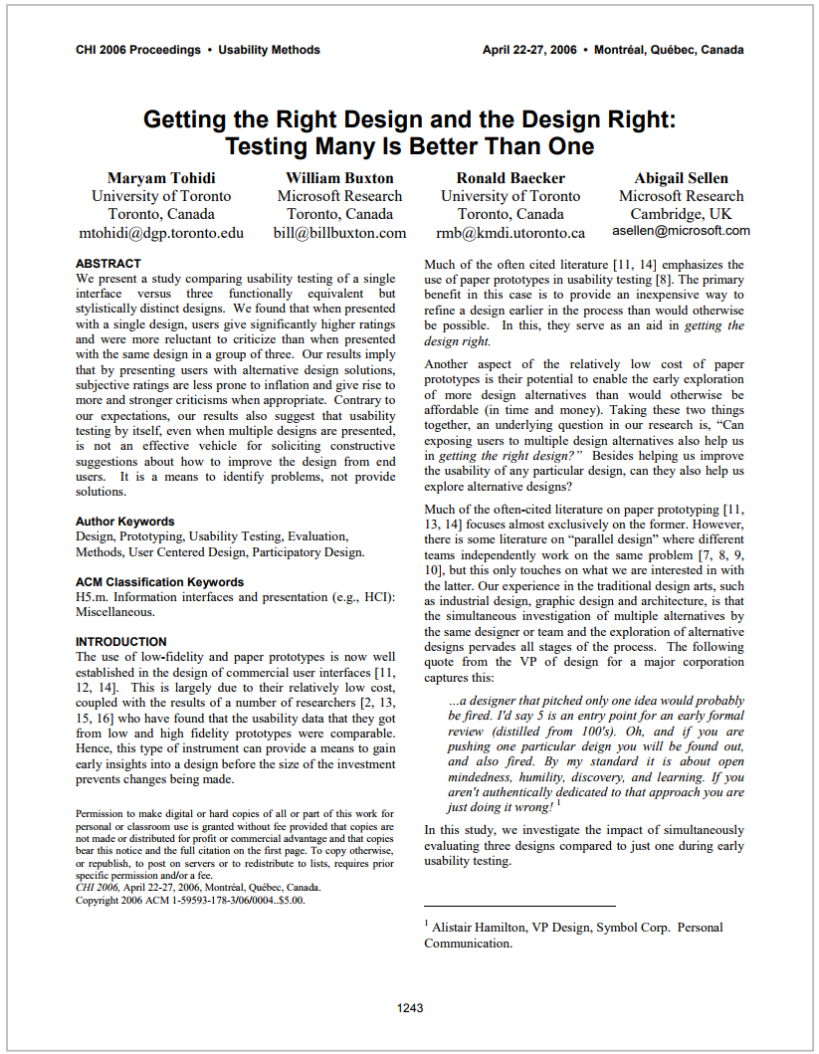
Participants performed four tasks, including setting the time/date, setting the temperature, & programming thermostat.

STUDY DATA

Observational notes, video recordings, questionnaires, post-study interviews

Source: Tohidi *et al.,* Getting the Right Design and the Design Right, *CHI2006*

TESTING MULTIPLE PROTOTYPES TOGETHER: AN EXPERIMENT



Getting the Right Design and the Design Right: Testing Many Is Better Than One

Maryam Tohidi
University of Toronto
Toronto, Canada
mtohidi@dgp.toronto.edu

William Buxton
Microsoft Research
Toronto, Canada
bill@billbuxton.com

Ronald Baecker
University of Toronto
Toronto, Canada
rmb@kmdi.utoronto.ca

Abigail Sellen
Microsoft Research
Cambridge, UK
asellen@microsoft.com

ABSTRACT
We present a study comparing usability testing of a single interface versus three functionally equivalent but stylistically distinct designs. We found that when presented with a single design, users give significantly higher ratings and were more reluctant to criticize than when presented with the same design in a group of three. Our results imply that by presenting users with alternative design solutions, subjective ratings are less prone to inflation and give rise to more and stronger criticisms when appropriate. Contrary to our expectations, our results also suggest that usability testing by itself, even when multiple designs are presented, is not an effective vehicle for soliciting constructive suggestions about how to improve the design from end users. It is a means to identify problems, not provide solutions.

Author Keywords
Design, Prototyping, Usability Testing, Evaluation, Methods, User Centered Design, Participatory Design.

ACM Classification Keywords
H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

INTRODUCTION
The use of low-fidelity and paper prototypes is now well established in the design of commercial user interfaces [11, 12, 14]. This is largely due to their relatively low cost, coupled with the results of a number of researchers [2, 13, 15, 16] who have found that the usability data that they got from low and high fidelity prototypes were comparable. Hence, this type of instrument can provide a means to gain early insights into a design before the size of the investment prevents changes being made.

Much of the often cited literature [11, 14] emphasizes the use of paper prototypes in usability testing [8]. The primary benefit in this case is to provide an inexpensive way to refine a design earlier in the process than would otherwise be possible. In this, they serve as an aid in *getting the design right.*

Another aspect of the relatively low cost of paper prototypes is their potential to enable the early exploration of more design alternatives than would otherwise be affordable (in time and money). Taking these two things together, an underlying question in our research is, "Can exposing users to multiple design alternatives also help us in *getting the right design?"* Besides helping us improve the usability of any particular design, can they also help us explore alternative designs?

Much of the often-cited literature on paper prototyping [11, 13, 14] focuses almost exclusively on the former. However, there is some literature on "parallel design" where different teams independently work on the same problem [7, 8, 9, 10], but this only touches on what we are interested in with the latter. Our experience in the traditional design arts, such as industrial design, graphic design and architecture, is that the simultaneous investigation of multiple alternatives by the same designer or team and the exploration of alternative designs pervades all stages of the process. The following quote from the VP of design for a major corporation captures this:

> *...a designer that pitched only one idea would probably be fired. I'd say 5 is an entry point for an early formal review (distilled from 100's). Oh, and if you are pushing one particular deign you will be found out, and also fired. By my standard it is about open mindedness, humility, discovery, and learning. If you aren't authentically dedicated to that approach you are just doing it wrong!* [1]

In this study, we investigate the impact of simultaneously evaluating three designs compared to just one during early usability testing.

[1] Alistair Hamilton, VP Design, Symbol Corp. Personal Communication.

Participants exposed to multiple prototypes (*i.e.*, alternative designs) were more critical compared to participants exposed to only a single design.

No differences were found in providing design suggestions.

Source: Tohidi *et al.,* Getting the Right Design and the Design Right, *CHI2006*

PROTOTYPING: BEST PRACTICES

The importance of **exploring a breadth of ideas**

Focus on **rapidly building prototypes** to explore design space

Perceived fidelity of prototypes can impact **responses**

Iteration is critical

Prototype **multiple designs in parallel**

Show/test multiple prototypes to enable comparison

Use prototypes to **communicate and convince**


HoloLens 2

Source: IDEO, *Prototyping for Elmo's Monster Maker iPhone App*, https://youtu.be/-SOeMA3DUEs

BACK STORY

VIDEO PROTOTYPING ELMO'S APP

Source: http://www.slate.com/blogs/the_eye/2013/10/23/the_importance_of_prototyping_creative_confidence_by_tom_and_david_kelley.html

A **single take**, a **quick edit**, and the video clip was sent off to the Sesame Workshop team members just a few minutes before their meeting. Adam and Coe Leta's quick video was fun and endearing.

Tom and David Kelley

From: *Why Designers Should Never Go to a Meeting Without a Prototype*, Slate 2013

Source: Kelley & Kelley, Slate 2013

A **single take**, a **quick edit**, and the video clip was sent off to the Sesame Workshop team members just a few minutes before their meeting. Adam and Coe Leta's quick video was fun and endearing. It was also **much more persuasive than just talking** about their ideas would have been. They subscribe to Boyle's Law (named after one of IDEO's master prototypers, Dennis Boyle): **never go to a meeting without a prototype**.

Tom and David Kelley

From: *Why Designers Should Never Go to a Meeting Without a Prototype*, Slate 2013

Source: Kelley & Kelley, Slate 2013

A **single take**, a **quick edit**, and the video clip was sent off to the Sesame Workshop team members just a few minutes before their meeting. Adam and Coe Leta's quick video was fun and endearing. It was also **much more persuasive than just talking** about their ideas would have been. They subscribe to Boyle's Law (named after one of IDEO's master prototypers, Dennis Boyle): **never go to a meeting without a prototype**. Today, if you **download Elmo's Monster Maker** from the iTunes store, you'll **see the feature they prototyped in an hour** that morning. By acting quickly, they won the team over with their creative idea.

Tom and David Kelley

From: *Why Designers Should Never Go to a Meeting Without a Prototype*, Slate 2013

Source: Kelley & Kelley, Slate 2013