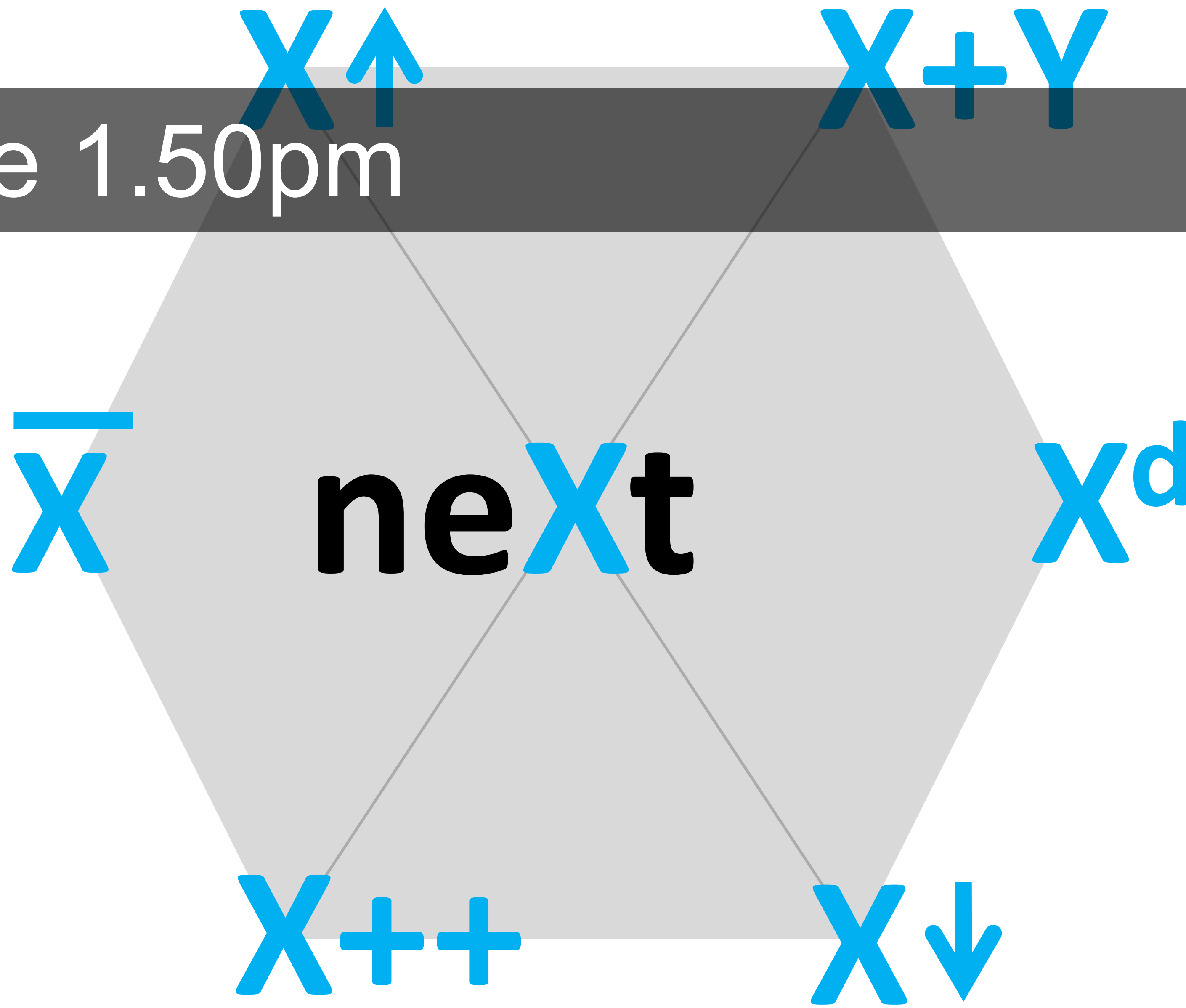
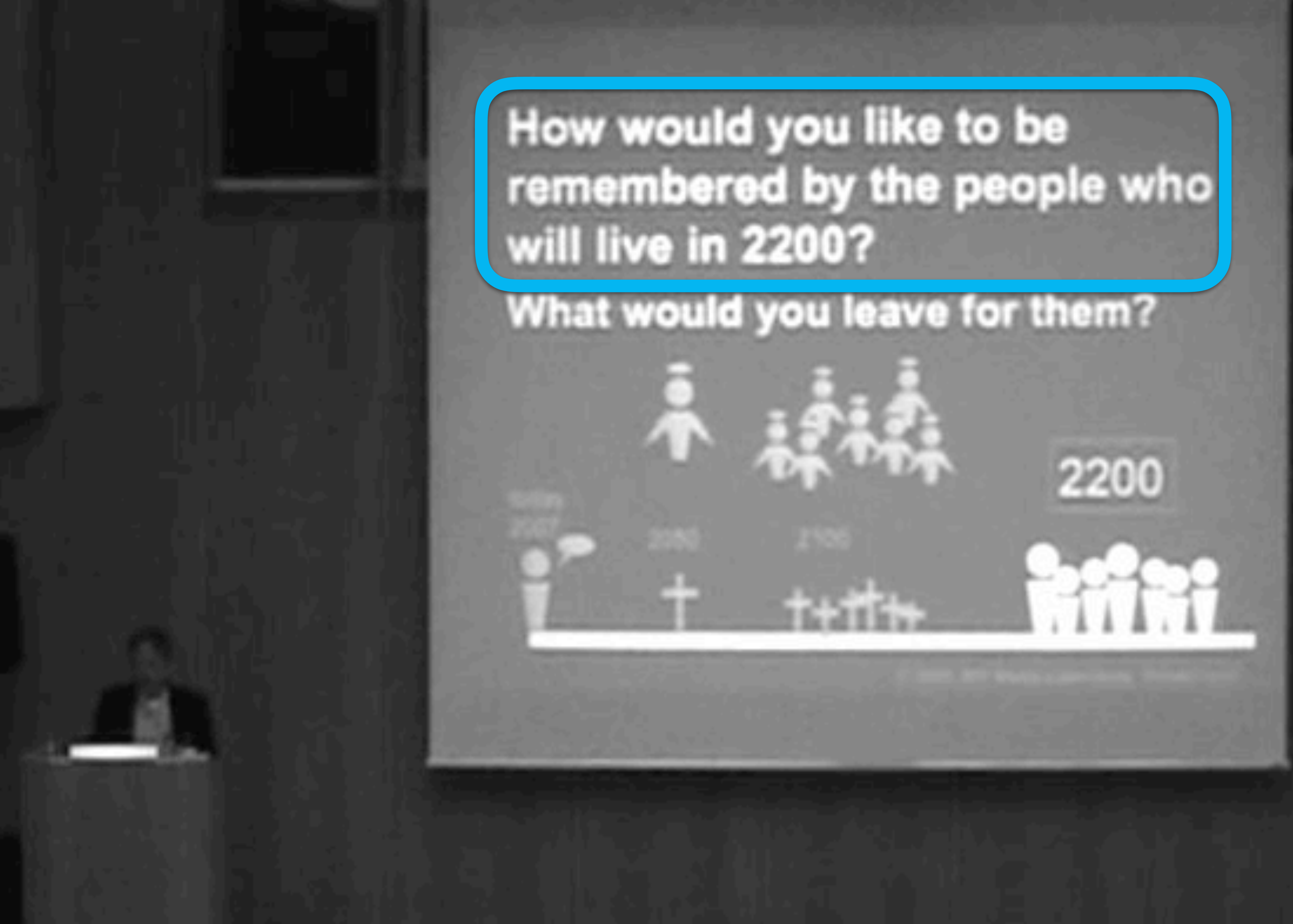
we continue 1.50pm



Invention Iterators

6.810 Engineering Interaction Technologies

Prof. Stefanie Mueller | HCI Engineering Group



Hiroshi Ishii, Keynote at TEI 2008, Bonn Germany, 18.02.2008

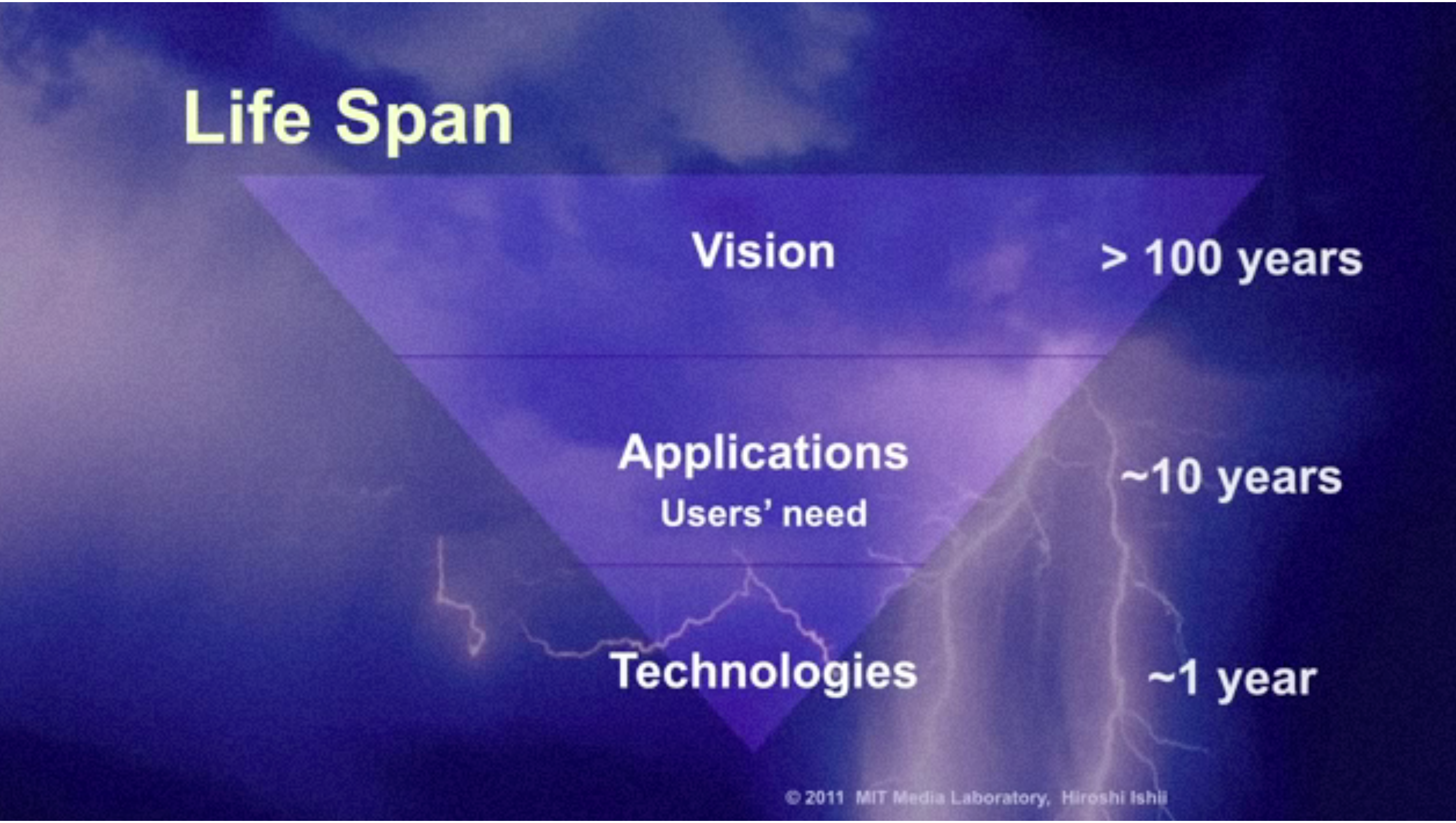
how to invent
future interactive tech?

how about user centered design?

- interview potential users
- find something that is hard to do or hard to use…
- e.g. via heuristic evaluation (5 experts list usability issues)

we did user-centered design in
6.813 / 6.831 User Interface Design

do you think any of the cool stuff
I showed in the last weeks came out of this?
nope.



Life Span
Vision
> 100 years
Applications
Users' need
~10 years
Technologies
~1 year
© 2011 MIT Media Laboratory, Hiroshi Ishii

Usability Evaluation Considered Harmful (Some of the Time)

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ABSTRACT

Current practice in Human Computer Interaction as encouraged by educational institutes, academic review processes, and institutions with usability groups advocate usability evaluation as a critical part of every design process. This is for good reason: usability evaluation has a significant role to play when conditions warrant it. Yet evaluation can be ineffective and even harmful if naively done 'by rule' rather than 'by thought'. If done during early stage design, it can mute creative ideas that do not conform to current interface norms. If done to test radical innovations, the many interface issues that would likely arise from an immature technology can quash what could have been an inspired vision. If done to validate an academic prototype, it may incorrectly suggest a design's scientific worthiness rather than offer a meaningful critique of how it would be adopted and used in everyday practice. If done without regard to how cultures adopt technology over time, then today's reluctant reactions by users will forestall tomorrow's eager acceptance. The choice of evaluation methodology – if any – must arise from and be appropriate for the actual problem or research question under consideration.

Author Keywords

INTRODUCTION

Usability evaluation is one of the major cornerstones of user interface design. This is for good reason. As Dix et al., remind us, such evaluation helps us "assess our designs and test our systems to ensure that they actually behave as we expect and meet the requirements of the user" [7]. This is typically done by using an evaluation method to measure or predict how effective, efficient and/or satisfied people would be when using the interface to perform one or more tasks. As commonly practiced, these usability evaluation methods range from laboratory-based user observations, controlled user studies, and/or inspection techniques [7,22,1]. The scope of this paper concerns these methods.

The purpose behind usability evaluation, regardless of the actual method, can vary considerably in different contexts. Within product groups, practitioners typically evaluate products under development for 'usability bugs', where developers are expected to correct the significant problems found (i.e., iterative development). Usability evaluation can also form part of an acceptance test, where human performance while using the system is measured quantitatively to see if it falls within an acceptable criteria (e.g., time to complete a task, error rate, relative satisfaction). Or if the team is considering purchasing one

but if user-centered design won't work
how do you do it?

how to make **big steps into the future?**

<30sec brainstorming>

how to make big steps into the future?

anticipate the future using **what-if questions**

what-if questions

how to **choose** a what-if question?

here's what most people do, don't do it:

(1) wait for wave

(2) start paddling

better:

(1) look far out, on horizon locate wave, estimate motion
(2) paddle towards extrapolated point
(3) prepare, when it arrives hop on

what-if question

= a wild extrapolation of what we see today

(and maybe there's nothing, but at least you tried to be the first!)

better:

(1) look far out, on horizon locate wave, estimate motion

(2) paddle towards extrapolated point

(3) prepare, when it arrives hop on

some more selected **what-if questions…**

ubiquitous computing (1991):

what if a user had multiple computers/CPUs available?

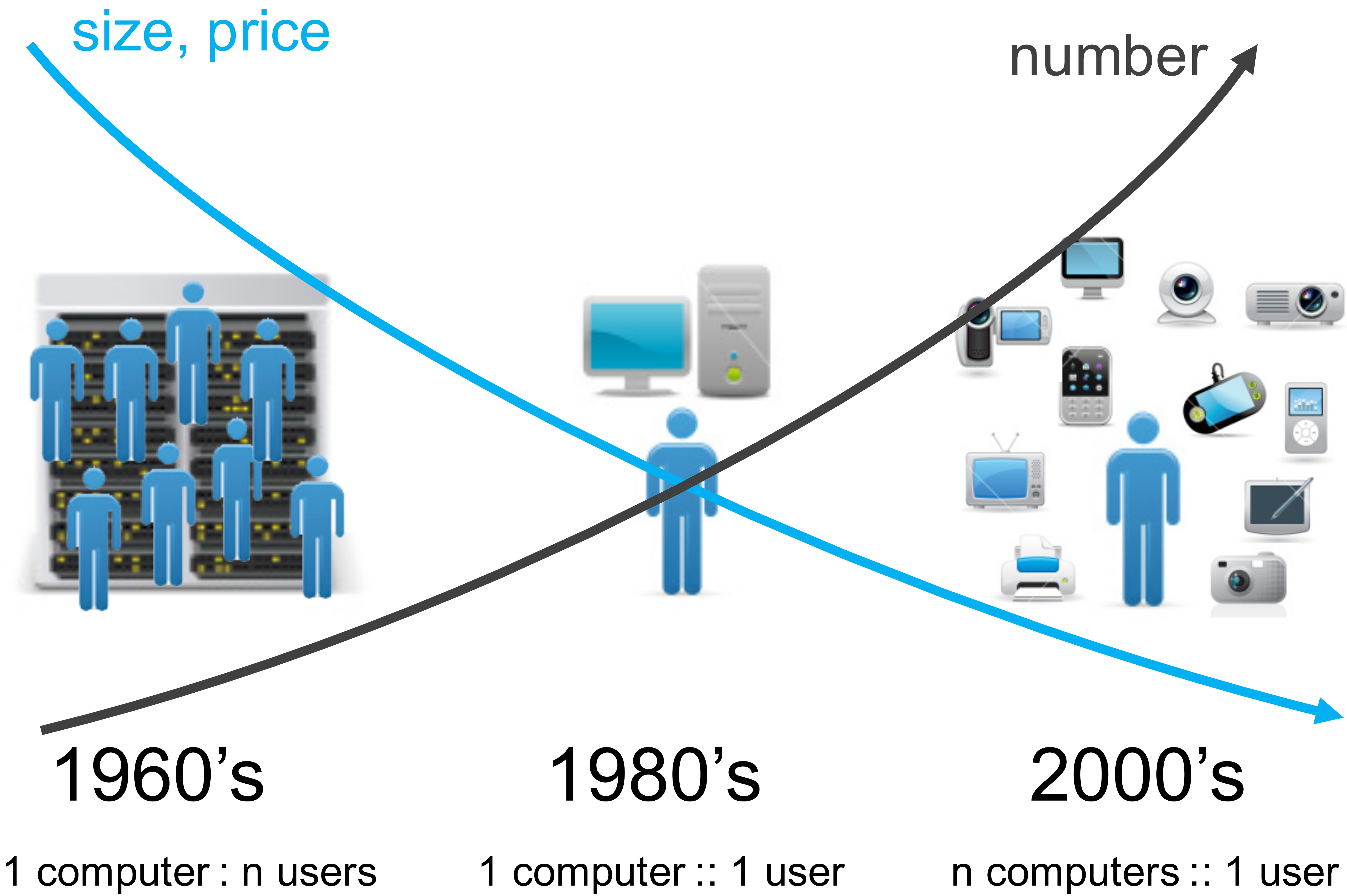
The Computer for the 21st Century

Mark Weiser 1991

The most profound technologies are those that disappear. They weave themselves into the fabric of everyday life until they are indistinguishable from it.

Consider writing, perhaps the first information technology: The ability to capture a symbolic representation of spoken language for long-term storage freed information from the limits of individual memory. Today this technology is ubiquitous in industrialized countries. Not only do books, magazines and newspapers convey written information, but so do street signs, billboards, shop signs and even graffiti. Candy wrappers are covered in writing. The constant background presence of these products of "literacy technology" does not require active attention, but the information to be conveyed is ready for use at a glance. It is difficult to imagine modern life otherwise.

Silicon-based information technology, in contrast, is far from having become part of the environment. More than 50 million personal computers have been sold, and nonetheless the computer remains largely in a world of its own. It is approachable only through complex jargon that has nothing to do with the tasks for which which people actually use computers. The state of the art is perhaps analogous to the period when scribes had to know as much about making ink or baking clay as they did about writing.


size, price
number
1960’s
1980’s
2000’s
1 computer : n users
1 computer :: 1 user
n computers :: 1 user

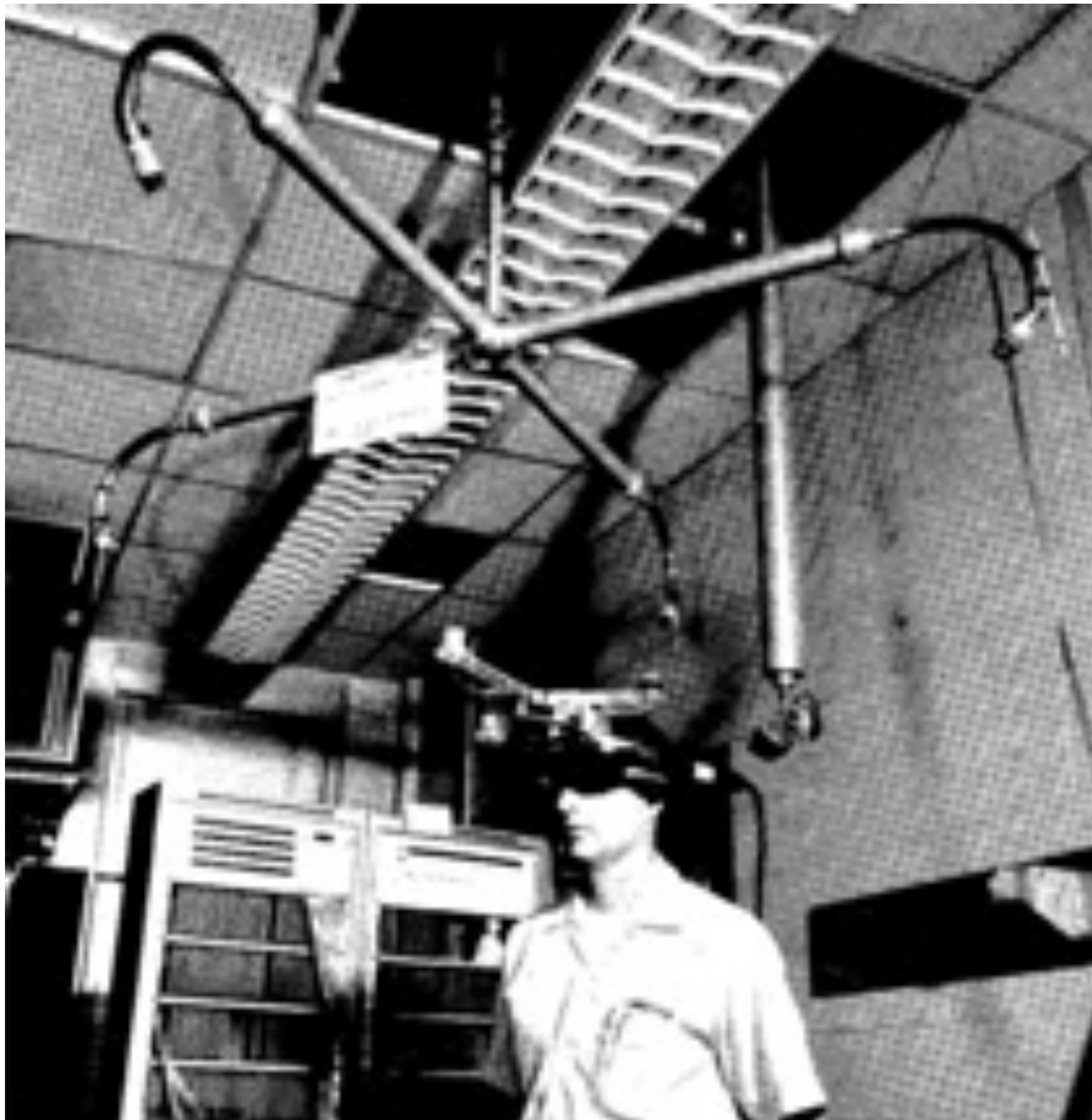
ubiquitous computing: the **obvious answer**

ubiquitous computing: the less obvious answer..
99 micro-controllers in a 2003 BMW

ubiquitous computing:
computers start to disappear

augmented reality (1968):

what if there was the perfect display everywhere I look



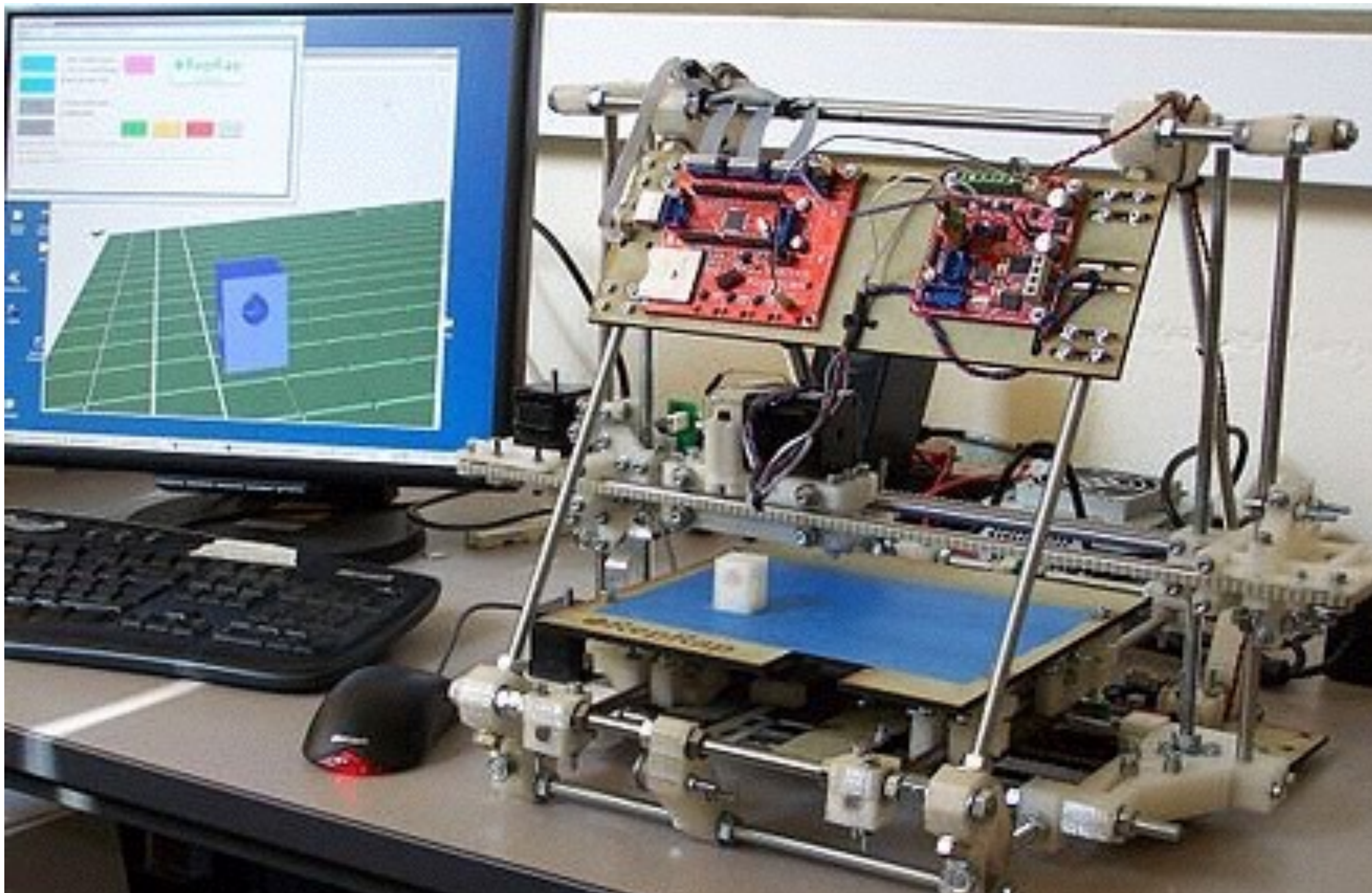
wearable (1961) + implanted:

what if **technology shrank past mobile?**

brain-computer interfaces (1961):

what if computers could read (and write) thoughts?

personal fabrication (2005):
what if **fabrication machinery is available**
in every office and/or every household?

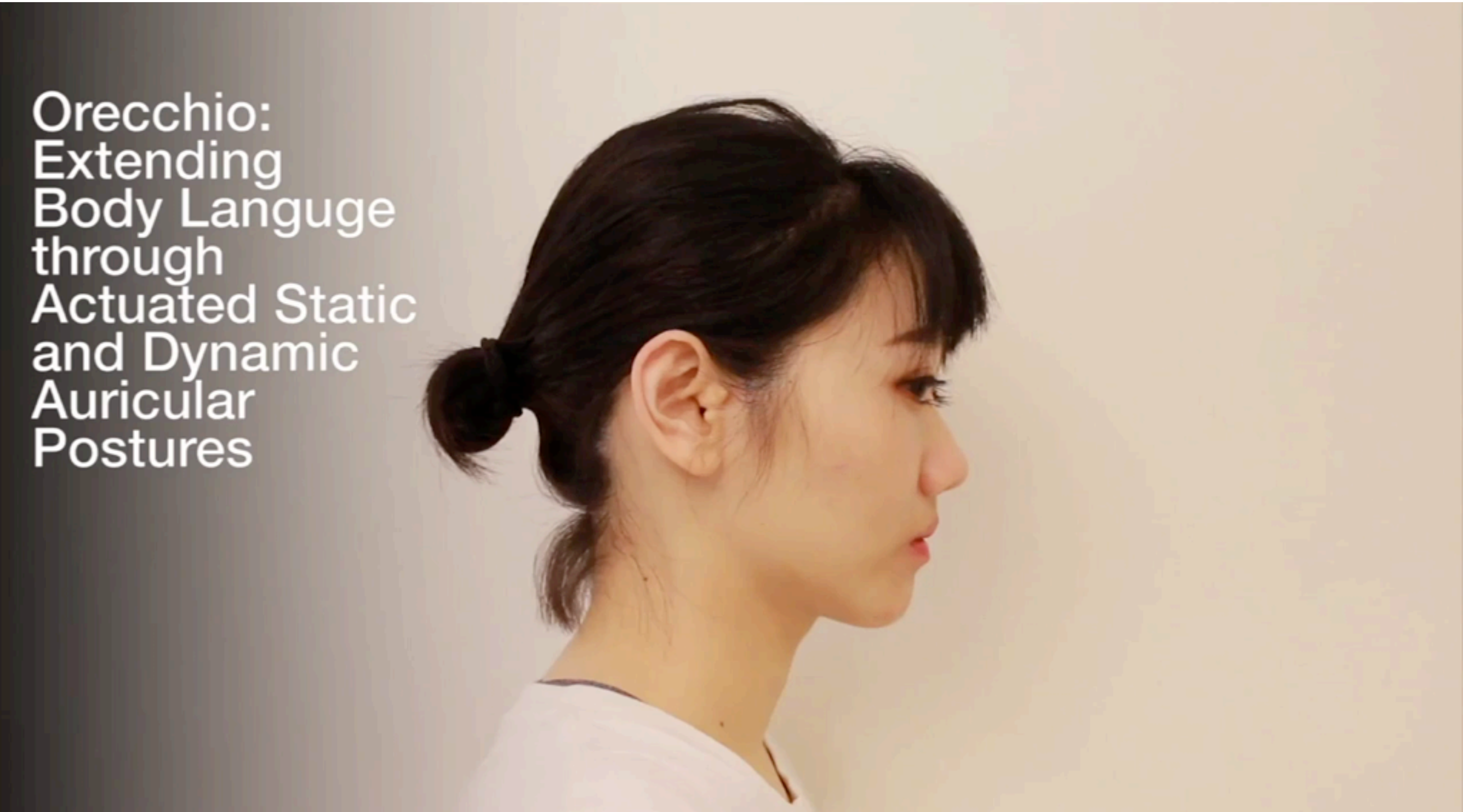


MetaArms (2018):

what if **people had extra limbs?**

Orecchio (2018):

what if **people could use extra body language?**



research:
speculating about the future.

then see who was right/wrong
20 years later.

any **what if questions**
that come to your mind right now?

<30sec brainstorming>

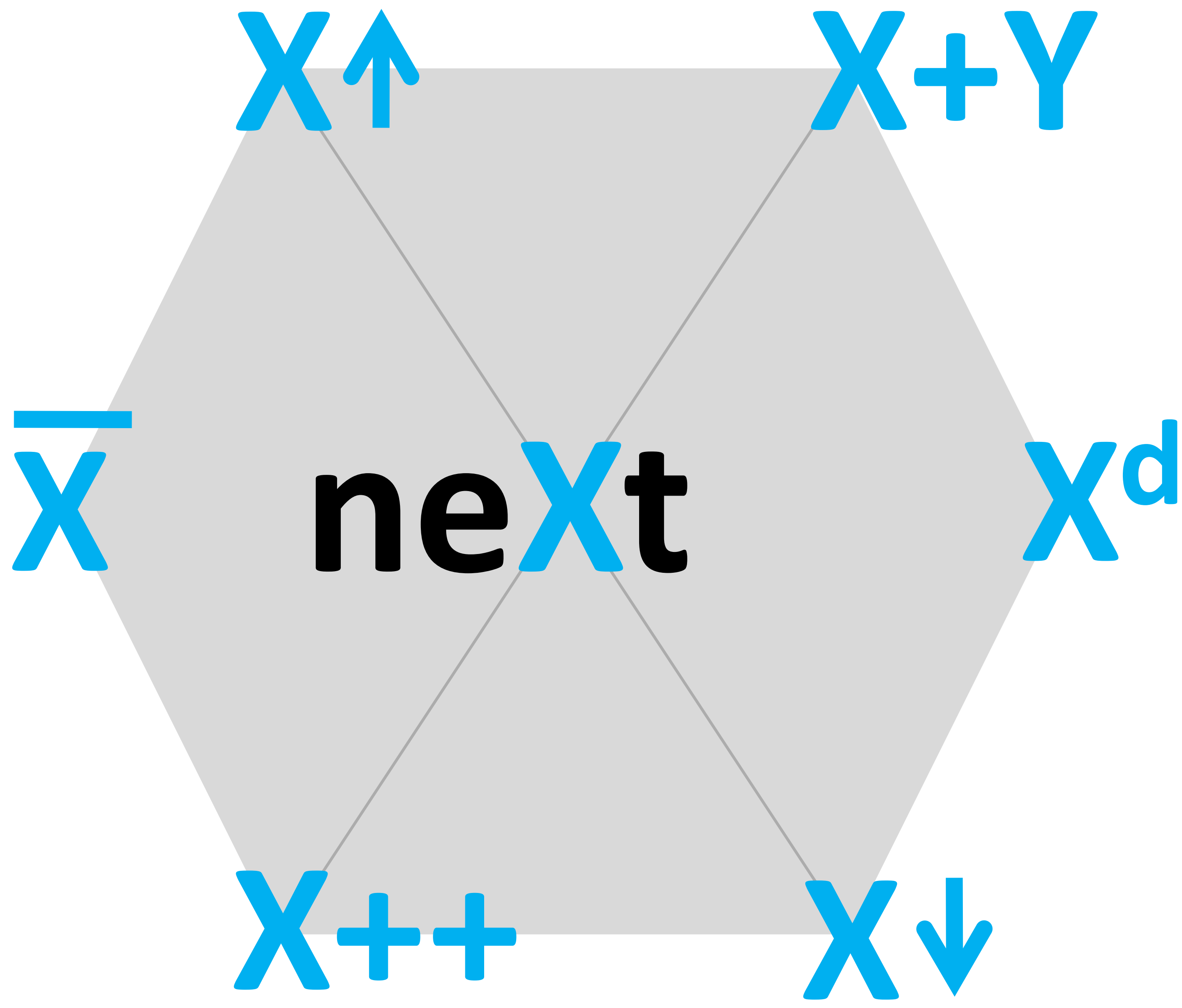
looking back through the history of HCI,
we see that **quantum leaps have rarely resulted from studies on user needs or market research;**

they have come from people
asking **visionary what-if questions!**

but what if questions are hard…

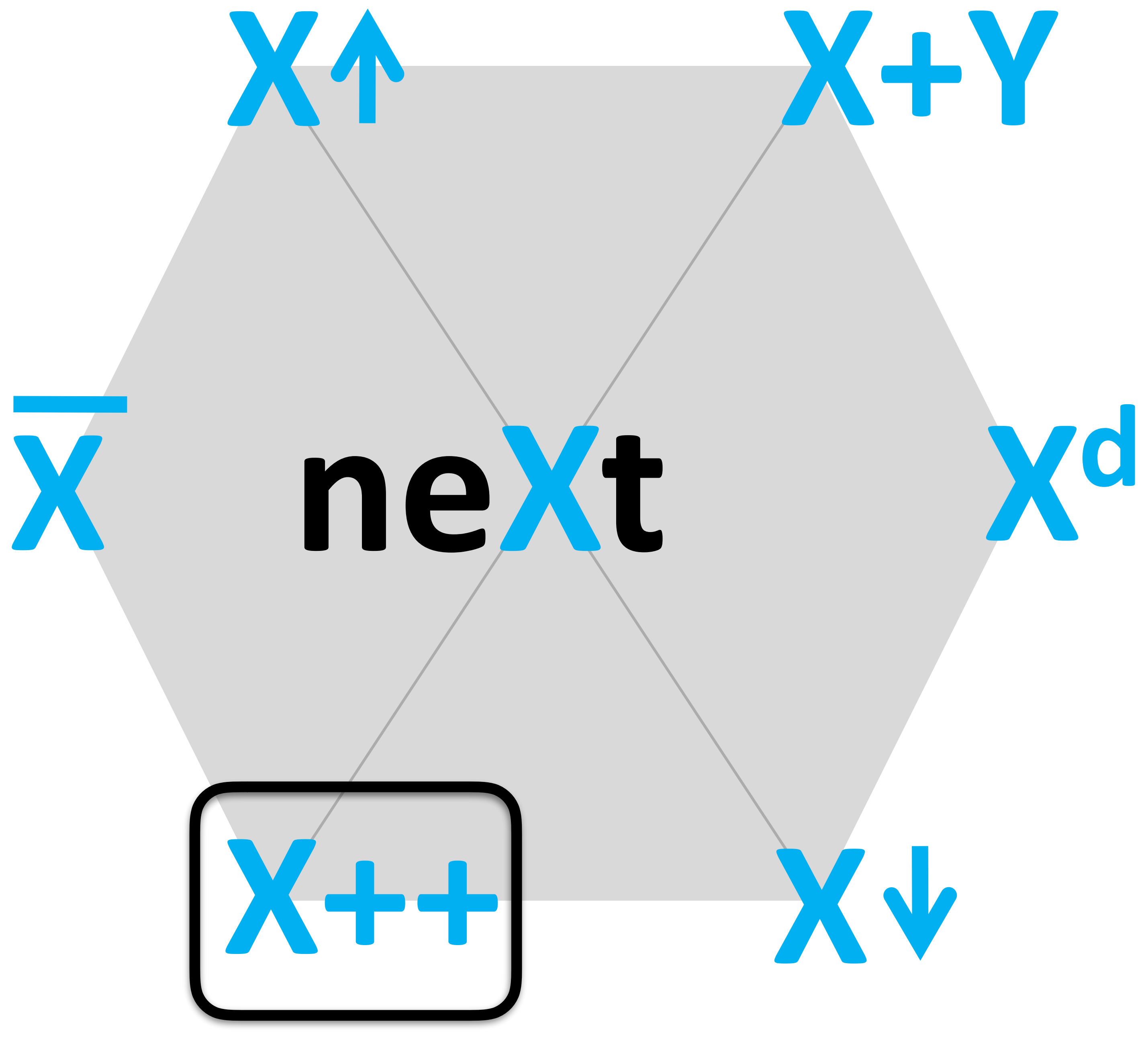
another way to extrapolate into the future
is to use **invention iterators…**

after X, what is neXt?



[Ramesh Raskar]

X = idea you just heard
concept
patent
new product
product feature
design
art
algorithm



X↑
X+Y
$\overline{X}$
neXt
X^d
X++
X↓

X++

increment

(make it faster, better, cheaper)

the first iPhone was a huge leap forward…
everything else is mainly **incremental**

	iPhone	iPhone 3G	iPhone 3GS	iPhone 4	iPhone 4S	iPhone 5	iPhone 5c	iPhone 5s
Code Name	M68	N82	N88	N90	N94	N41	N48	N51
Model Name	iPhone 1,1	iPhone 1,2	iPhone 2,1	iPhone 3,1	iPhone 4,1	iPhone 5,1	iPhone 5,3	iPhone 6,1
OS	iPhone OS 1.0	iPhone OS 2.0	iPhone OS 3.0	iOS 4	iOS 5	iOS 6	iOS 7	iOS 7
Screen Size	3.5-inch 480x320 at 163ppi	3.5-inch 480x320 at 163ppi	3.5-inch 480x320 at 163ppi	3.5-inch IPS 960x640 at 326ppi	3.5-inch IPS 960x640 at 326ppi	4-inch 1136x640 in-cell IPS LCD at 326ppi	4-inch 1136x640 in-cell IPS LCD at 326ppi	4-inch 1136x640 in-cell IPS LCD at 326ppi
System-on-chip	Samsung S5L8900	Samsung S5L8900	Samsung APL0298C05	Apple A4	Apple A5	Apple A6	Apple A6	64-bit Apple A7, M7 motion c-processor
CPU	ARM 1176JZ(F)-S	ARM 1176JZ(F)-S	600MHz ARM Cortex A8	800MHz ARM Cortex A8	800MHz dual-core ARM Cortex A9	1.3GHz dual-core Swift (ARM v7s)	1.3GHz dual-core Swift (ARM v7s)	1.3GHz dual-core Cyclone (ARM v8)
GPU	Power VR MBX Lite 3D	Power VR MBX Lite 3D	PowerVR SGX535	PowerVR SGX535	PowerVR dual-core SGX543MP4	PowerVR triple-core SGX543MP3	PowerVR triple-core SGX543MP3	PowerVR G6430
RAM	128MB	128MB	256MB	512MB	512MB	1GB	1GB	1GB DDR3
Storage	4GB/8GB (16GB later)	8GB/16GB	16GB/32GB	16GB/32GB	16GB/32GB/64GB	16GB/32GB/64GB	16GB/32GB	16GB/32GB/64GB
Top Data Speed	EDGE	3G 3.6	HSPA 7.2	HSPA 7.2	HSPA 14.4	LTE/DC-HSPA	LTE/DC-HSPA	LTE/DC-HSPA
SIM	Mini	Mini	Mini	Micro	Micro	Nano	Nano	Nano
Rear Camera	2MP	2MP	3MP/480p	5MP/720p, f2.8, 1.75µ	8MP/1080p, f2.4, BSI, 1.4µ	8MP/1080p, f2.4, BSI, 1.4µ	8MP/1080p, f2.4, BSI, 1.4µ	8MP/1080p, f2.2, BSI, 1.5µ
Front Camera	None	None	None	VGA	VGA	1.2MP/720p, BSI	1.2MP/720p, BSI	1.2MP/720p, BSI
Bluetooth	Bluetooth 2.0 + EDR	Bluetooth 2.0 + EDR	Bluetooth 2.1 + EDR	Bluetooth 2.1 + EDR	Bluetooth 4.0	Bluetooth 4.0	Bluetooth 4.0	Bluetooth 4.0
WiFi	802.11 b/g	802.11 b/g	802.11 b/g	802.11 b/g/n (2.4GHz)	802.11 b/g/n (2.4GHz)	802.11 b/g/n (2.4 and 5GHz)	802.11 b/g/n (2.4 and 5GHz)	802.11 b/g/n (2.4 and 5GHz)
GPS	None	aGPS	aGPS	aGPS	aGPS, GLONASS	aGPS, GLONASS	aGPS, GLONASS	aGPS, GLONASS
Sensors	Light, accelerometer, proximity	Light, accelerometer, proximity	Light, accelerometer, proximity, compass	Light, accelerometer, proximity, compass, gyroscope	Light, accelerometer, proximity, compass, gyroscope, infrared	Light, accelerometer, proximity, compass, gyroscope, infrared	Light, accelerometer, proximity, compass, gyroscope, infrared	Light, accelerometer, proximity, compass, gyroscope, infrared, fingerprint identity

screen size becomes a bit bigger..
camera resolution becomes a bit higher…
hard drive can store a bit more data…

better
= pick your favorite adjective:

- more context aware
- more adaptive
- more (temporally) coherent,
- more progressive
- more efficient
- more parallelized
- more distributed
- more personalized/customized
- more democratized

least innovative

X++ is a sign that the **field or tech is “maturing”**

increments get smaller, less ground-breaking

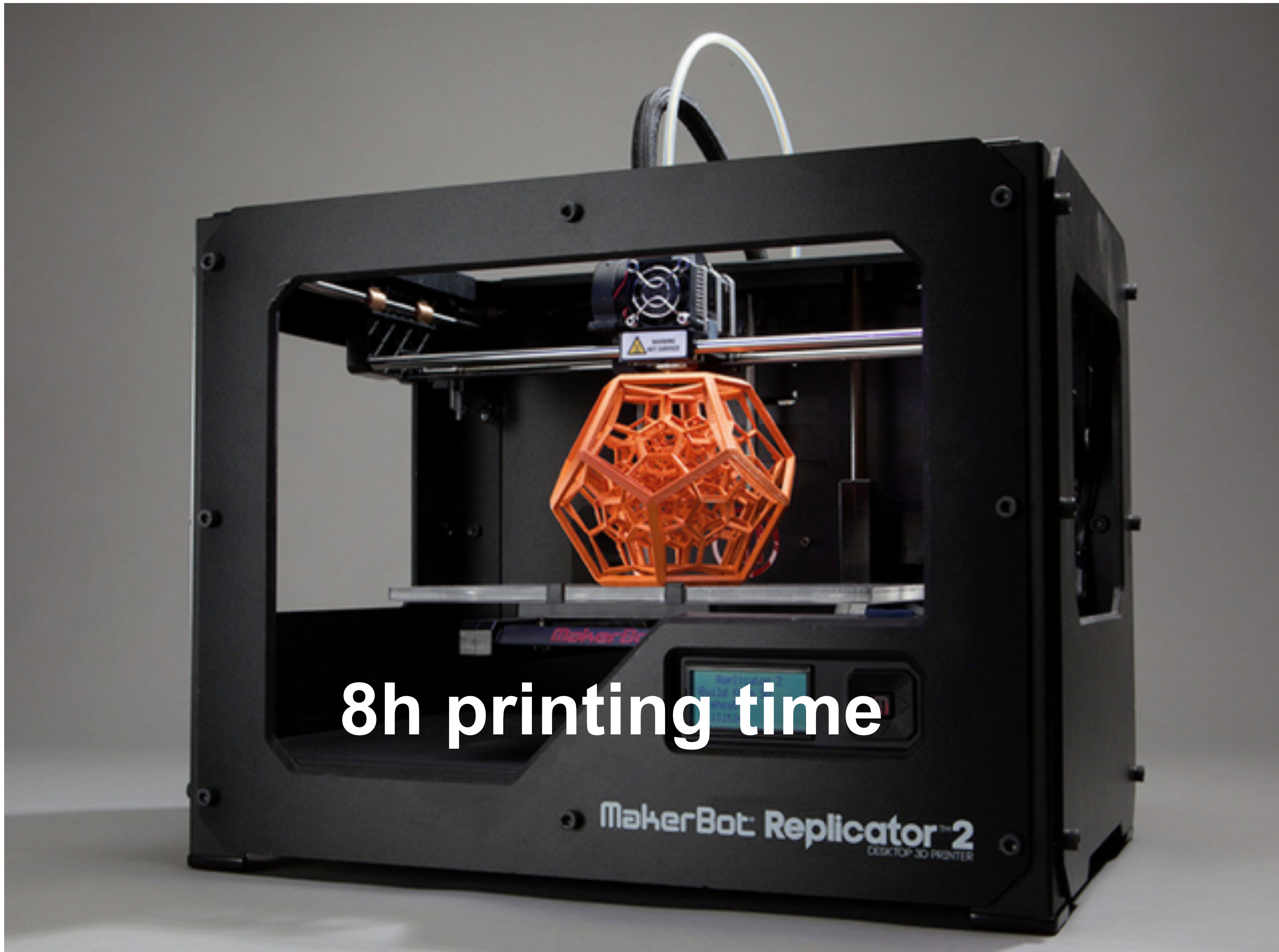
X↓

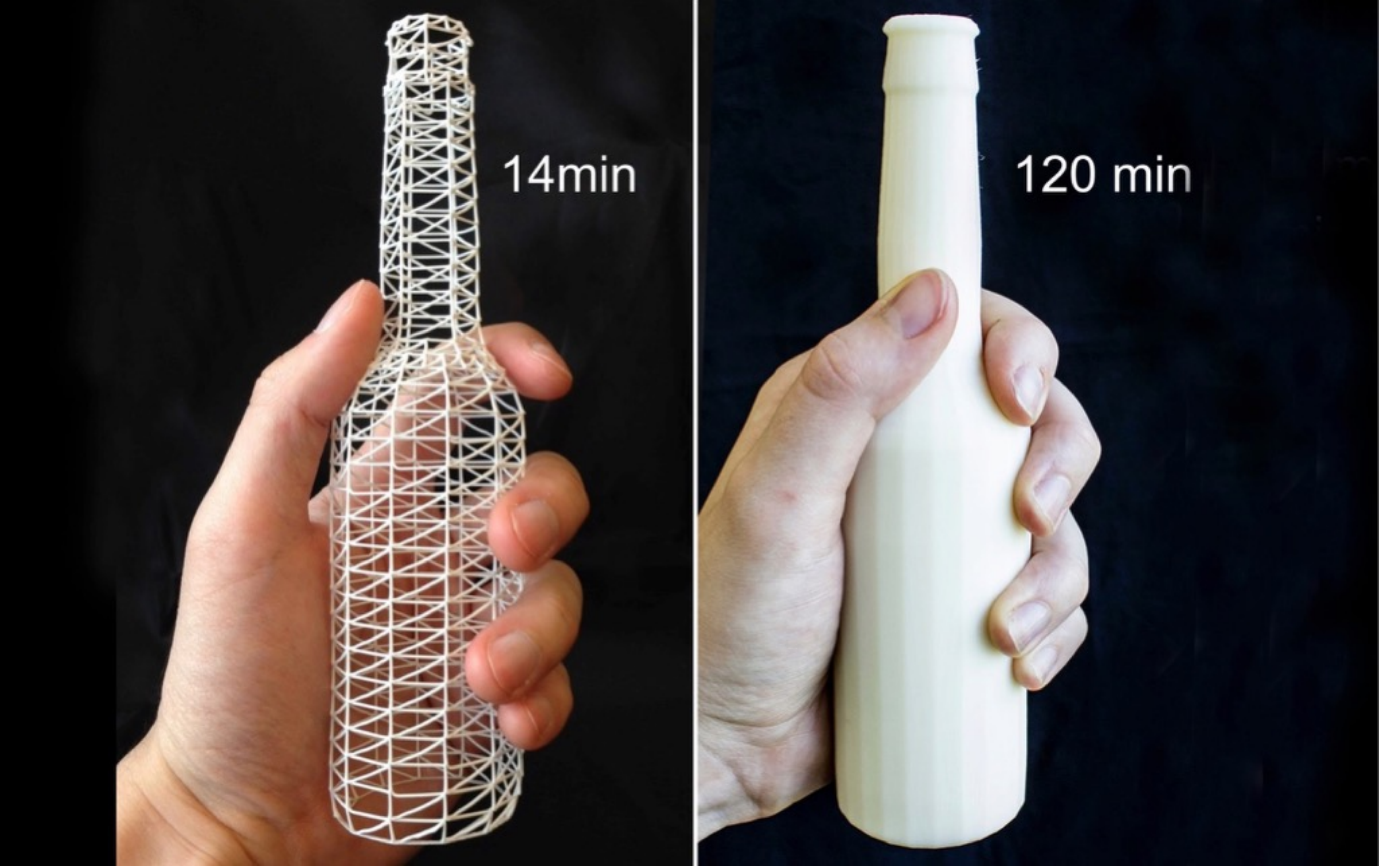
given a nail

find all the hammers

given a problem,
find all solutions…

e.g. 3D Printing is so slow





solution 1: print as wireframes

WirePrint: 3D Printed Previews for Fast Prototyping

Stefanie Mueller[1], Sangha Im[2], Serafima Gurevich[1], Alexander Teibrich[1], Lisa Pfisterer[1], François Guimbretière[2], Patrick Baudisch[1]

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ABSTRACT

Even though considered a *rapid* prototyping tool, 3D printing is so slow that a reasonably sized object requires printing overnight. This slows designers down to a single iteration per day. In this paper, we propose to instead print low-fidelity *wireframe previews* in the early stages of the design process. Wireframe previews are 3D prints in which surfaces have been replaced with a wireframe mesh. Since wireframe previews are to scale and represent the overall shape of the 3D object, they allow users to quickly verify key aspects of their 3D design, such as the ergonomic fit.

To maximize the speed-up, we instruct 3D printers to extrude filament not layer-by-layer, but directly in 3D-space, allowing them to create the edges of the wireframe model directly one stroke at a time. This allows us to achieve speed-ups of up to a factor of 10 compared to traditional layer-based printing. We demonstrate how to achieve wireframe previews on standard FDM 3D printers, such as the *PrintrBot* or the *Kossel mini*. Users only need to install the WirePrint software, making our approach applicable to many 3D printers already in use today. Finally, wireframe previews use only a fraction of material required for a regular print, making it even more affordable to iterate.

Author Keywords: rapid prototyping; 3D printing.

ACM Classification Keywords: H5.2 [Information interfaces and presentation]: User Interfaces.

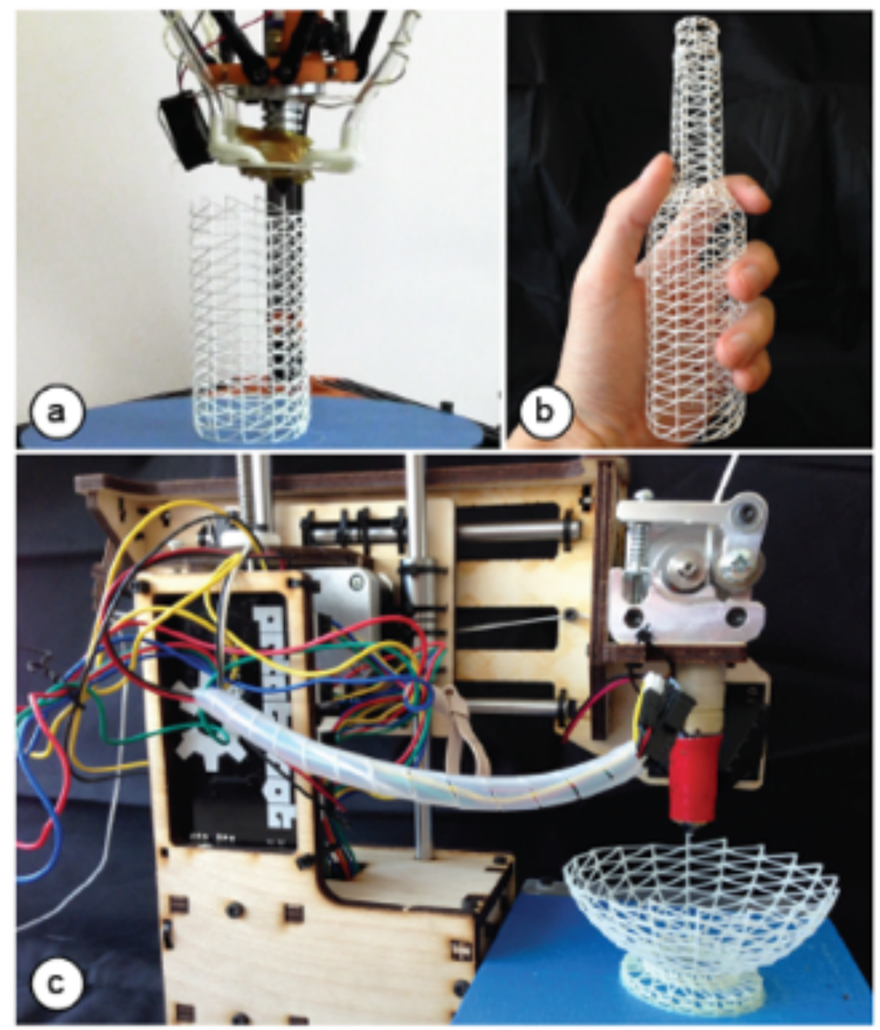
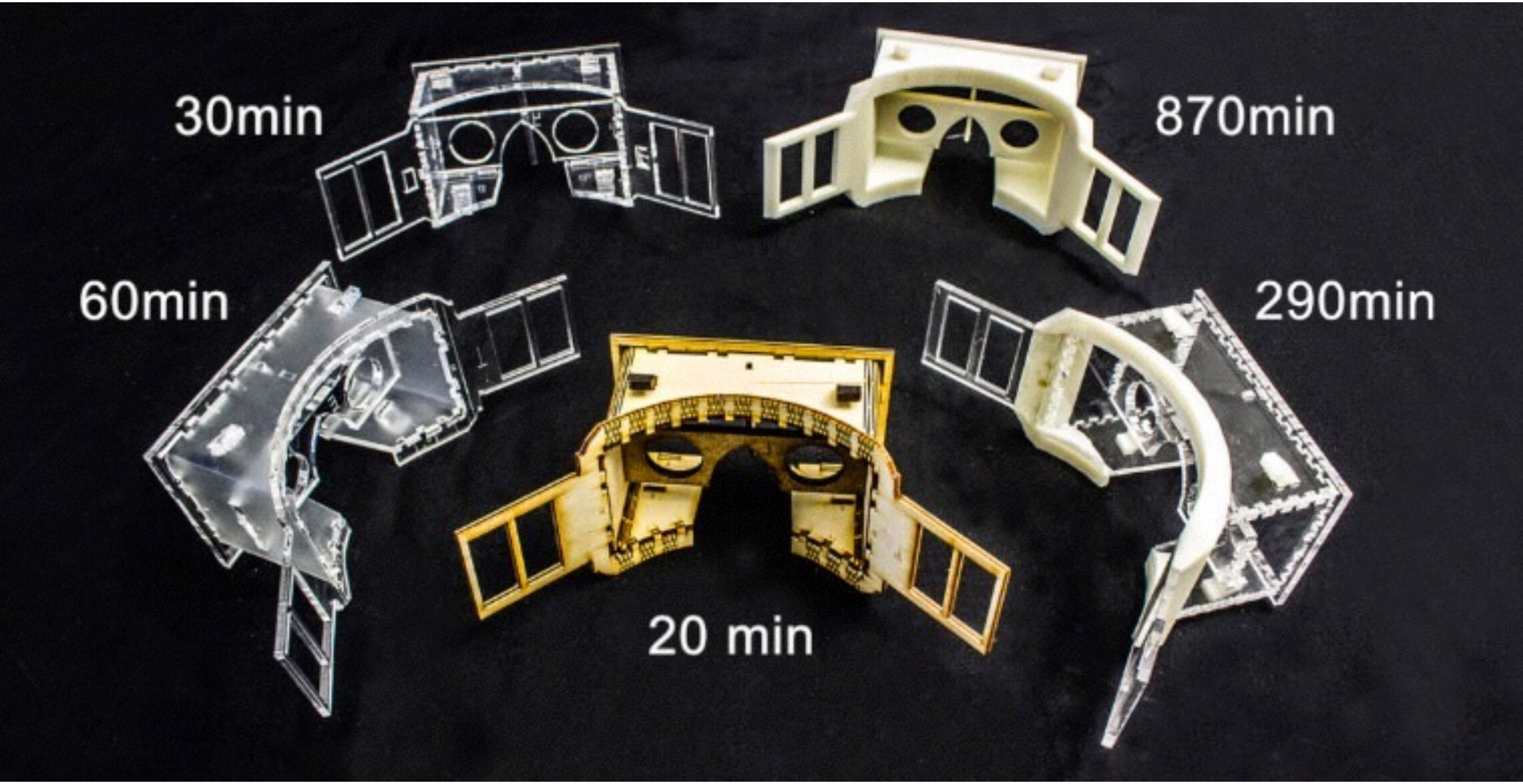


Figure 1: WirePrint prints 3D objects as wireframe previews. By extruding filament directly into 3D space instead of printing layer-wise, it achieves a speed-up of up to a factor of 10, allowing designers to iterate more quickly in the early stages of design. WirePrint achieves its maximum speed-up on (a) 3D printers based on the delta design, but also works on traditional Cartesian-based printers such as the PrintrBot shown in (c).

INTRODUCTION

The recent development in rapid prototyping tools, such as 3D printers [5] allows users to prototype one-off objects and to iterate over designs. Unfortunately, 3D printers are inherently slow, because they fabricate objects voxel-by-voxel and layer-by-layer. A reasonably sized object thus tends to print overnight, slowing designers down to a single



solution 2: convert to laser cut plates

Platener: Low-Fidelity Fabrication of 3D Objects by Substituting 3D Print with Laser-Cut Plates

Dustin Beyer, Serafima Gurevich, Stefanie Mueller, Hsiang-Ting Chen, Patrick Baudisch
Hasso Plattner Institute, Potsdam, Germany
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ABSTRACT

This paper presents Platener, a system that allows quickly fabricating intermediate design iterations of 3D models, a process also known as low-fidelity fabrication. Platener achieves its speed-up by extracting straight and curved plates from the 3D model and substituting them with laser cut parts of the same size and thickness. Only the regions that are of relevance to the current design iteration are executed as full-detail 3D prints. Platener connects the parts it has created by automatically inserting joints. To help fast assembly it engraves instructions. Platener allows users to customize substitution results by (1) specifying fidelity-speed tradeoffs, (2) choosing whether or not to convert curved surfaces to plates bent using heat, and (3) specifying the conversion of individual plates and joints interactively.

Platener is designed to best preserve the fidelity of *functional* objects, such as casings and mechanical tools, all of which contain a large percentage of straight/rectilinear elements. Compared to other low-fab systems, such as faBrickator and WirePrint, Platener better preserves the stability and functionality of such objects: the resulting assemblies have fewer parts and the parts have the same size and thickness as in the 3D model.

To validate our system, we converted 2,250 3D models downloaded from a 3D model site (*Thingiverse*). Platener achieves a speed-up of 10x or more for 39.9% of all objects.

Author Keywords: rapid prototyping; 3D printing; building blocks; physical prototyping.

ACM Classification Keywords: H5.2 [Information interfaces and presentation]: User Interfaces.

INTRODUCTION

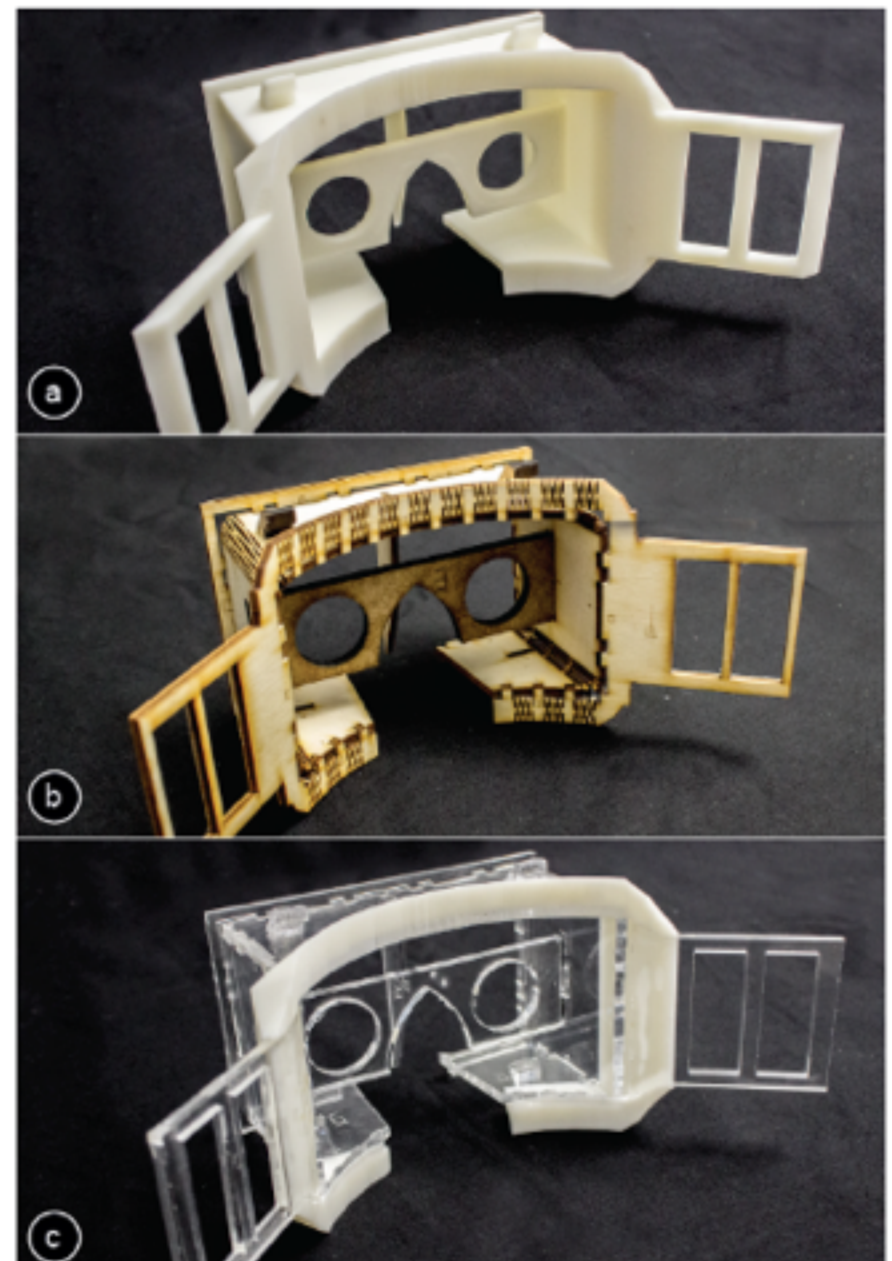
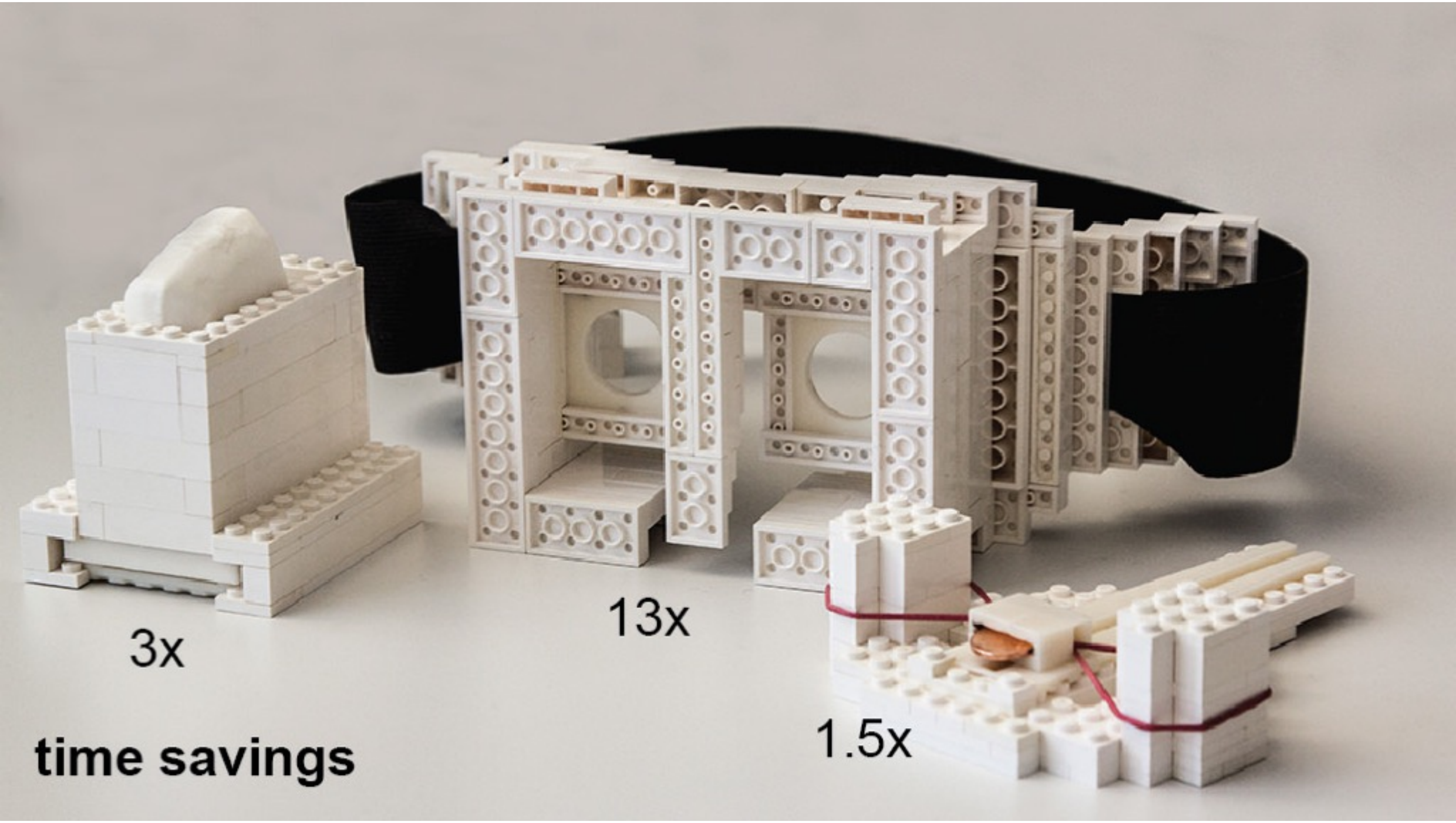


Figure 1: Platener speeds up the fabrication process by substituting parts of 3D models with straight and curved plates that can be fabricated quickly on a laser cutter.



solution 3: combine with existing building blocks

faBrickation: Fast 3D Printing of Functional Objects by Integrating Construction Kit Building Blocks

Stefanie Mueller, Tobias Mohr, Kerstin Guenther, Johannes Frohnhofen, Patrick Baudisch
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ABSTRACT
We present a new approach to rapid prototyping of functional objects, such as the body of a head-mounted display. The key idea is to save 3D printing time by automatically substituting sub-volumes with standard building blocks—in our case Lego bricks. When making the body for a head-mounted display, for example, getting the optical path right is paramount. Users thus mark the lens mounts as "high-resolution" to indicate that these should later be 3D printed. faBrickator then 3D prints these parts. It also generates instructions that show users how to create everything else from Lego bricks. If users iterate on the design later, faBrickator offers even greater benefit as it allows re-printing only the elements that changed. We validated our system at the example of three 3D models of functional objects. On average, our system fabricates objects 2.44 times faster than traditional 3D printing while requiring only 14 minutes of manual assembly.

Author Keywords: rapid prototyping; 3D printing; design iteration; building blocks; physical prototyping.

ACM Classification Keywords: H.5.2 [Information interfaces and presentation]: User Interfaces.

General Terms: Design; Human Factors.

Figure 1: Let's fabricate this head-mounted display body quickly: (a) The exact shape of the lens mounts matters; the user thus marks them as "high-resolution" in faBrickator and (b) prints them. (c) faBrickator shows the user how to create everything else from Lego

INTRODUCTION
The recent development in rapid prototyping tools, such as laser cutters, milling machines, and 3D printers [8], allows users to prototype one-off objects and to iterate over designs. These tools offer sufficient shape complexity and resolution to allow prototyping functional objects, such as the body of a head-mounted display with its bosses and mounts for holding the lenses, the head-strap, etc.

While 3D printers can create objects with the necessary level of detail, they are also very slow. Since printing time

first one is very innovative!
all follow ups dance around the same problem

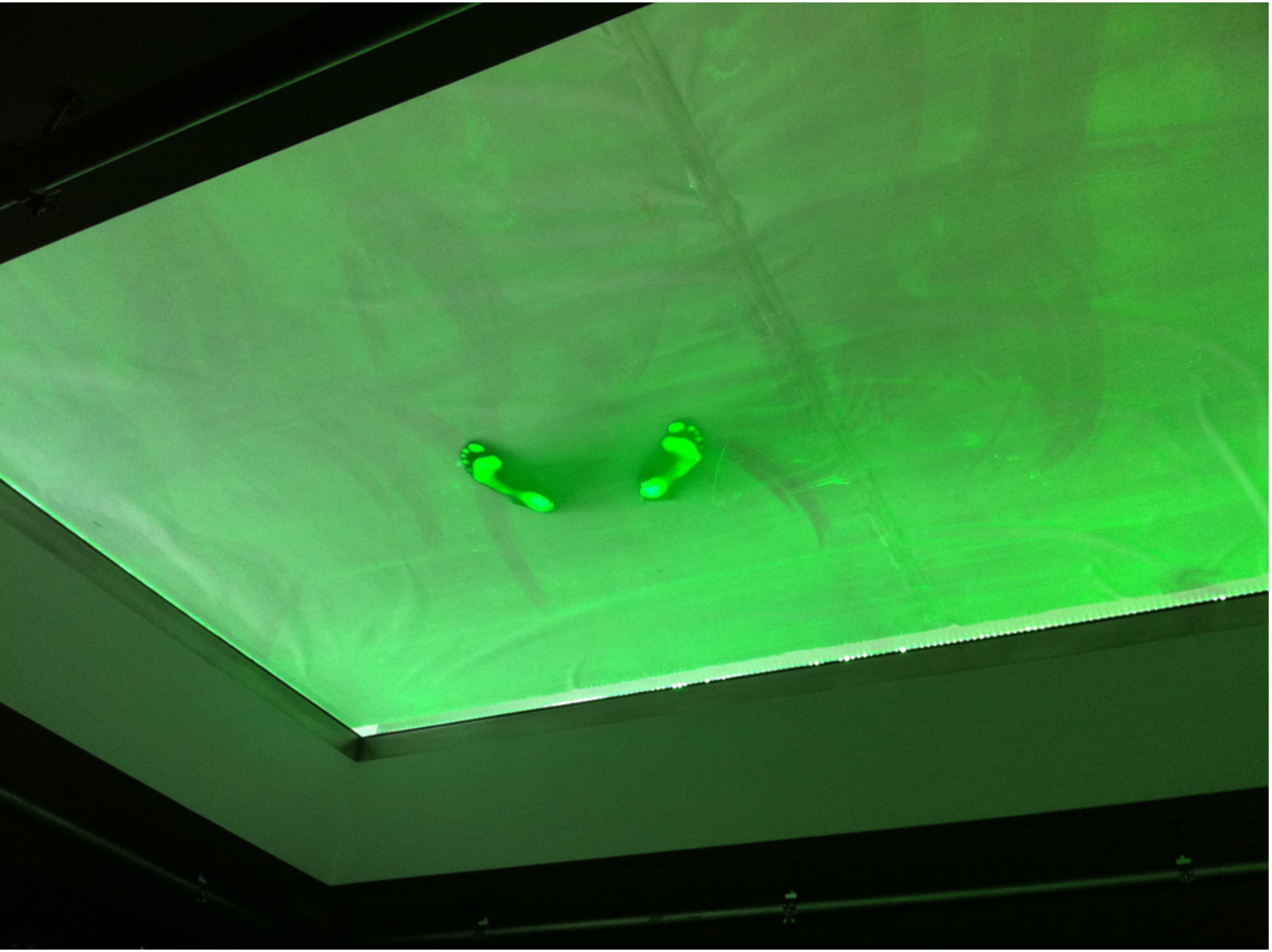
low in innovation power

given a hammer

find all the nails

given a cool solution find other problems

-> high inventive power



multitouch:

for hands -> multitouch for feet

2010 recognizing users based on shoe sole

Multitoe: High-Precision Interaction with Back-Projected Floors Based on High-Resolution Multi-Touch Input

Thomas Augsten, Konstantin Kaefer, René Meusel, Caroline Fetzer, Dorian Kanitz, Thomas Stoff, Torsten Becker, Christian Holz, and Patrick Baudisch
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ABSTRACT
Tabletop applications cannot display more than a few dozen on-screen objects. The reason is their limited size: tables cannot become larger than arm's length without giving up direct touch. We propose creating direct touch surfaces that are orders of magnitude larger. We approach this challenge by integrating high-resolution multi-touch input into a back-projected floor. As the same time, we maintain the purpose and interaction concepts of tabletop computers, namely direct manipulation.

We base our hardware design on frustrated total internal reflection. Its ability to sense per-pixel pressure allows the floor to locate and analyze users' soles. We demonstrate how this allows the floor to recognize foot postures and identify users. These two functions form the basis of our system. They allow the floor to ignore users unless they interact explicitly, identify and track users based on their shoes, enable high-precision interaction, invoke menus, track heads, and allow users to control high-degree of freedom interactions using their feet. While we base our designs on a series of simple user studies, the primary contribution on this paper is in the engineering domain.

ACM Classification: H5.2 [Information interfaces and presentation]: User Interfaces: Input Devices and Strategies, Interaction Styles.

Keywords: Interactive Floor, Multi-touch, FTIR, Front DI, Direct Manipulation, Tabletop, Projection.

General terms: Design, Human factors.

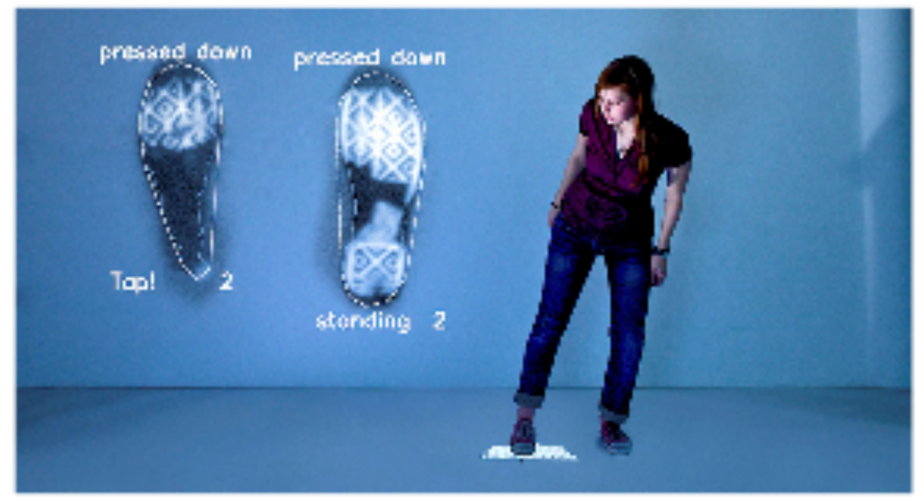

Figure 1: Integrating high-resolution FTIR into a back-projected floor allows the floor to see the pressure distribution of the user's soles (inset top left, as seen from below). In the shown situation, the floor ignores the foot on the right based on its posture, yet allows the foot on the left to interact. By identifying the user based on her sole patterns, the floor has attached a user-specific high-precision pointer to her foot, which allows her to operate tiny controls, here a keyboard.

INTRODUCTION

We argue that the size constraints of tabletops have limited the discussion about what can be done on horizontal surfaces to what fits the format. What about applications were users interact with *thousands or ten-thousands* of on-screen objects, such as complex visual sensemaking applications?

We propose direct touch surfaces that are orders of magnitude larger than tables by integrating high-resolution multi-touch technology into back-projected floors. Unlike table

2013 reconstructing 3D position from shoe sole

GravitySpace: Tracking Users and Their Poses in a Smart Room Using a Pressure-Sensing Floor

Alan Bränzel, Christian Holz, Daniel Hoffmann, Dominik Schmidt, Marius Knaust, Patrick Lühne, René Meusel, Stephan Richter, Patrick Baudisch
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ABSTRACT
We explore how to track people and furniture based on a high-resolution pressure-sensitive floor. Gravity pushes people and objects against the floor, causing them to leave imprints of pressure distributions across the surface. While the sensor is limited to sensing direct contact with the surface, we can sometimes *conclude* what takes place *above* the surface, such as users' poses or collisions with virtual objects. We demonstrate how to extend the range of this approach by sensing through passive furniture that propagates pressure to the floor. To explore our approach, we have created an 8 m^2 back-projected floor prototype, termed *GravitySpace*, a set of passive touch-sensitive furniture, as well as algorithms for identifying users, furniture, and poses. Pressure-based sensing on the floor offers four potential benefits over camera-based solutions: (1) it provides consistent coverage of rooms wall-to-wall, (2) is less susceptible to occlusion between users, (3) allows for the use of simpler recognition algorithms, and (4) intrudes less on users' privacy.

Author Keywords
Interactive floor; smart rooms; ubicomp; multitoe; multi-touch; FTIR; tabletop; vision.

ACM Classification Keywords
H.5.2. [Information Interfaces and Presentation]: User Interfaces–Input devices and strategies, interaction styles.

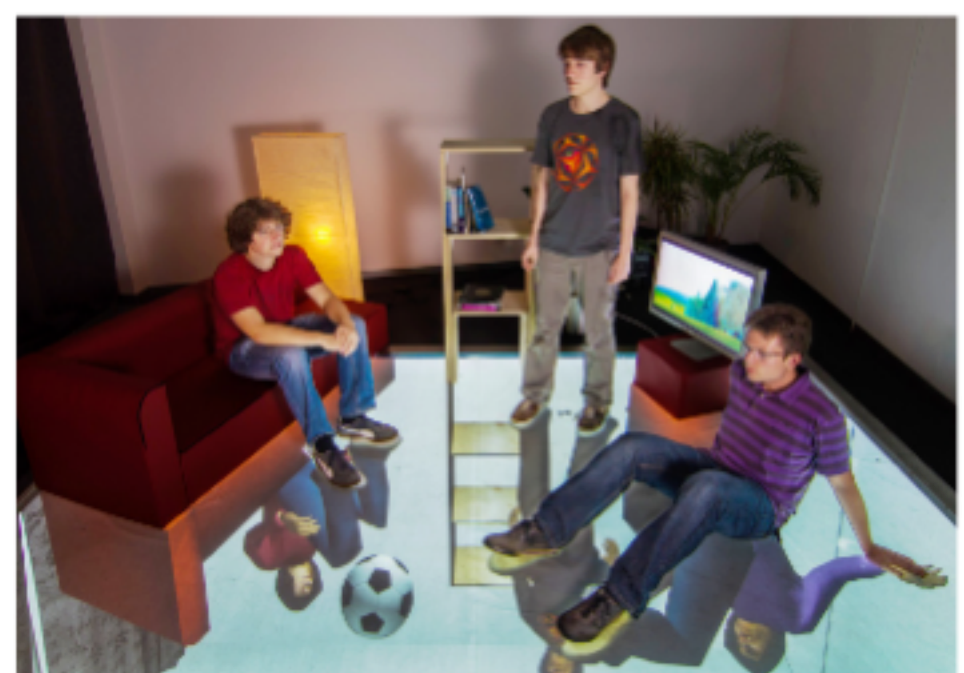
General Terms
Design; Human Factors.

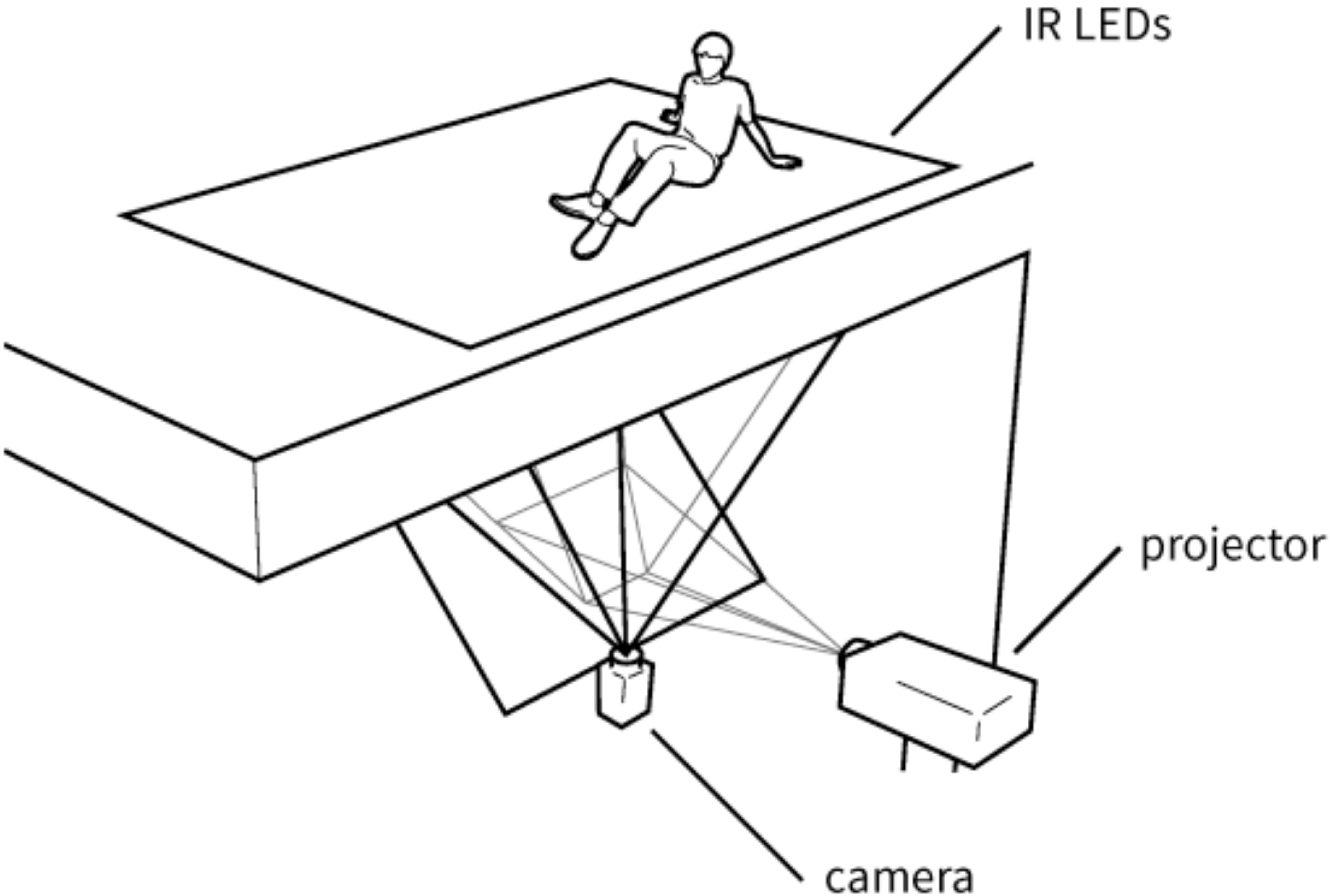
INTRODUCTION

Brummit et al. define self-aware spaces as "… [a space that]

In order to provide this support, smart rooms track users and try to automatically recognize their activities. In systems like EasyLiving, this was done by pointing tracking equipment, such as cameras, at the interior of the room [5]. The direct observation of scenes using computer vision is of limited reliability, because of illumination and perspective effects, as well as occlusion between people. The latter also affects more recent approaches based on depth cameras (e.g., *LightSpace* [43]).

We propose an alternative approach to tracking people and objects in smart rooms. Building on recent work on touch-sensitive floors (e.g., *Multitoe* [1]) and pose reconstruction, such as [44], we explore how much a room can infer about its inhabitants solely based on the pressure imprints people and objects leave on the floor.




IR LEDs
projector
camera

2015 Ergonomic Interaction on Touch Floors

Ergonomic Interaction on Touch Floors

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Figure 1: We argue that touch floors have bad ergonomics as they are designed for being used while standing, which causes fatigue, especially in combination with looking down. We thus propose allowing users to operate touch floors in other poses. Based on a series of studies, we have created a simple view manager that supports users in switching poses by re-layouting screen content.

ABSTRACT
The main appeal of touch floors is that they are the only direct touch form factor that scales to arbitrary size, therefore allowing direct touch to scale to very large numbers of display objects. In this paper, however, we argue that the price for this benefit is bad physical ergonomics: prolonged standing, especially in combination with looking down, quickly causes fatigue and repetitive strain. We propose addressing this issue by allowing users to operate touch floors in any pose they like, including sitting and lying. To allow users to transition between poses seamlessly, we present a simple pose-aware view manager that supports users by adjusting the entire view to the new pose. We support

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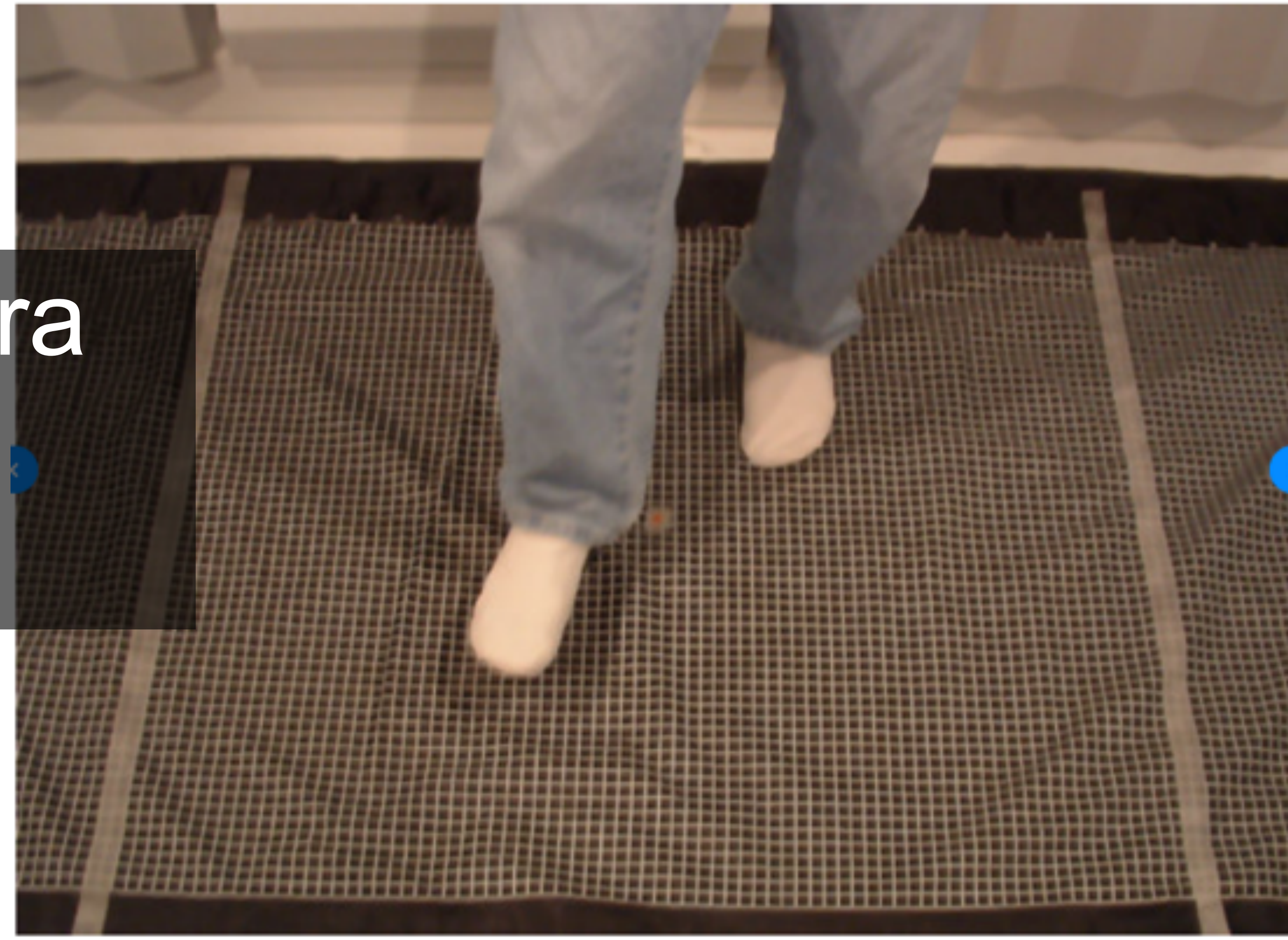
Ubicomp; Smart Rooms; Interactive Floor; GUI; Multi-touch; Ergonomics.

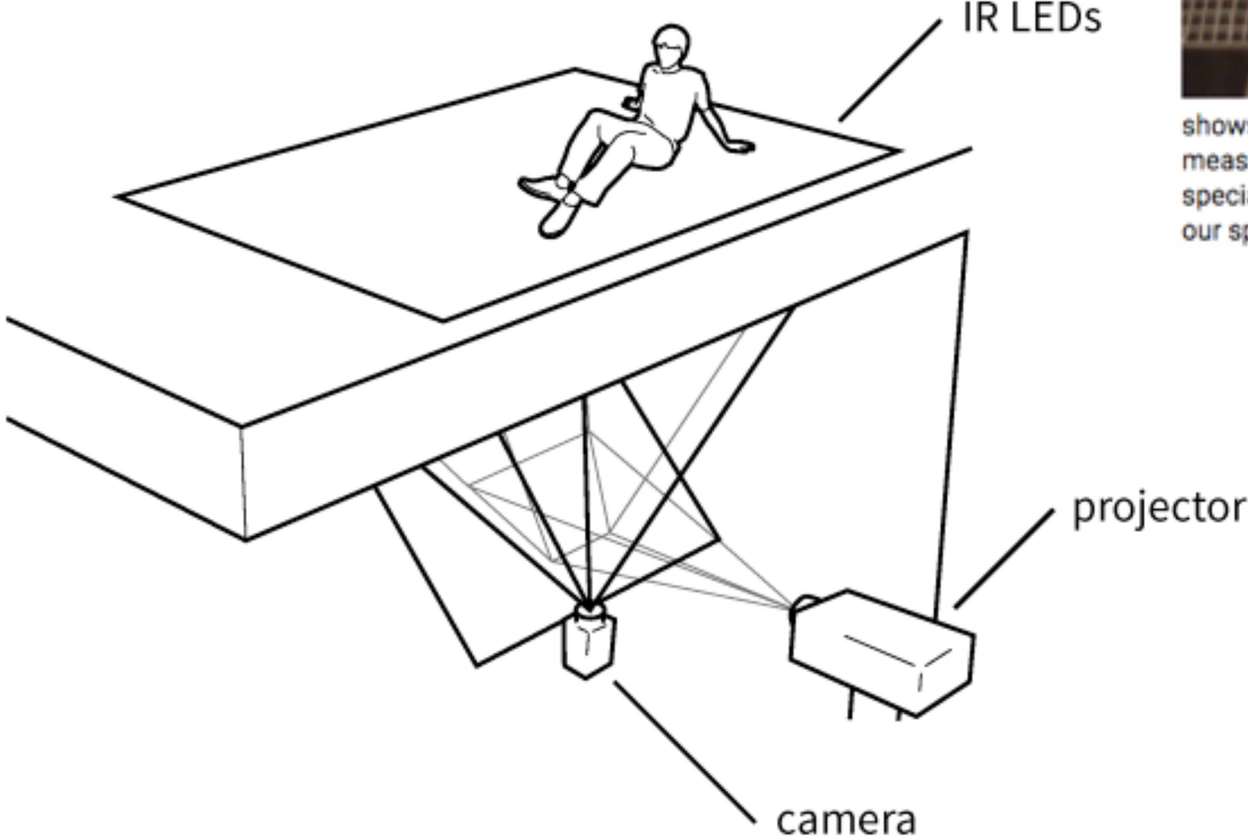
ACM Classification Keywords
H.5.2. [Information Interfaces and Presentation]: User Interfaces–Input devices and strategies, interaction styles.

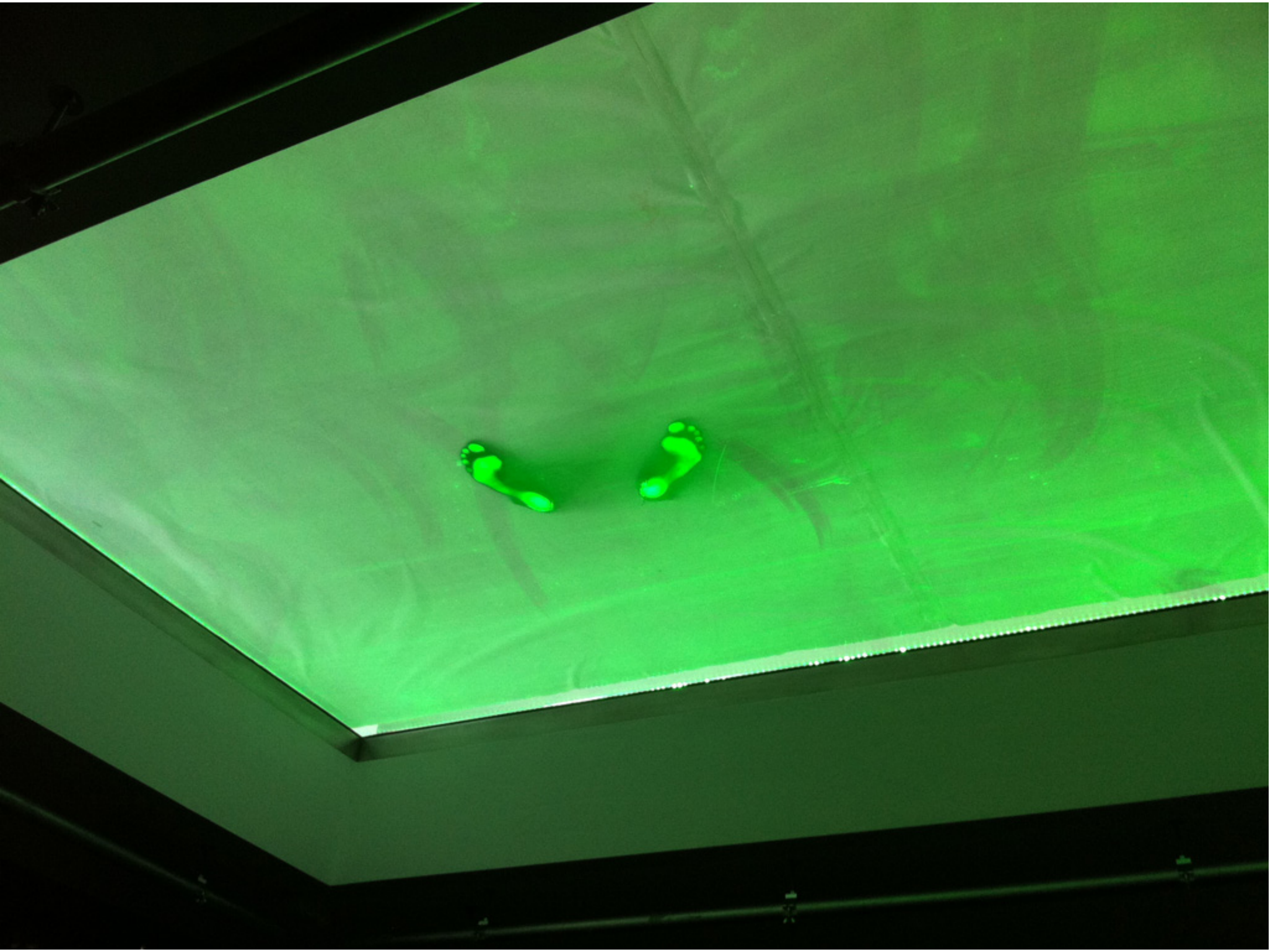
INTRODUCTION
The main appeal of touch floors (e.g., [1,11,26]) is that they allow creating interaction spaces of *arbitrary* size, while maintaining the affordance of direct touch. This makes touch floors different from touch tables, tablets, etc. whose size is limited by arm's reach—even interactive walls,

future: replace camera setup with pressure sensor carpet



shows our XSensor pressure sensor pad. It is made of a 160 by 64 grid of pressure sensors. It was originally designed for measuring the pressures of a person lying on a bed, and was capable of sampling the whole pad at 6 Hz. Our pad is specially constructed to measure the larger pressures due to standing and running. Using custom software developed to our specifications, we can sample a smaller region of interest at a higher rate.





multitouch (hammer):
solutions: for hands -> for feet

look back at your life so far
what could be **your hammer?**

<something you know a lot about but others know little>

<30sec brainstorming>

X^d

extend it

to the next dimension

flickr -> youtube
text, audio (speech), image, video -> physical objects

visible images -> infrared
sound -> ultrasound -> electromagnetic spectrum

macro scale -> micro scale
airbag for car -> airbag for .. ?

= generalize the concept (common in patent applications)

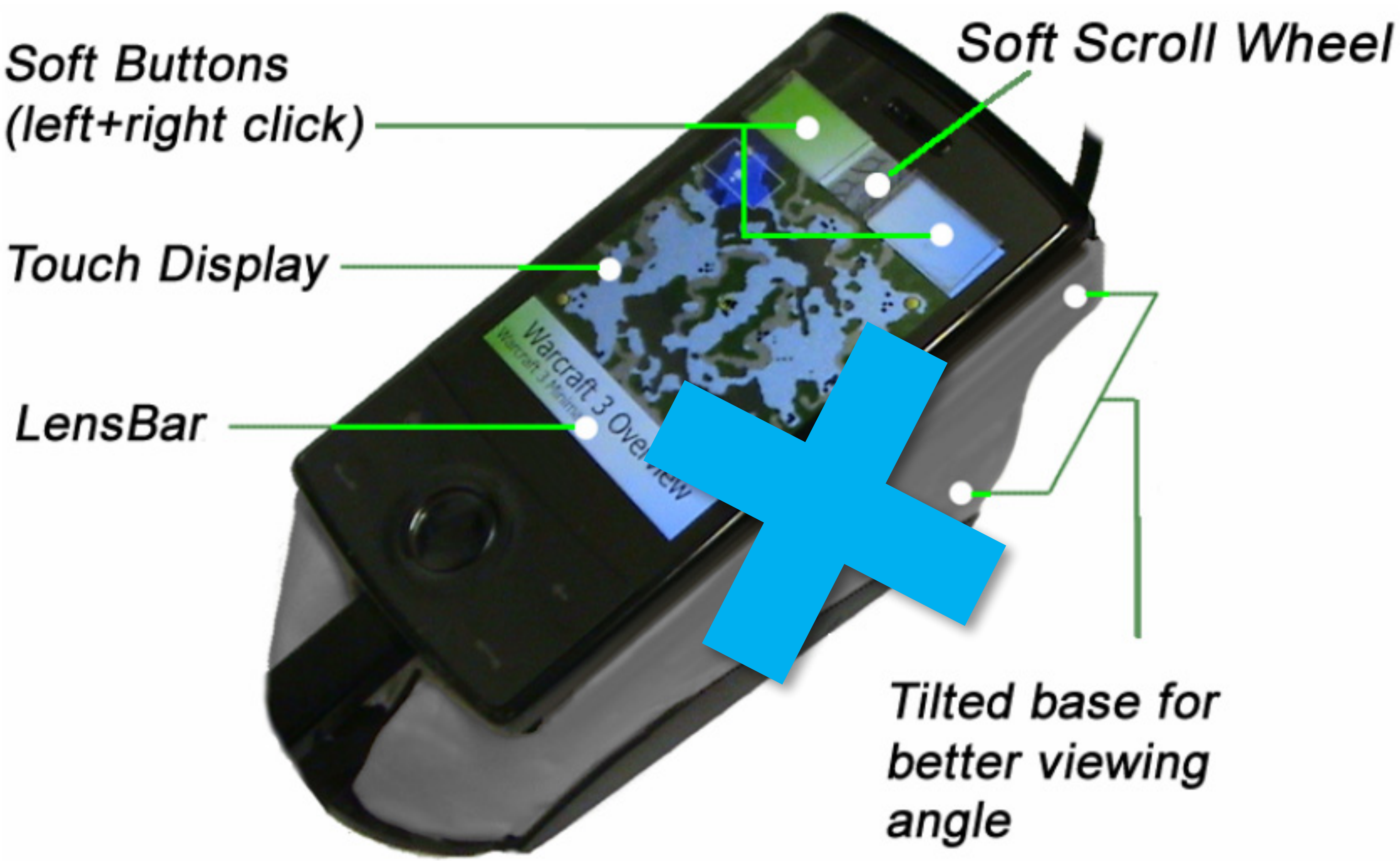
variation for hammer re-use, but more **actionable**
(extend solution to next dimension)

X+Y

fusion of the dissimilar

X+Y only good if **emergent effect**

value(X+Y) > value(X)+value(Y)



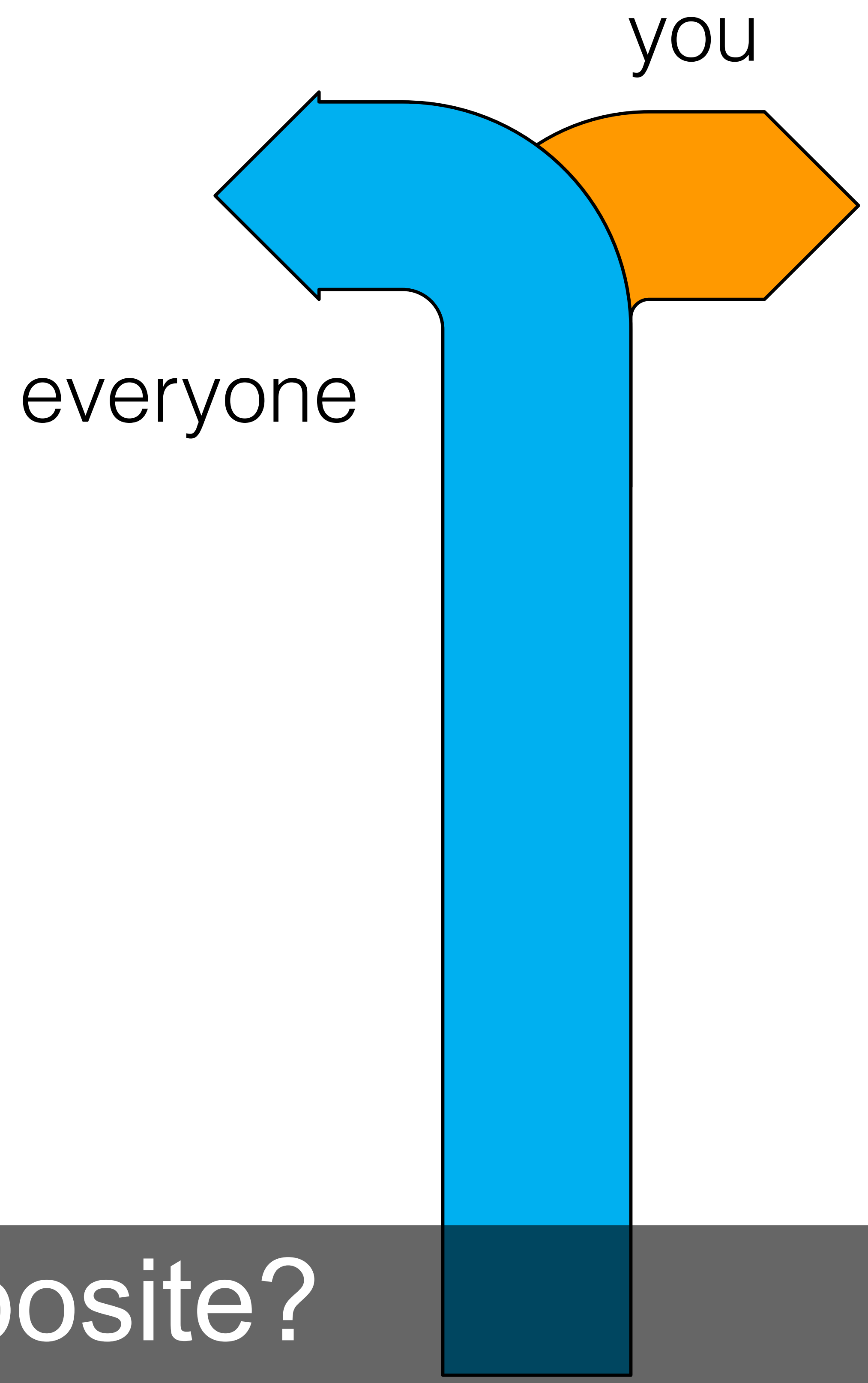
negative example:
mounting touchscreen on mouse offers
the same value as mouse & touchscreen separate

good example:
glass fibers + diffuse illumination touch screen -> Fiberio

high innovative power, but not very actionable because for a given X the search space of all Y is large and unstructured do the opposite

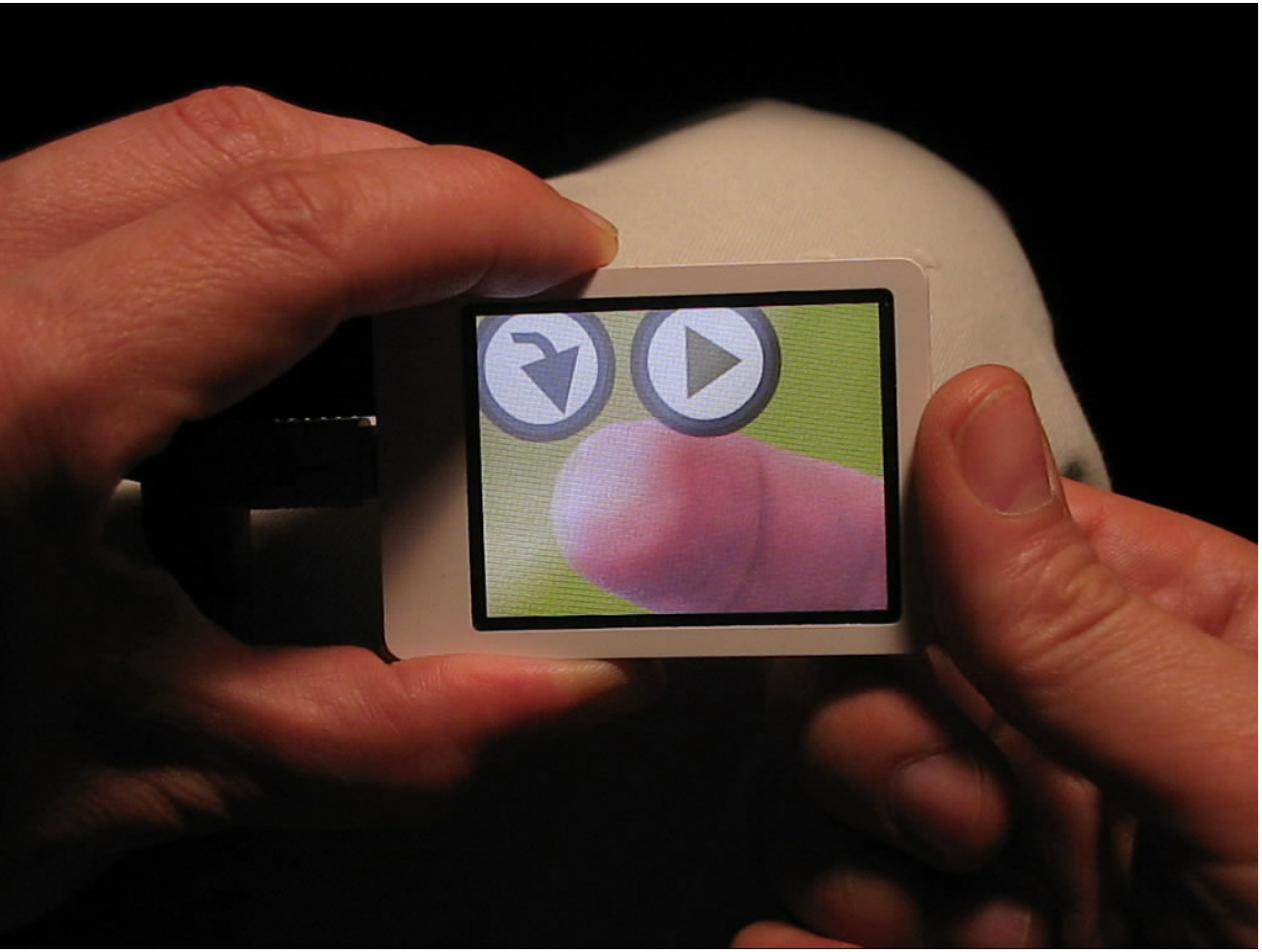
Straddle Method for High Jump

1968 Olympics: “Fosbury Flop”

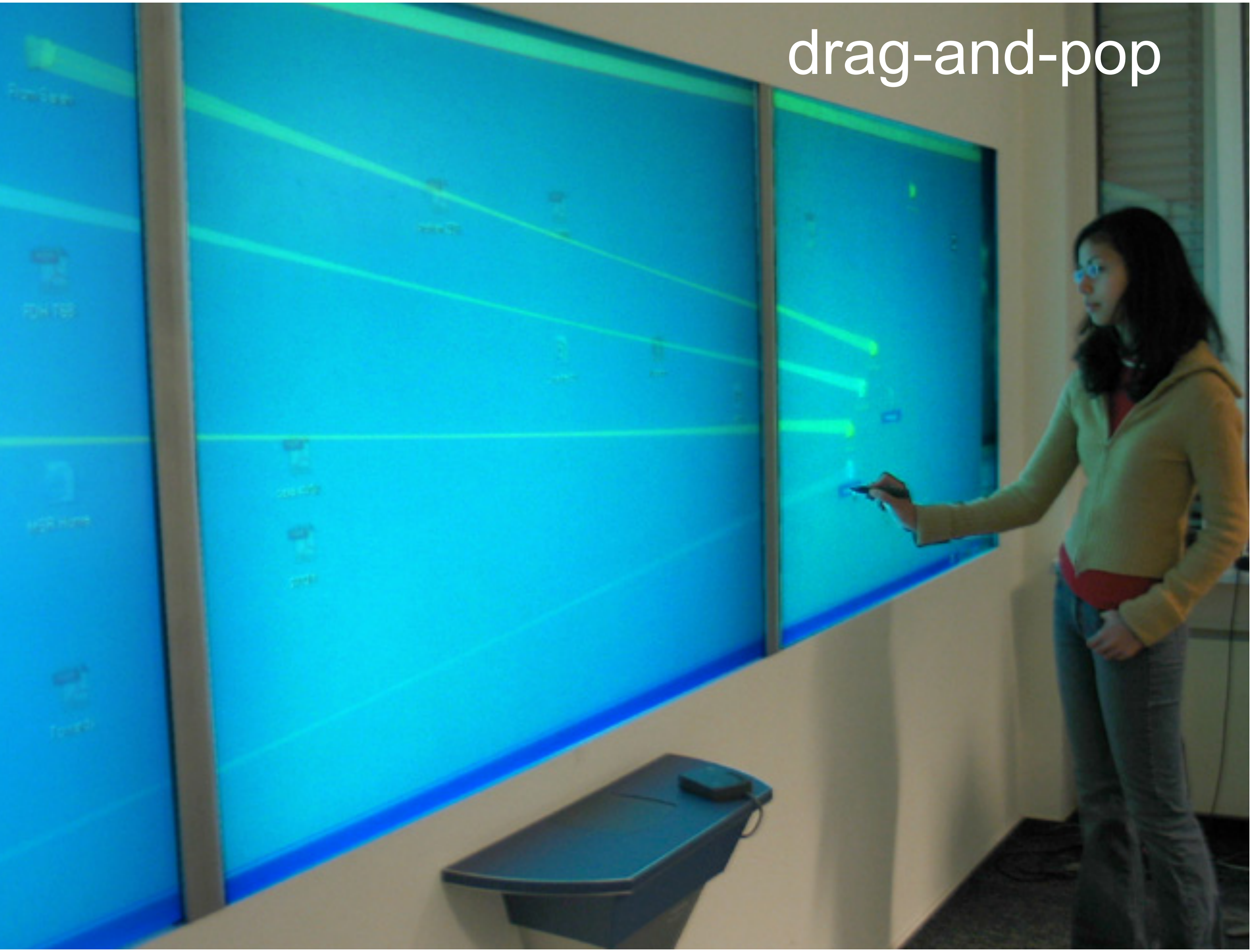


find the opposite?

strong and actionable in brainstorming

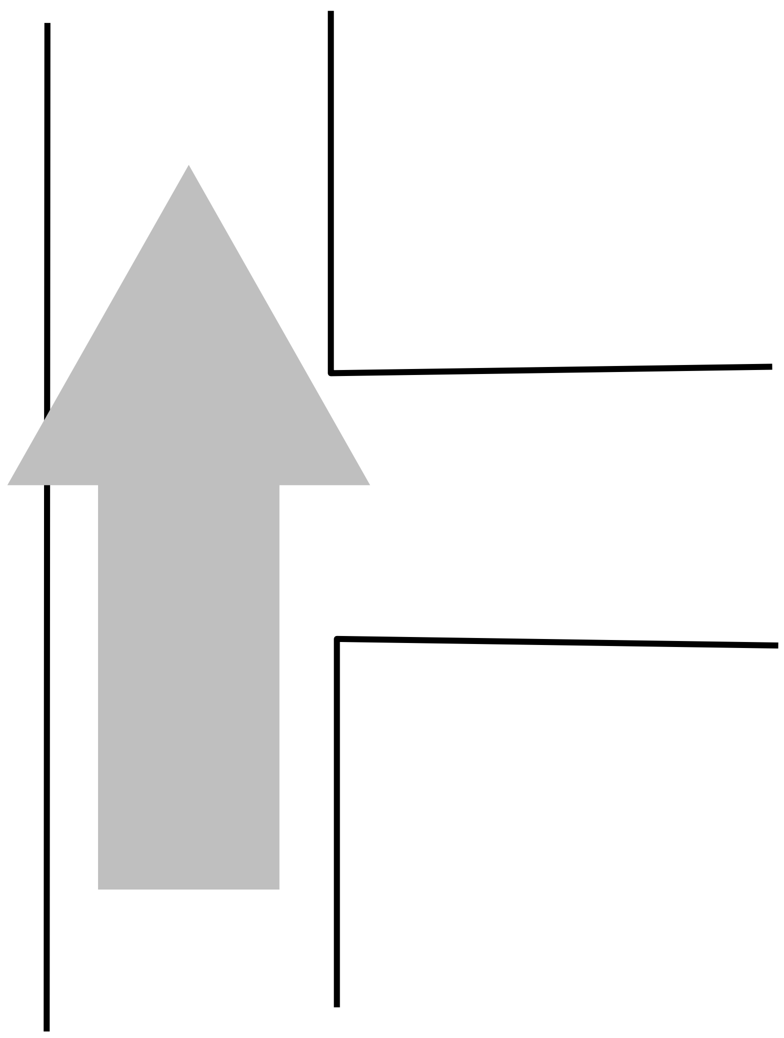


everyone adds touch screens to the front,
instead add it on the back

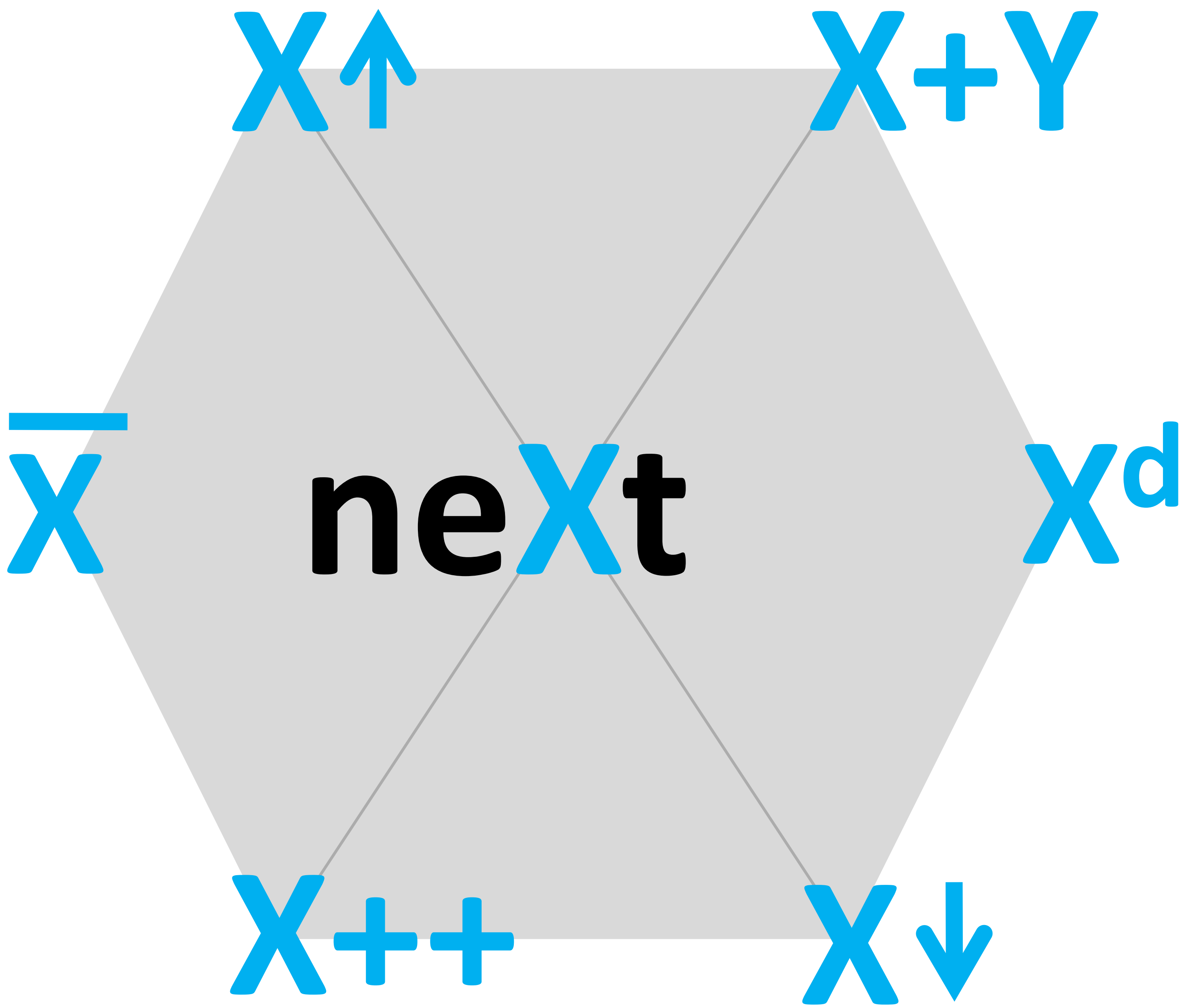


how can user reach contents?
how can contents get to the user?

process:
look at existing designs.
find point(s) where everyone
made the same decision



finding X



these were the 6 iterators…

X =

idea you just heard
concept
patent
new product
product feature
design
art
algorithm

but how to **find the right X to start** out with?

stand a the edge of the ‘known world’
to find new land

awards (best paper, best product, researchers)

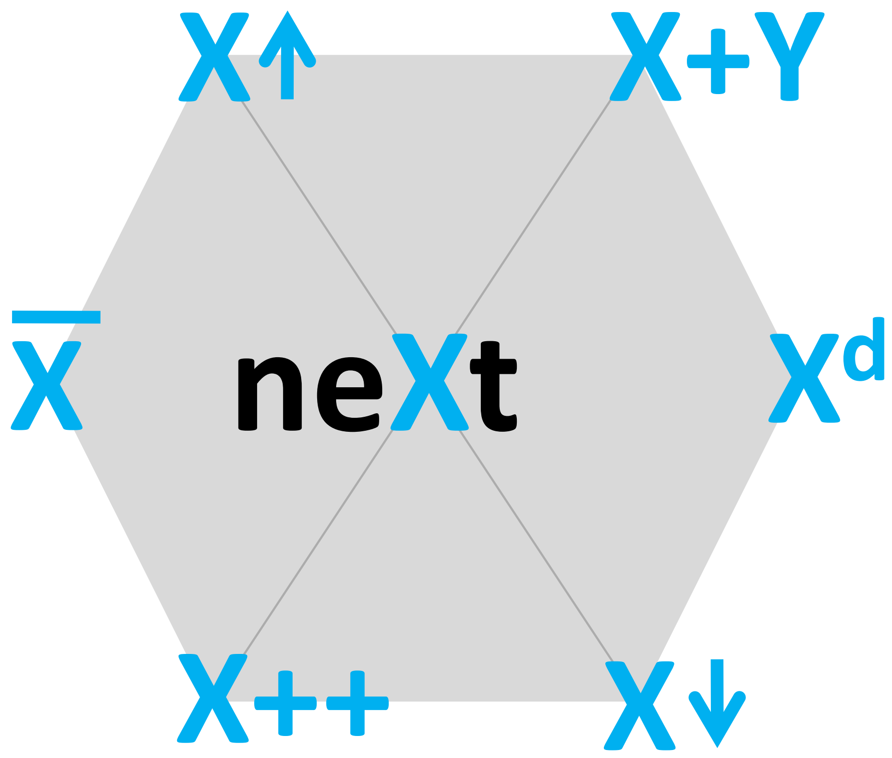
network and talk to people:
avoid small-talk .. ask ‘what is the latest x’

patents (but searching them is time-consuming)

(DIY community ca. 10-15 years behind research.)

do not follow the hype

too much competition



any template will produce the same ideas
as everyone else who uses the same templates

address this by
1. using a wilder set of iterators than others
2. make your very own iterators

conclusions

“so many people get
stuck in incremental research:
‘my double click mouse is better than your double click mouse’”

“do what I call **vision-driven research…”**

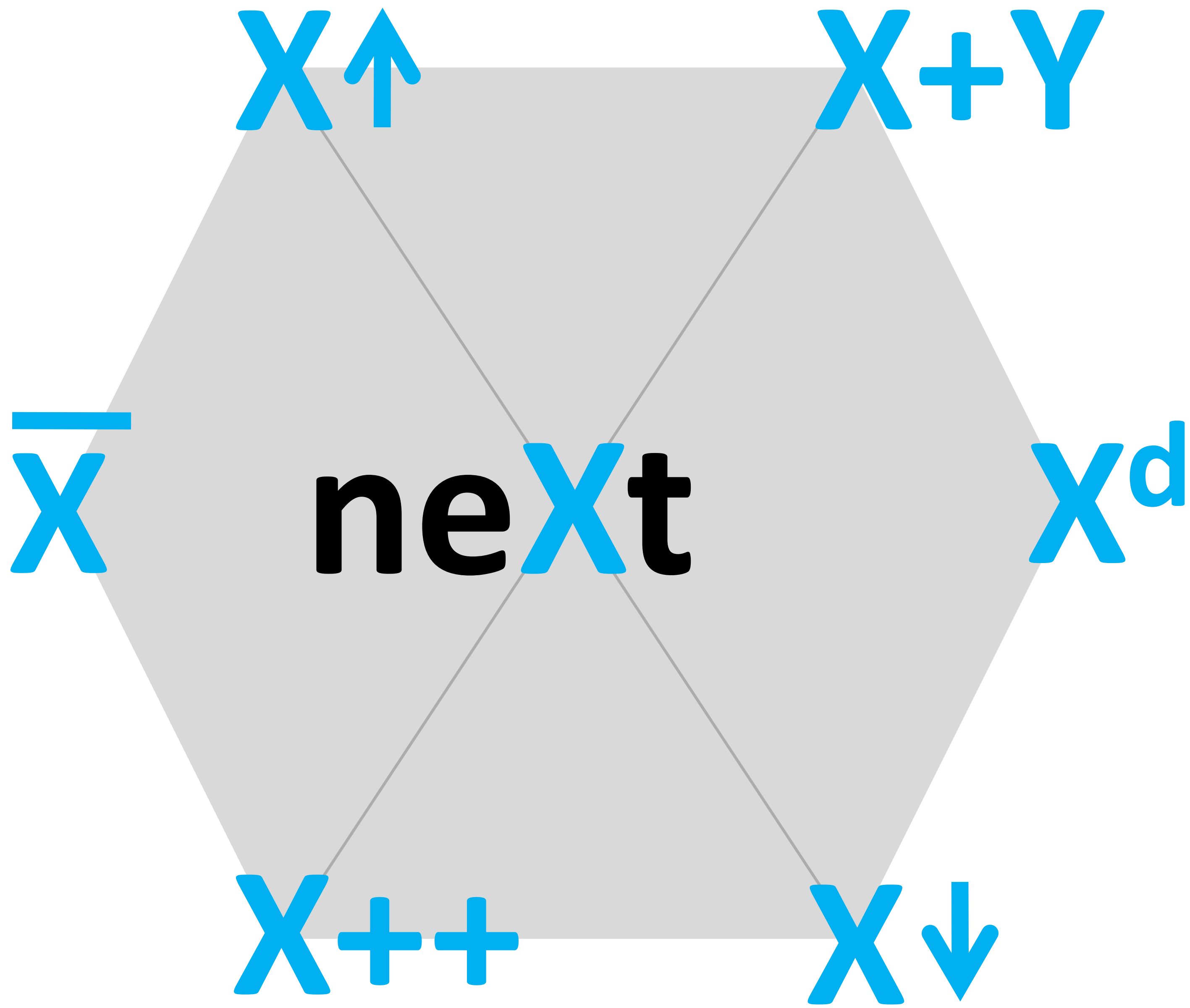
[Ishii at UIST’11]

great project:

1. **novel =** not done

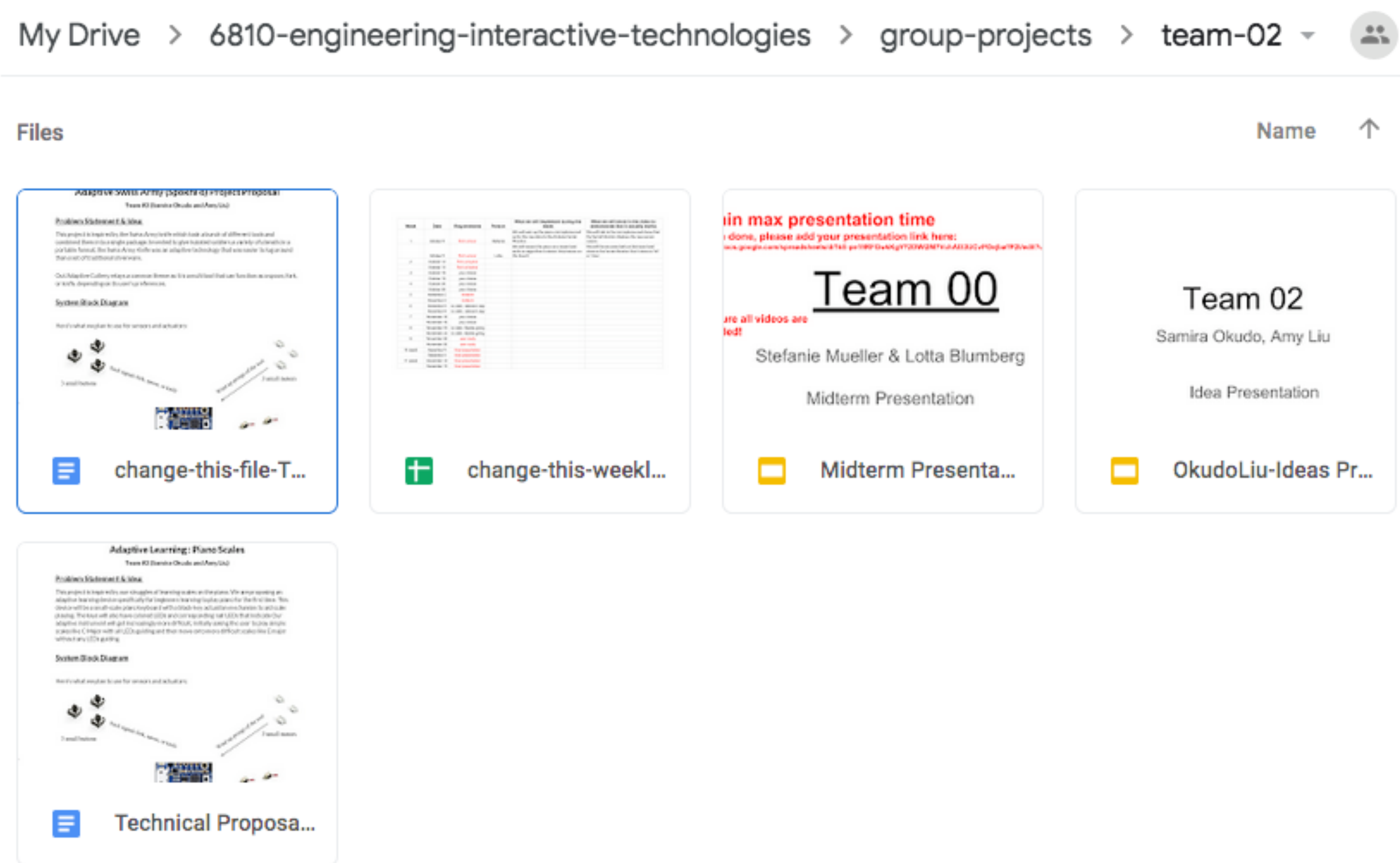
2. **important =** future people will say “this matters to us”

3. **something you can do =** you have/can acquire the skills



think about it **before** you start your next class project / start up / research

midterm presentation


My Drive
6810-engineering-interactive-technologies
group-projects
team-02
Files
Name
Team 00
Stefanie Mueller & Lotta Blumberg
Midterm Presentation
Team 02
Samira Okudo, Amy Liu
Idea Presentation
Adaptive Learning: Piano Scales
change-this-file-T...
change-this-weekl...
Midterm Presenta...
OkudoLiu-Ideas Pr...
Technical Proposa...

Grading Scheme for Group Project (100pts max)

- Creativity of Idea (10%)
- Technical Proposal (10%)
- Weekly Milestones (30% total, 5% each for 6 milestones)
- Midterm Presentation (5%):
  - Overall Project Progress & Quality of Results so far
- User Study (10%)
- Final Presentation, Quality of Prototype + Live Demo (20%)
- Presentation Materials for Project: (15%):
  - Rotoscope, Photos, Video, Website.

end.