Design Process
(User Centred Design)

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Human Computer Interaction

COMS21301

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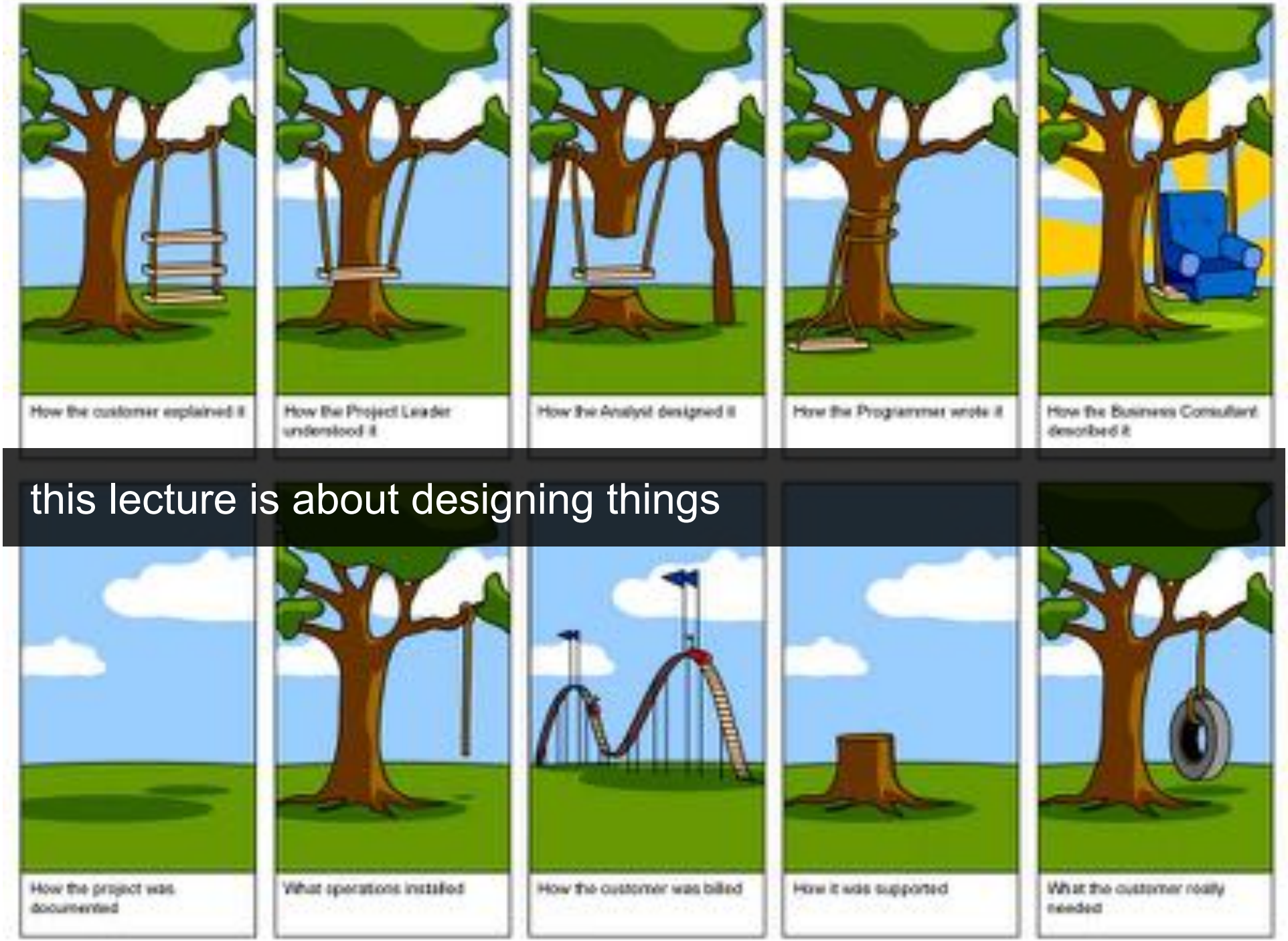
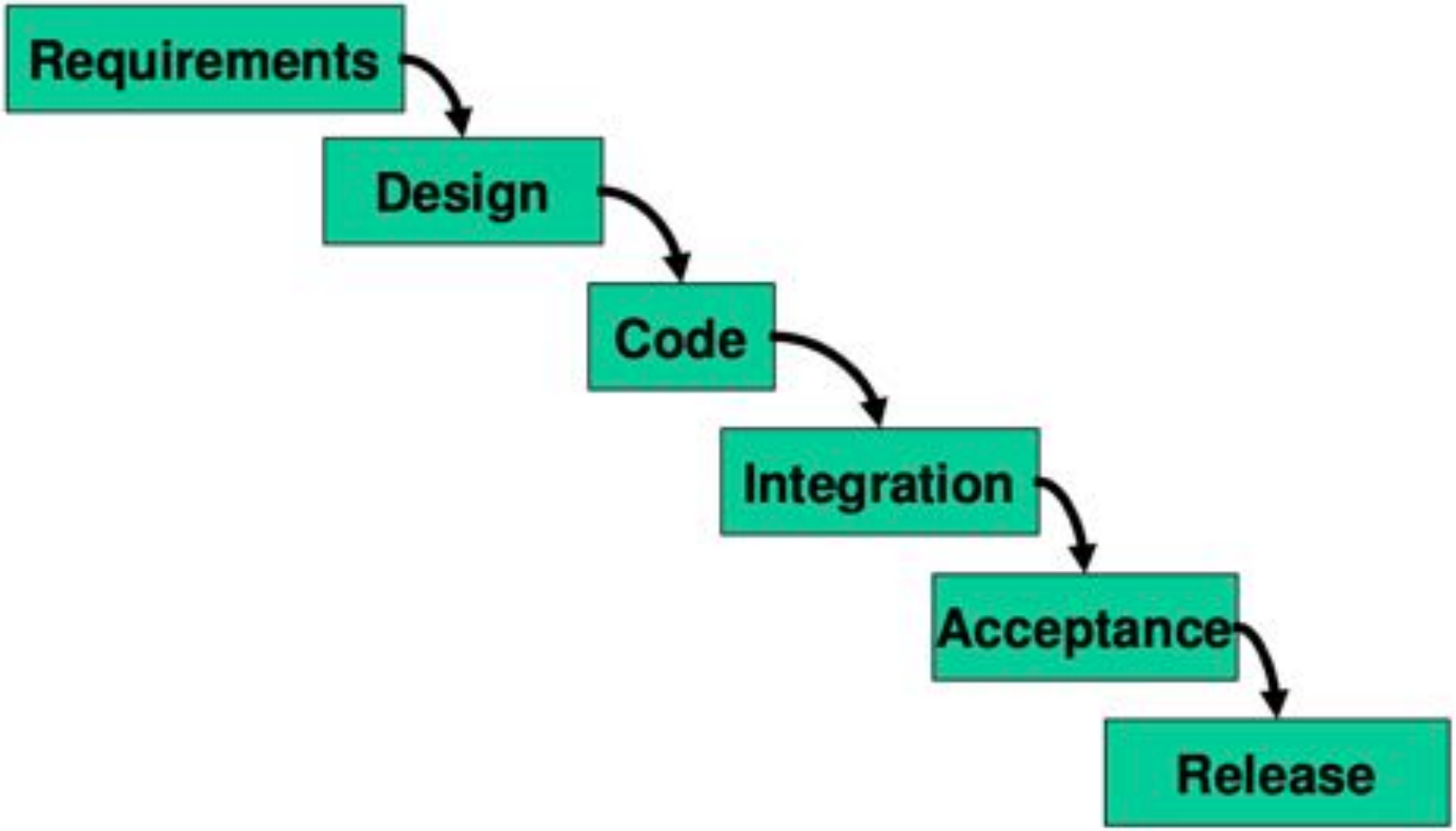
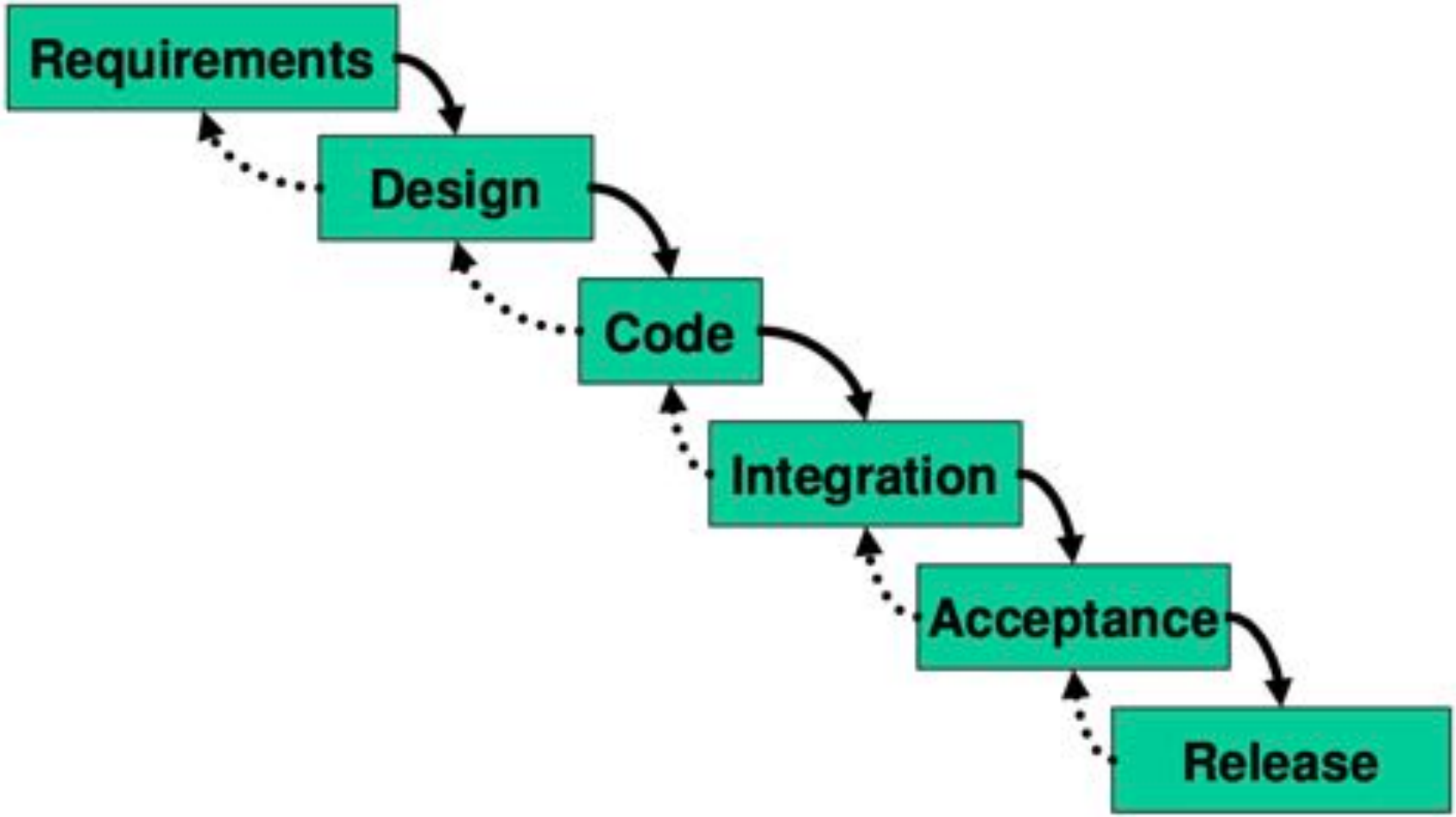


this lecture is about designing things



traditional software engineering process:
waterfall model



traditional software engineering process: **waterfall model** implicitly needs feedback between stages

the waterfall model is **bad for interactive developments**

user interface design is **risky** … so likely to get it wrong

users are not involved in validation until acceptance testing

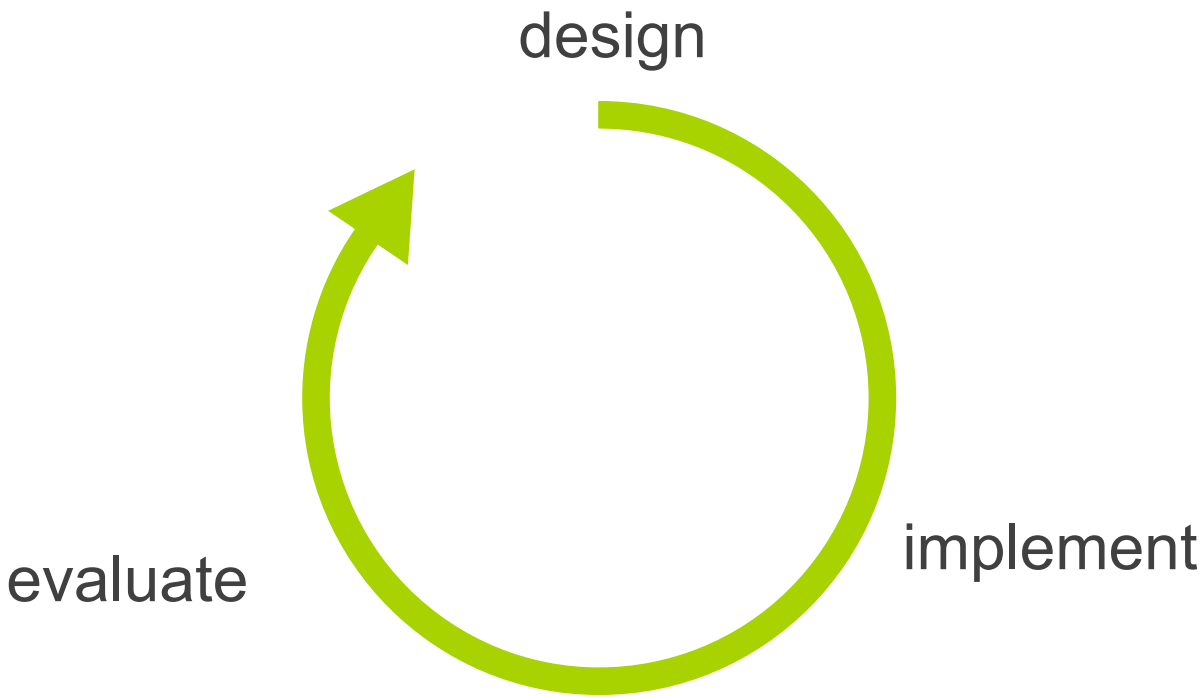
…so wont find out until the end

ui flaws often cause **changes in requirements** and design

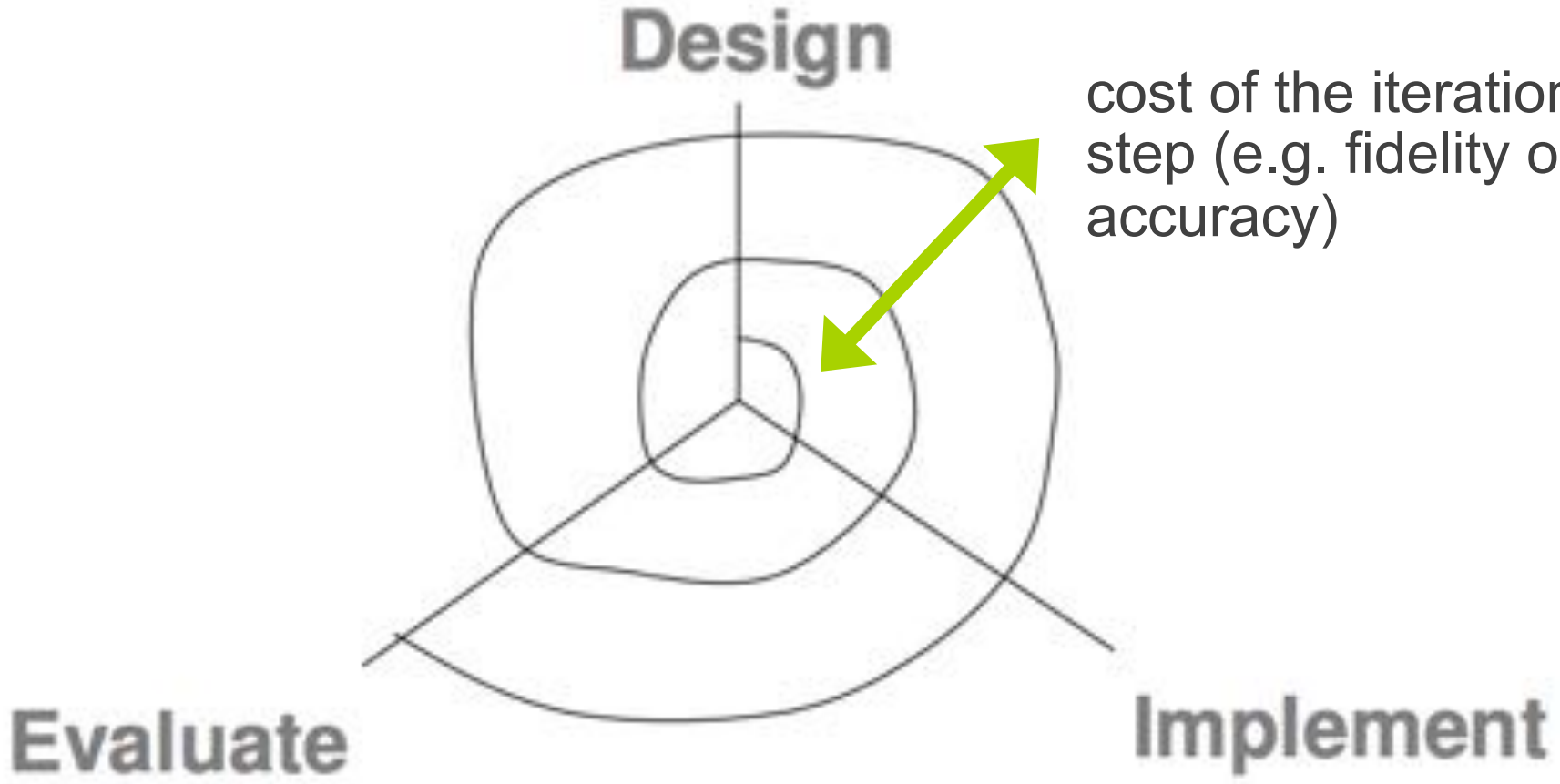
… so throw away carefully-written and tested code

iterative design::

manage the inherent risk in user interface design, design refined by repeated trips around a design cycle: imagining it (design), realizing it (implement), testing it (evaluate).



ok but this look like quite similar than the waterfall model …
what is the trick here?



spiral model: several iterations, early iterations as **cheap** as possible

early iterations use **cheap prototypes**

-> parallel design is feasible: build & test multiple prototypes to explore design alternatives

later iterations use richer implementations, after UI risk has been mitigated

more iterations generally means better UI

only mature iterations are seen by the world

User Centred Design (UCD)::

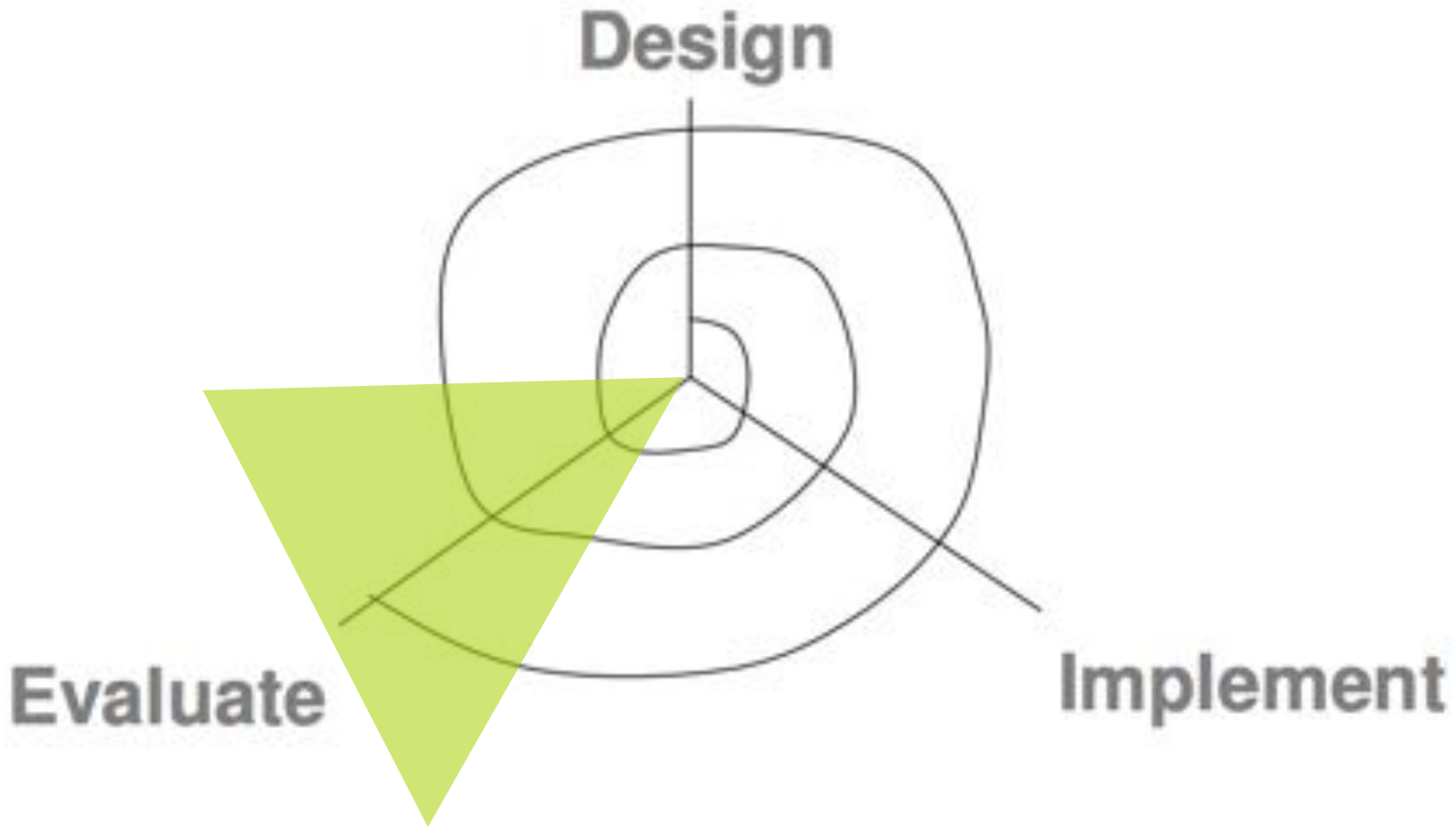
Iterative process, early focus on users and tasks and involving users as evaluators, consultants, and sometimes designers

constant evaluation

users are involved in every iteration

every prototype is evaluated somehow

let’s go along the spiral …



evaluate what?
previous systems, user requirements, user habits etc.

user analysis (who is the user)

age, gender, ethnicity
education
physical abilities
general computer experience
skills (typing? reading?)
domain experience
application experience
work environment and other social context
relationships and communication patterns

identify characteristics of target users

how to find these information?

… ask them

questionnaires
interviews
observations

Betty is 37 years old, She has been Warehouse Manager for five years and worked for Simpkins Brothers Engineering for twelve years. She didn't go to university, but has studied in her evenings for a business diploma. She has two children aged 15 and 7 and does not like to work late. She did part of an introductory in-house computer course some years ago, but it was interrupted when she was promoted and could no longer afford to take the time. Her vision is perfect, but her right-hand movement is slightly restricted following an industrial accident 3 years ago. She is enthusiastic about her work and is happy to delegate responsibility and take suggestions from her staff. However, she does feel threatened by the introduction of yet another new computer system (the third in her time at SBE).

personas (fictional person who gathers characteristics of your users)

task analysis (what users need to do)

identify the individual tasks the user will do

each task is a goal (**what**, **not how**)

often helps to start with overall goal of the system and then decompose it hierarchically into tasks

what needs to be done?

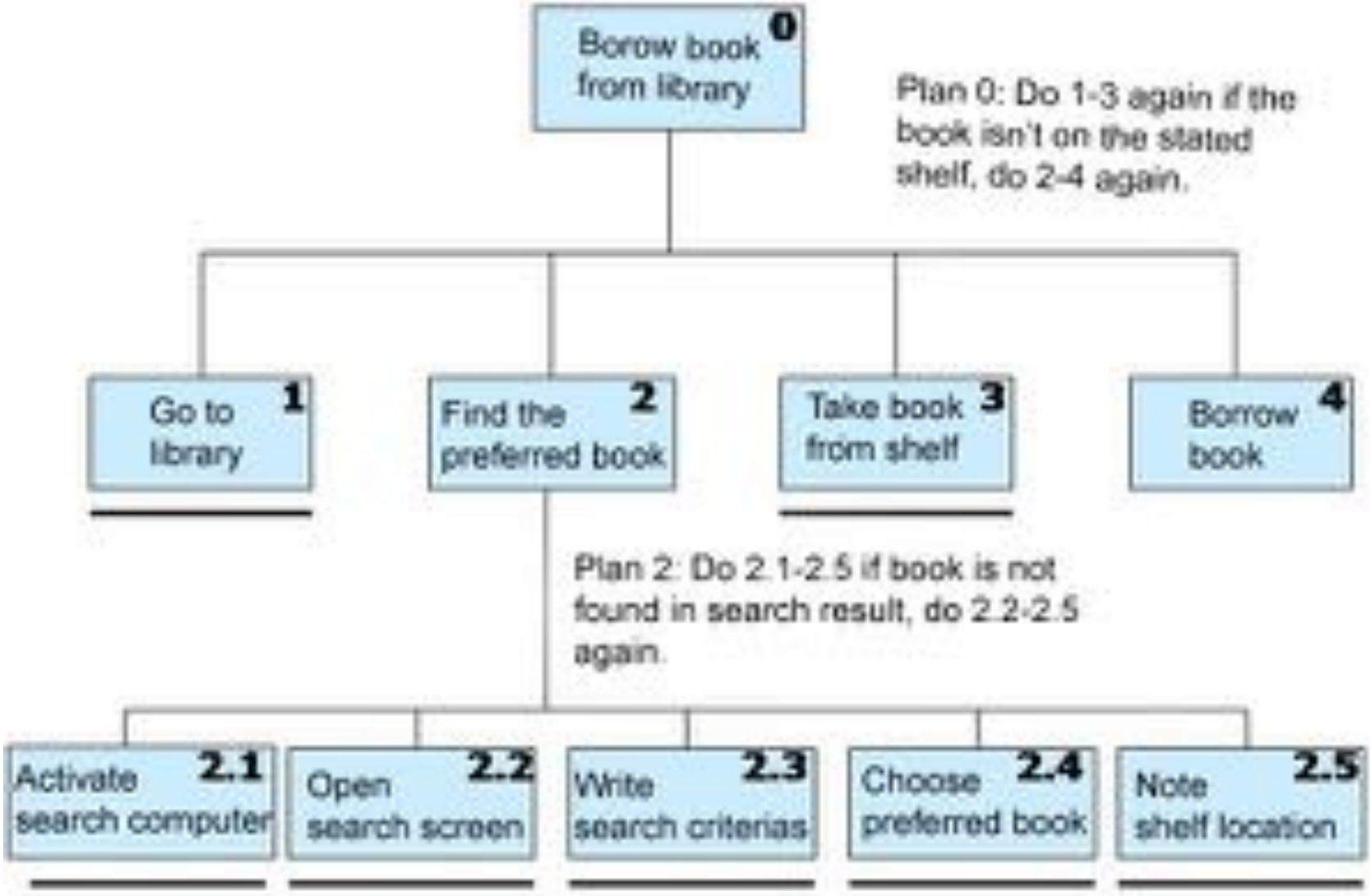
goal

what must be done first to make it possible?

preconditions
information that must be known to the user

what steps are involved in doing the task?

subtasks (may be decomposed recursively)


Borow book from library 0
Plan 0: Do 1-3 again if the book isn't on the stated shelf, do 2-4 again.
Go to library 1
Find the preferred book 2
Take book from shelf 3
Borrow book 4
Plan 2: Do 2.1-2.5 if book is not found in search result, do 2.2-2.5 again.
Activate search computer 2.1
Open search screen 2.2
Write search criterias 2.3
Choose preferred book 2.4
Note shelf location 2.5

example

there are a few techniques to make **user analysis and task analysis** more efficient

contextual inquiry::

a technique that combines interviewing and observation, in the user's actual work environment, discussing actual work products


either go in real environment or recreate them (e.g. fake grocery store)

any drawbacks of observing users in their work environment?

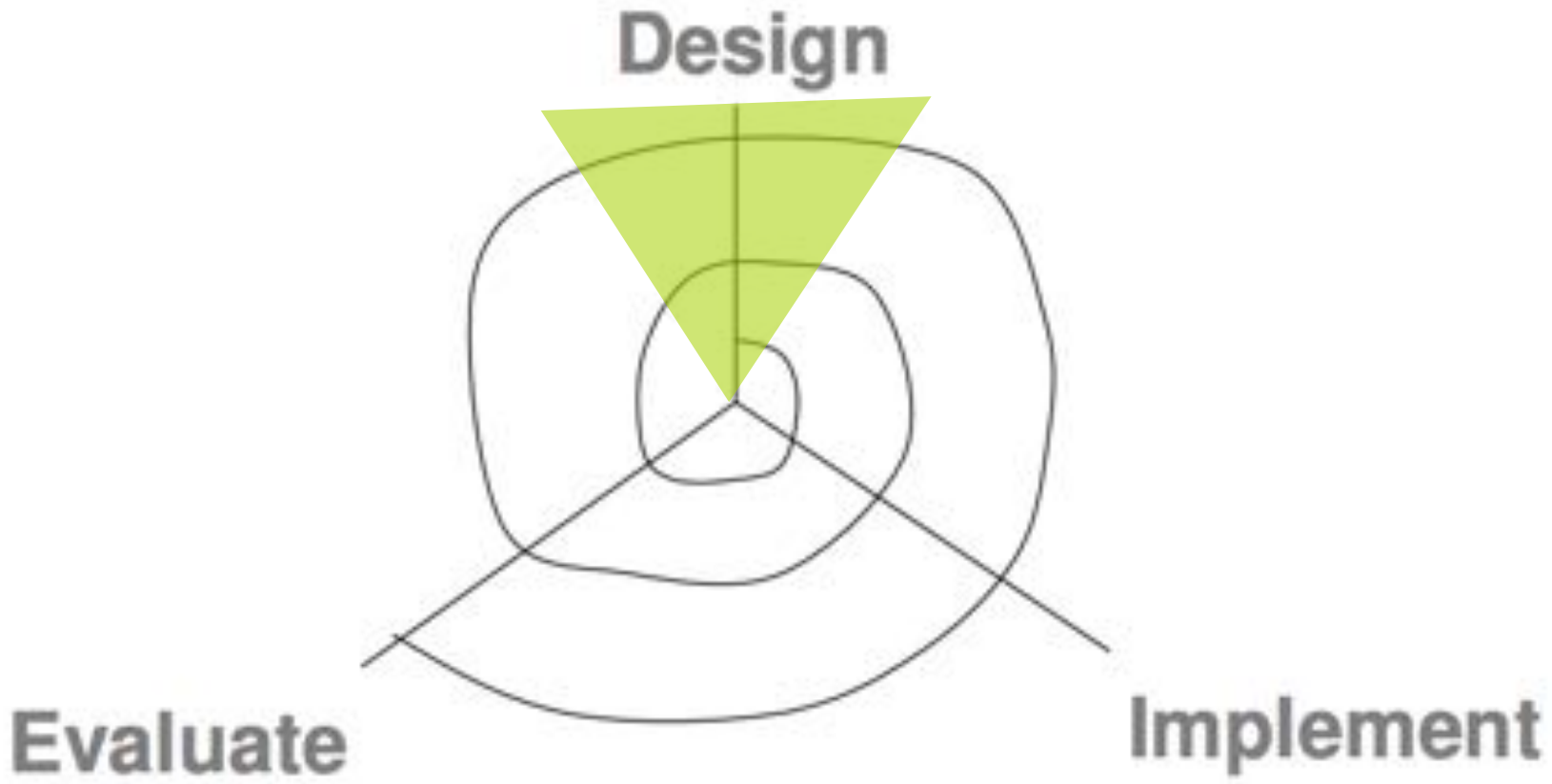
might not behave naturally

<30 sec brainstorming>

participatory design::

includes users directly on the design team – participating in the task analysis, proposing design ideas, helping with evaluation

particularly vital when the target users have much deeper domain knowledge than the design team



let generate some ideas

brainstorming

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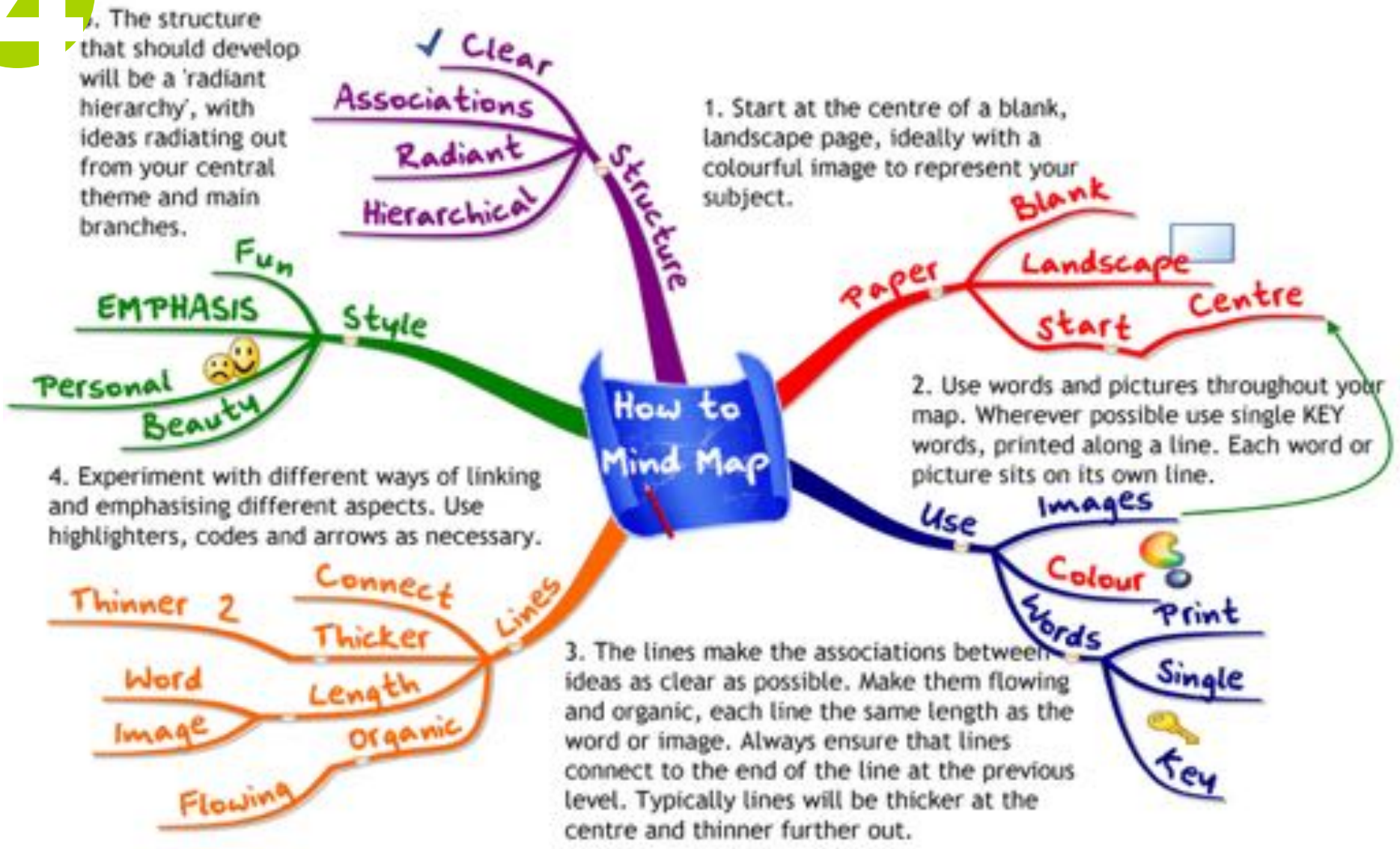
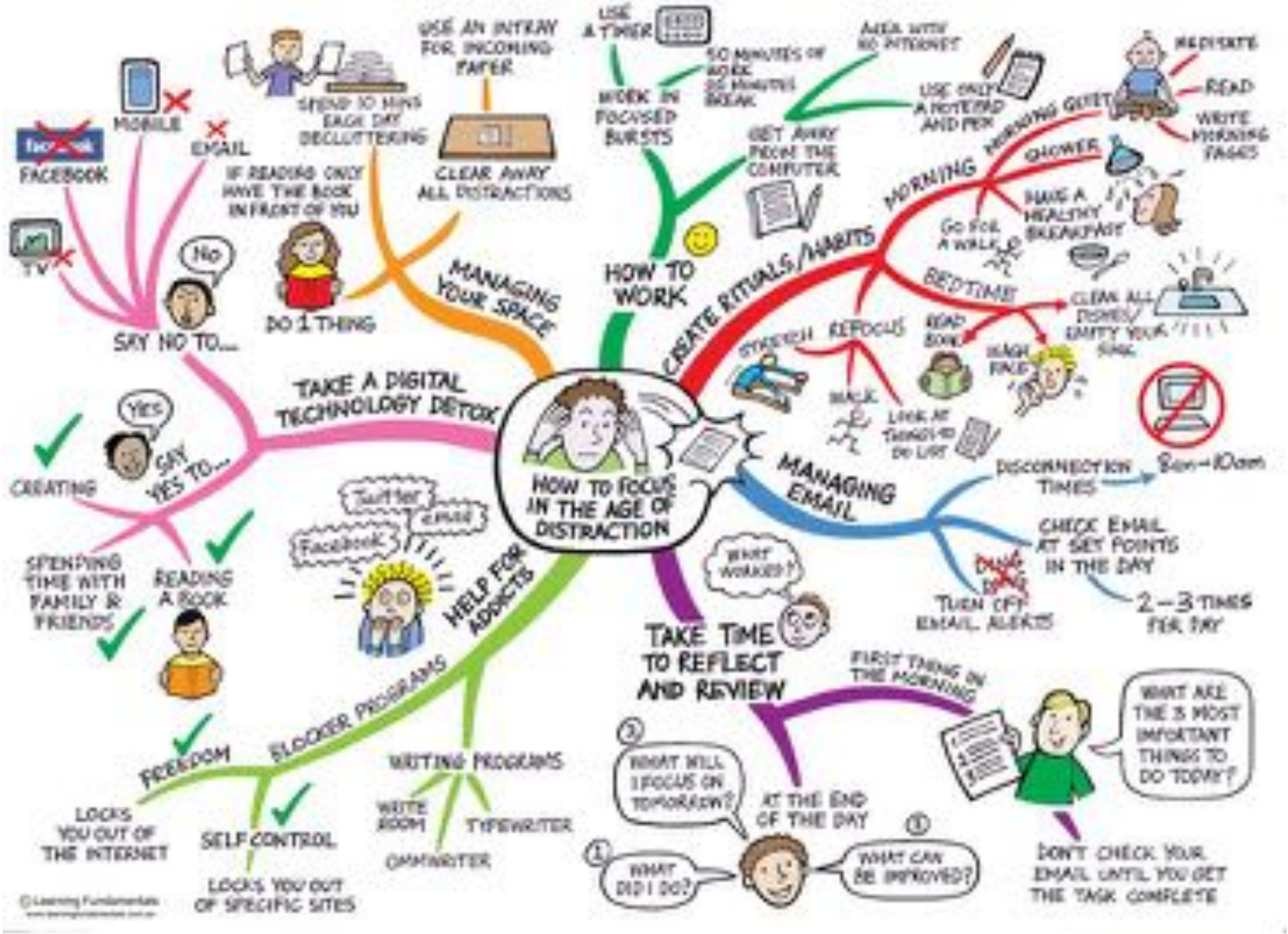
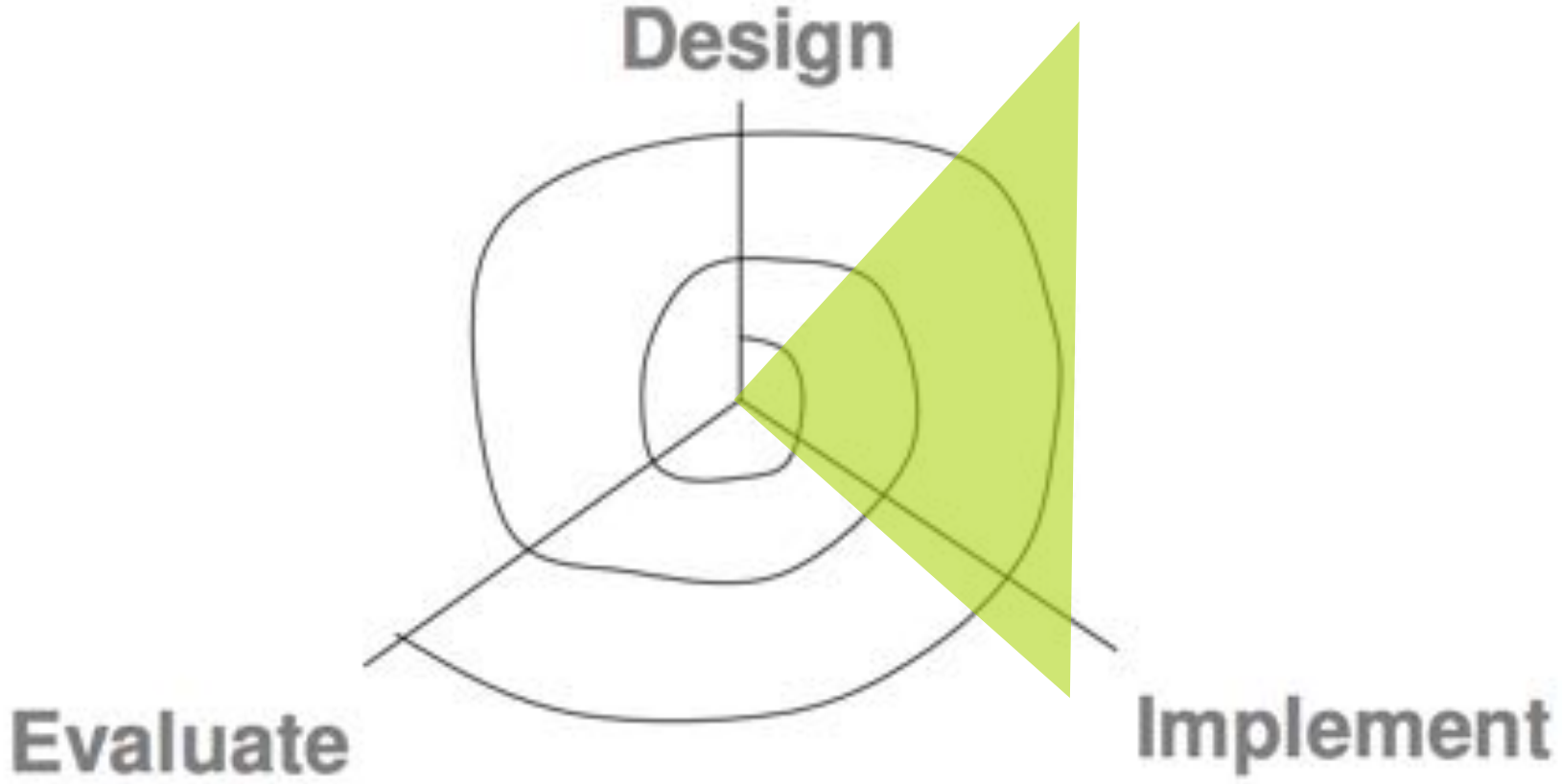


mind mapping


HOW TO FOCUS IN THE AGE OF DISTRACTION
TAKE A DIGITAL TECHNOLOGY DETOX
SAY NO TO...
FACEBOOK
MOBILE
EMAIL
TV
No
SAY YES TO...
Yes
CREATING
SPENDING TIME WITH FAMILY & FRIENDS
READING A BOOK
MANAGING YOUR SPACE
SPEND 10 MINS EACH DAY DECLUTTERING
USE AN INTRAY FOR INCOMING PAPER
CLEAR AWAY ALL DISTRACTIONS
IF READING ONLY HAVE THE BOOK IN FRONT OF YOU
DO 1 THING
HOW TO WORK
USE A TIMER
50 MINUTES OF WORK 10 MINUTES BREAK
WORK IN FOCUSED BURSTS
AREA WITH NO INTERNET
USE ONLY A NOTEPAD AND PEN
GET AWAY FROM THE COMPUTER
CREATE RITUALS/HABITS
MORNING
MORNING GUEST
MEDITATE
READ
WRITE MORNING PAGES
SHOWER
HAVE A HEALTHY BREAKFAST
GO FOR A WALK
BEDTIME
CLEAN ALL DISHES/ EMPTY YOUR EMAIL
READ BOOK
STRETCH
REFOCUS
WALK
LOOK AT THINGS TO DO LIST
MANAGING EMAIL
DISCONNECTION TIMES
8am-10am
CHECK EMAIL AT SET POINTS IN THE DAY
2-3 TIMES PER DAY
TURN OFF EMAIL ALERTS
HELP FOR ADDICTS
Twitter
email
Facebook
BLOCKER PROGRAMS
FREEDOM
LOCKS YOU OUT OF THE INTERNET
SELF CONTROL
LOCKS YOU OUT OF SPECIFIC SITES
WRITING PROGRAMS
WRITE ROOM
TYPEWRITER
OMMWRITER
TAKE TIME TO REFLECT AND REVIEW
WHAT WORKED?
AT THE END OF THE DAY
WHAT DID I DO?
WHAT CAN BE IMPROVED?
WHAT WILL I FOCUS ON TOMORROW?
FIRST THING IN THE MORNING
WHAT ARE THE 3 MOST IMPORTANT THINGS TO DO TODAY?
DON'T CHECK YOUR EMAIL UNTIL YOU GET THE TASK COMPLETE

(Mike will tell you more about design thinking in the next lecture)



low-fi prototypes

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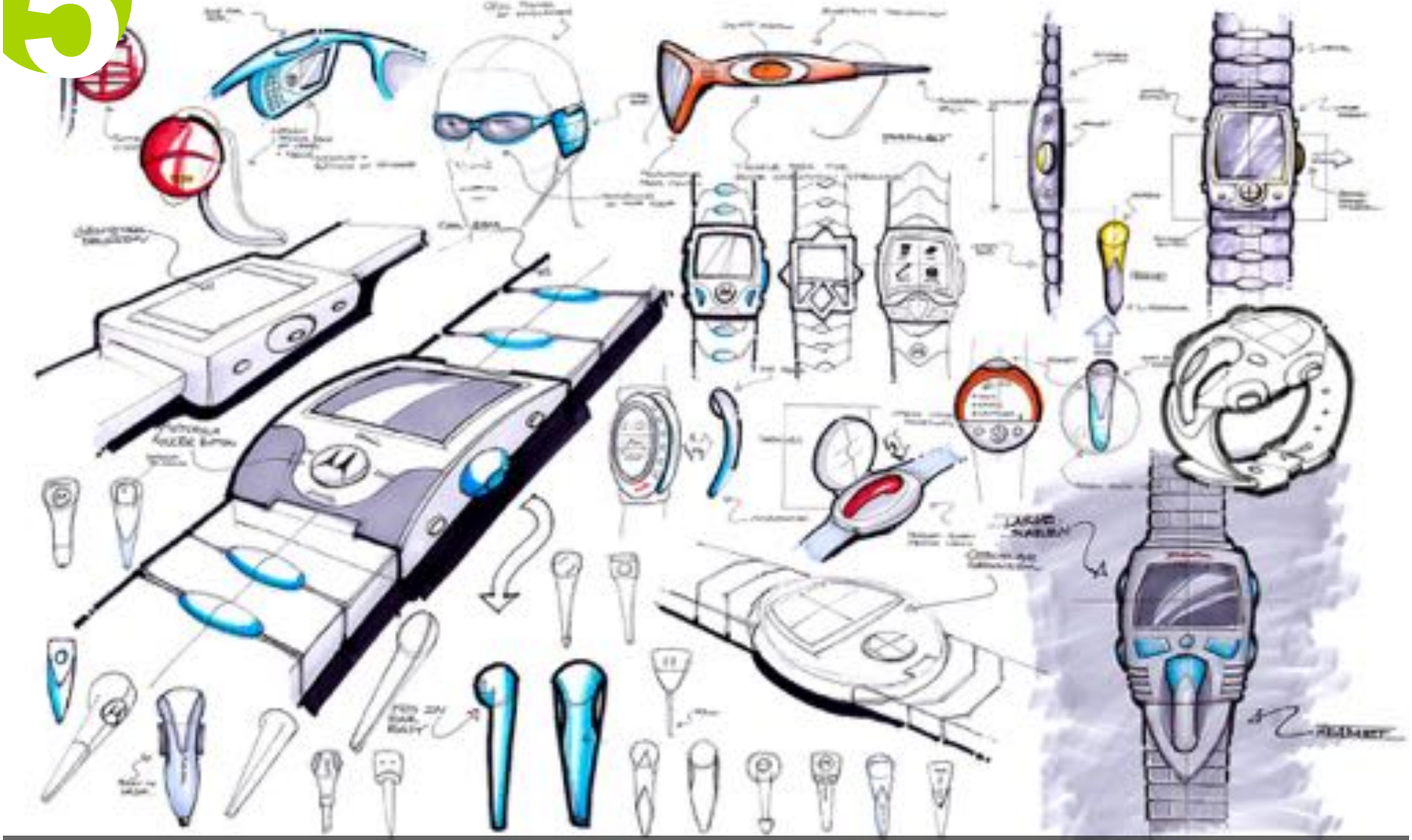
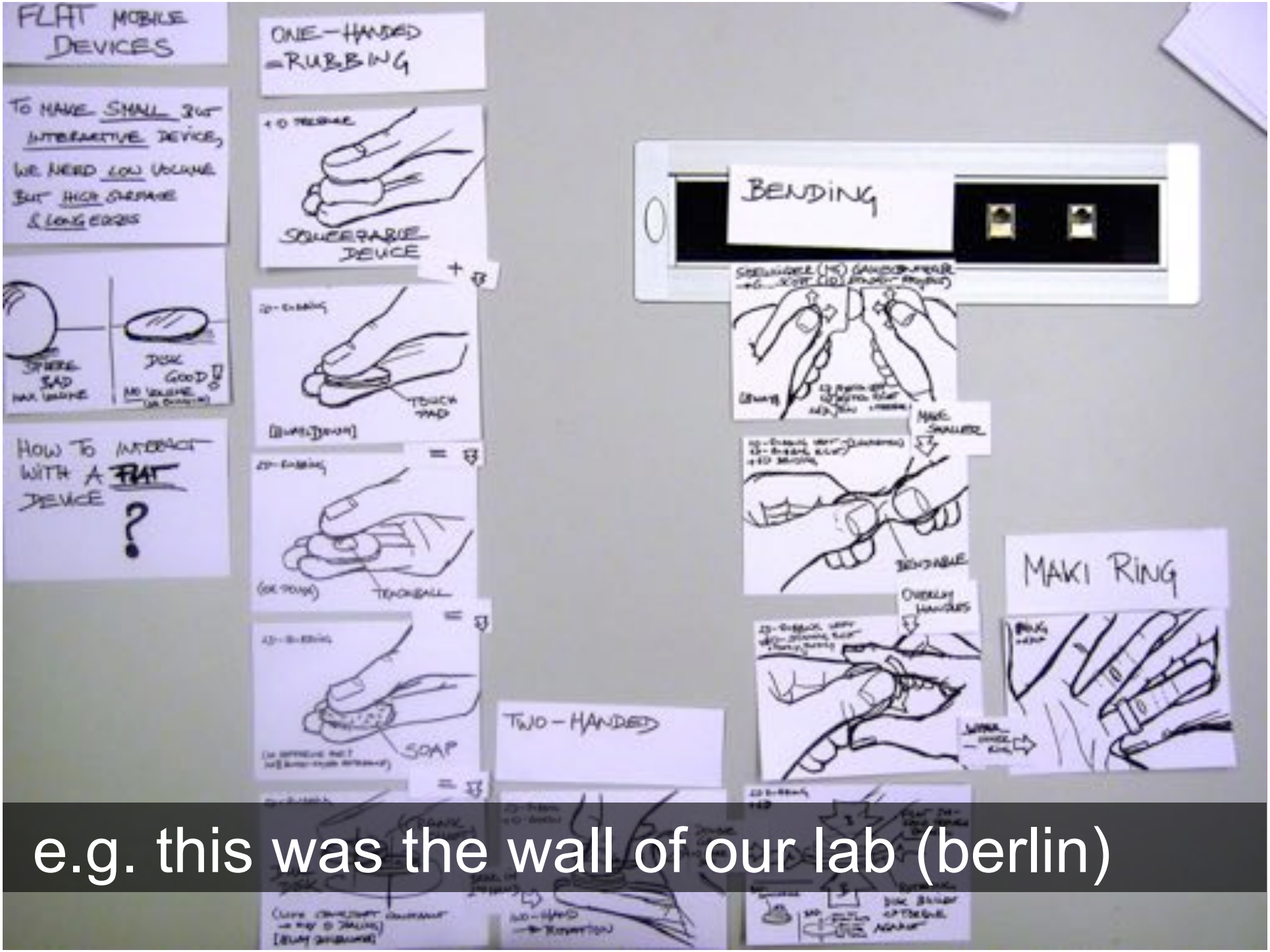


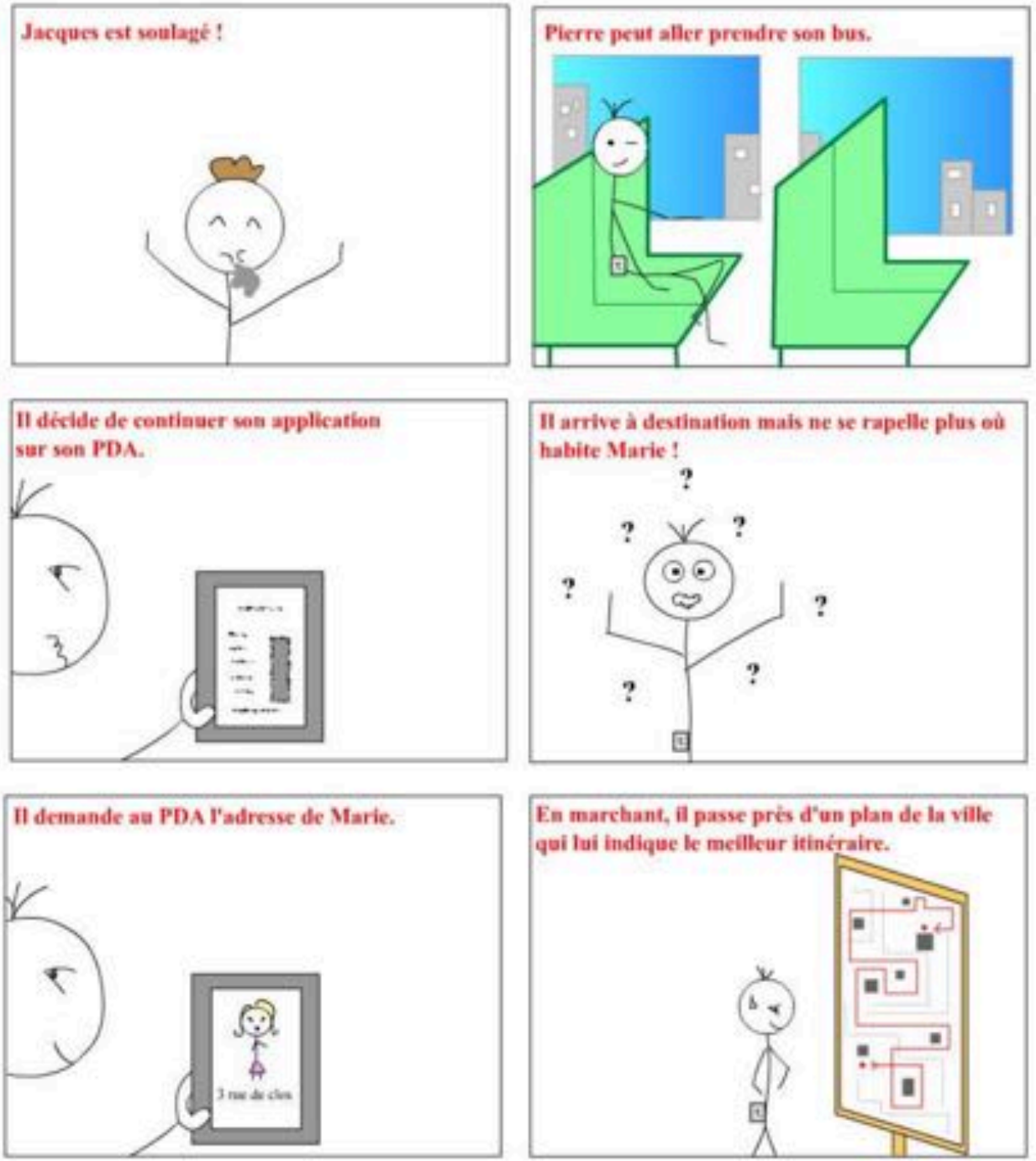
sketches



e.g. this was the wall of our lab (berlin)

not about art
about
communicating ideas

(proof my Bsc thesis)



sketch::

quick/timely

inexpensive/**disposable**

plentiful

no higher resolution than required to communicate the intended purpose/concept

ambiguous

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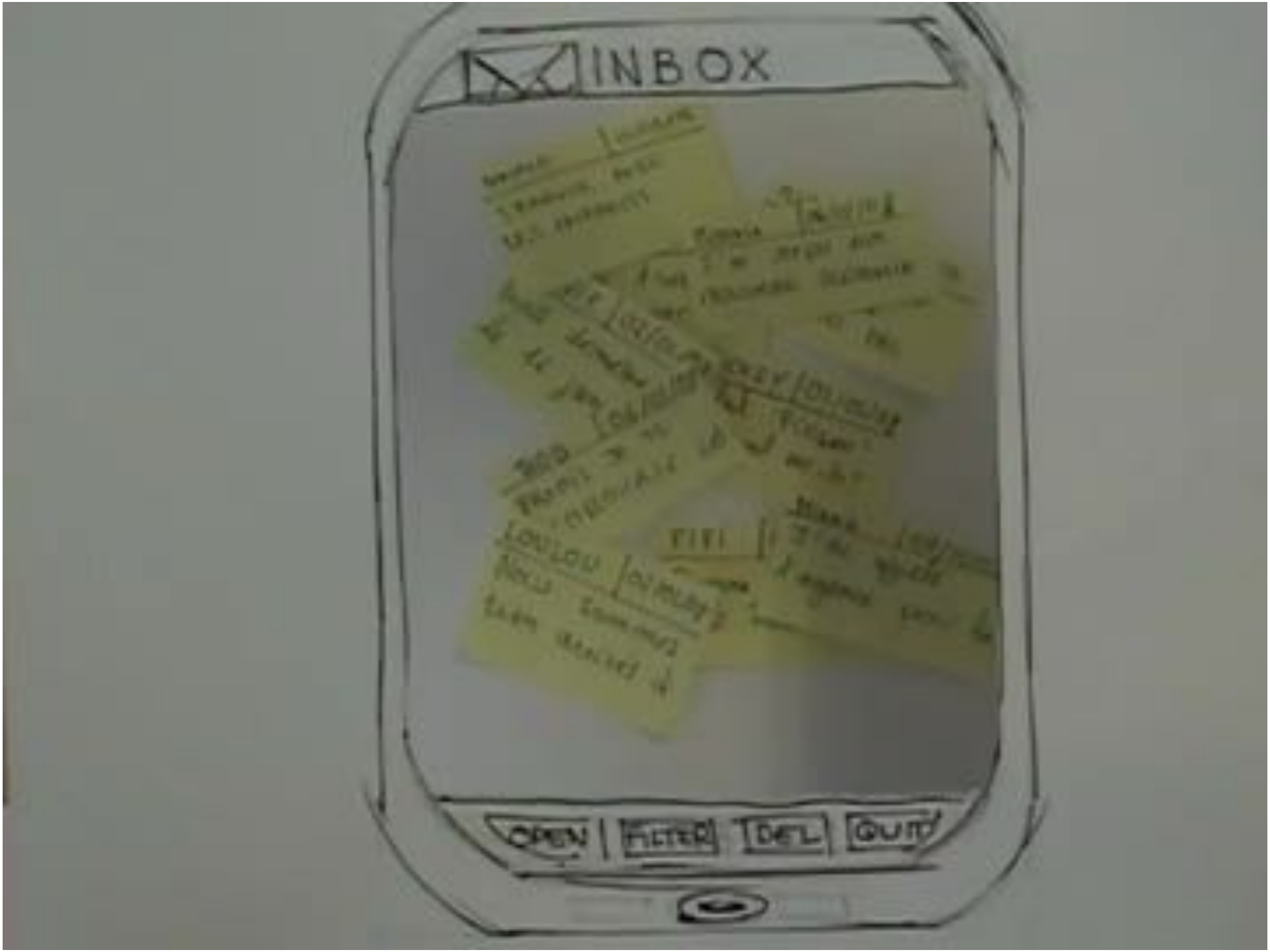
paper and video prototyping


INBOX
OPEN
FILTER
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QUIT

https://www.youtube.com/user/crazyPTchannel

animations

paper prototypes vs. animation?

paper prototype = can be manipulated (tangible)

animation = more realistic

<30 sec brainstorming>

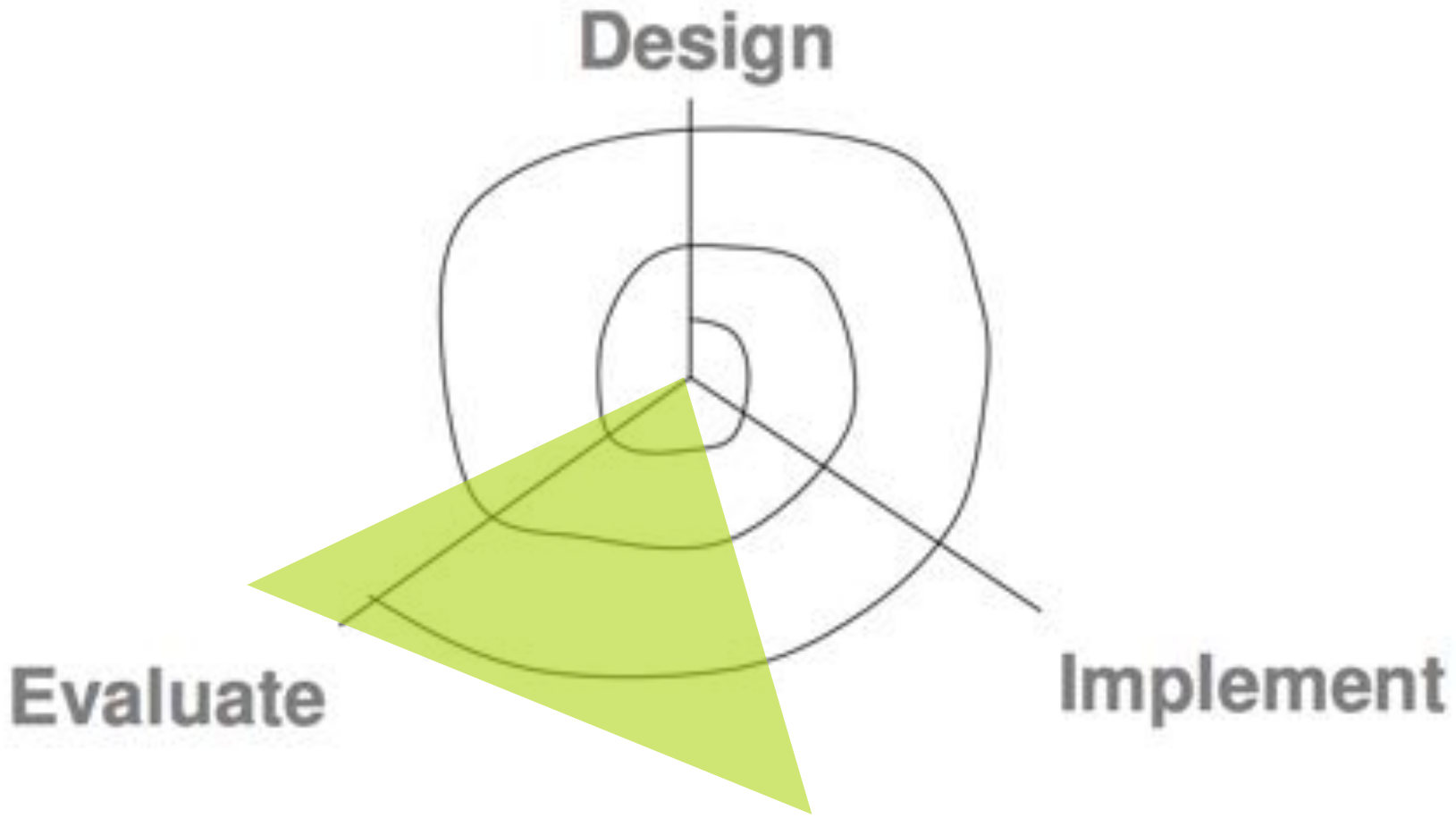
“cheap” prototyping

time it takes to make 1 interactive prototype (10h)

= 10 video prototype (1h each)

= 100 paper prototype (6min each)

= 6000 sketches (6sec each)

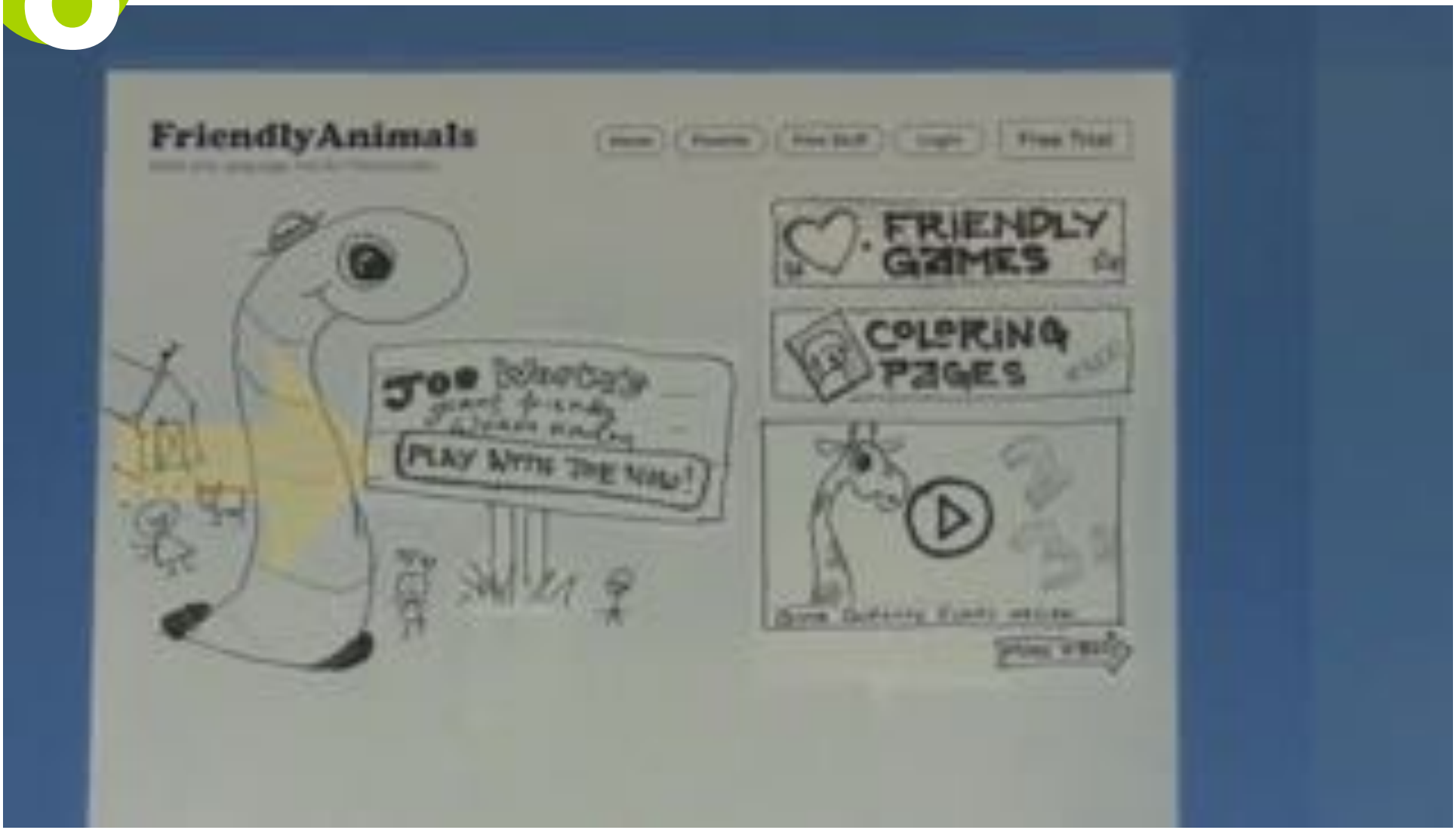


qualitative/formative user studies

can we test things when the systems is not even built?

sure why not!

<30 sec brainstorming>



we can totally do **study with prototypes**

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or we can do a **“wizard of oz”** study
(e.g. someone hidden fake the system)

or we can do a **“wizard of oz”** study
(e.g. someone hidden fake the system)

[Golden moustache]

this type of user studies is called **qualitative** or **formative**

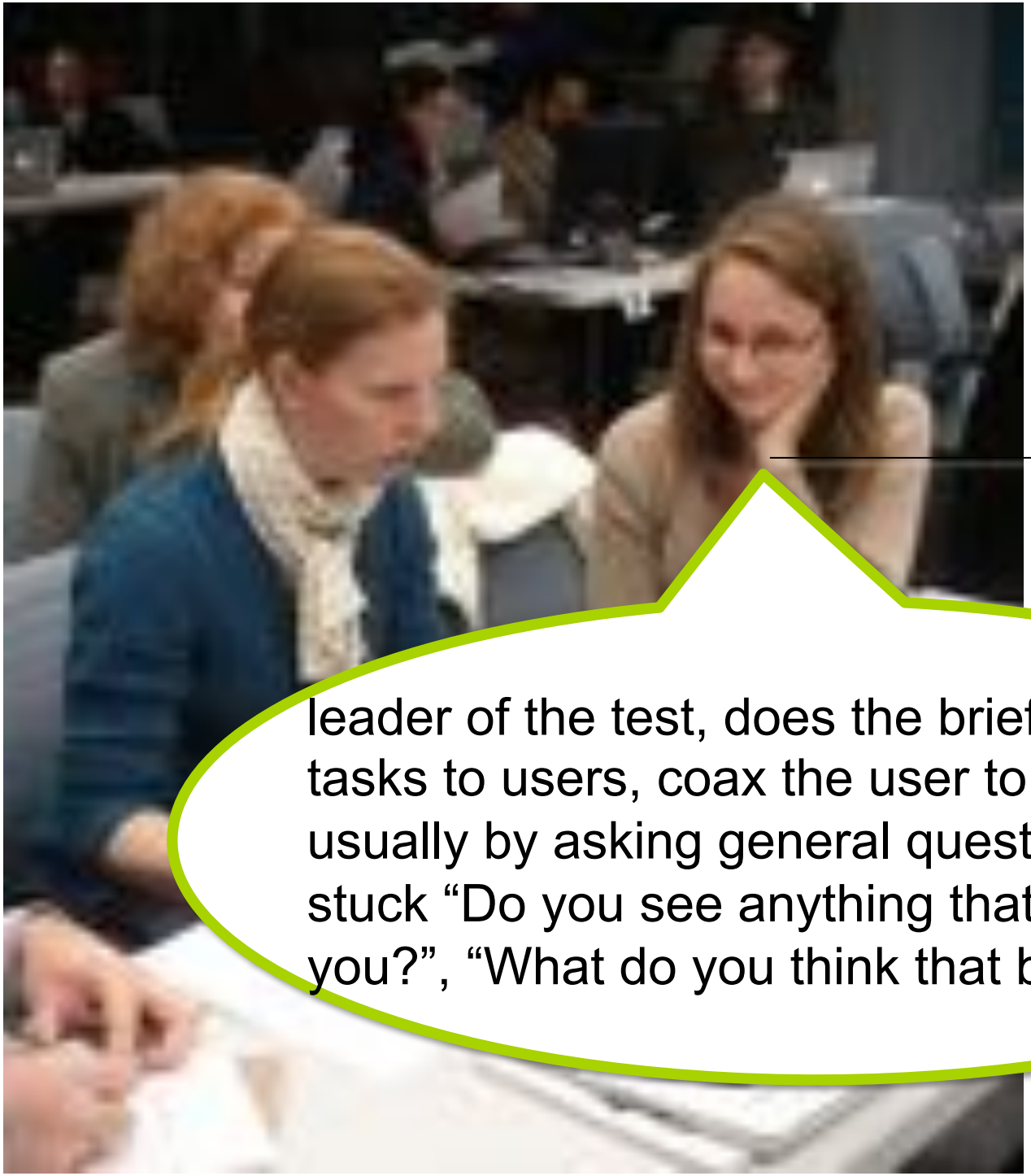
find some users (representative of the target users)

give each user some tasks (representative of important tasks, generally based on task analysis)

watch user do the tasks

three roles in formative user testing


user(s)
think aloud: OK, now I'm looking for the place to set the font size, usually it's on the toolbar, nope, hmm, maybe the Format menu...



facilitator

leader of the test, does the briefing, gives tasks to users, coax the user to think aloud, usually by asking general questions. if user stuck “Do you see anything that might help you?”, “What do you think that button does?”

observer(s)

keep quiet! don't offer help, don't attempt to explain. Just sit on your hands, bite your tongue, and watch. Keep busy by taking notes on everything but focus particularly on **critical incidents**, which are moments that strongly affect usability

qualitative data::

feedback from participants (notes, video and audio recording, screen capture)

how many users?

<30 sec brainstorming>

every usability problem has a probability **L** of being found by a random user.

a single user finds a **fraction L** of the usability problems. If user tests are independent (users don't watch or talk to each other), then **n** users will find a fraction $\mathbf{1-(1-L)^n}$ of the usability problems.

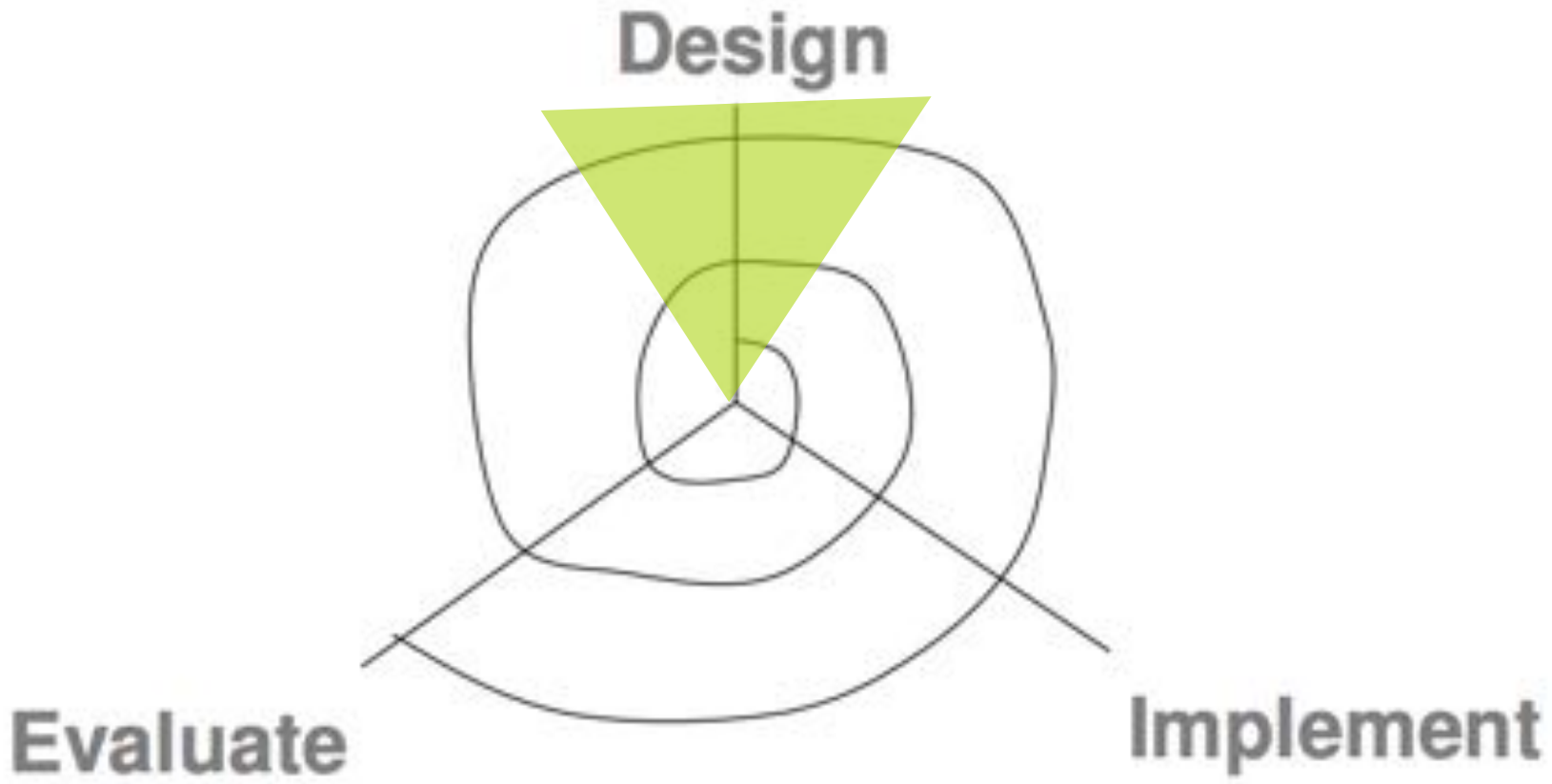
Landauer and Nielsen estimated that L is typically 31% (the actual range was 12% to 60%).

with **L=31%**, 5 users will find about **85% of the problems**.

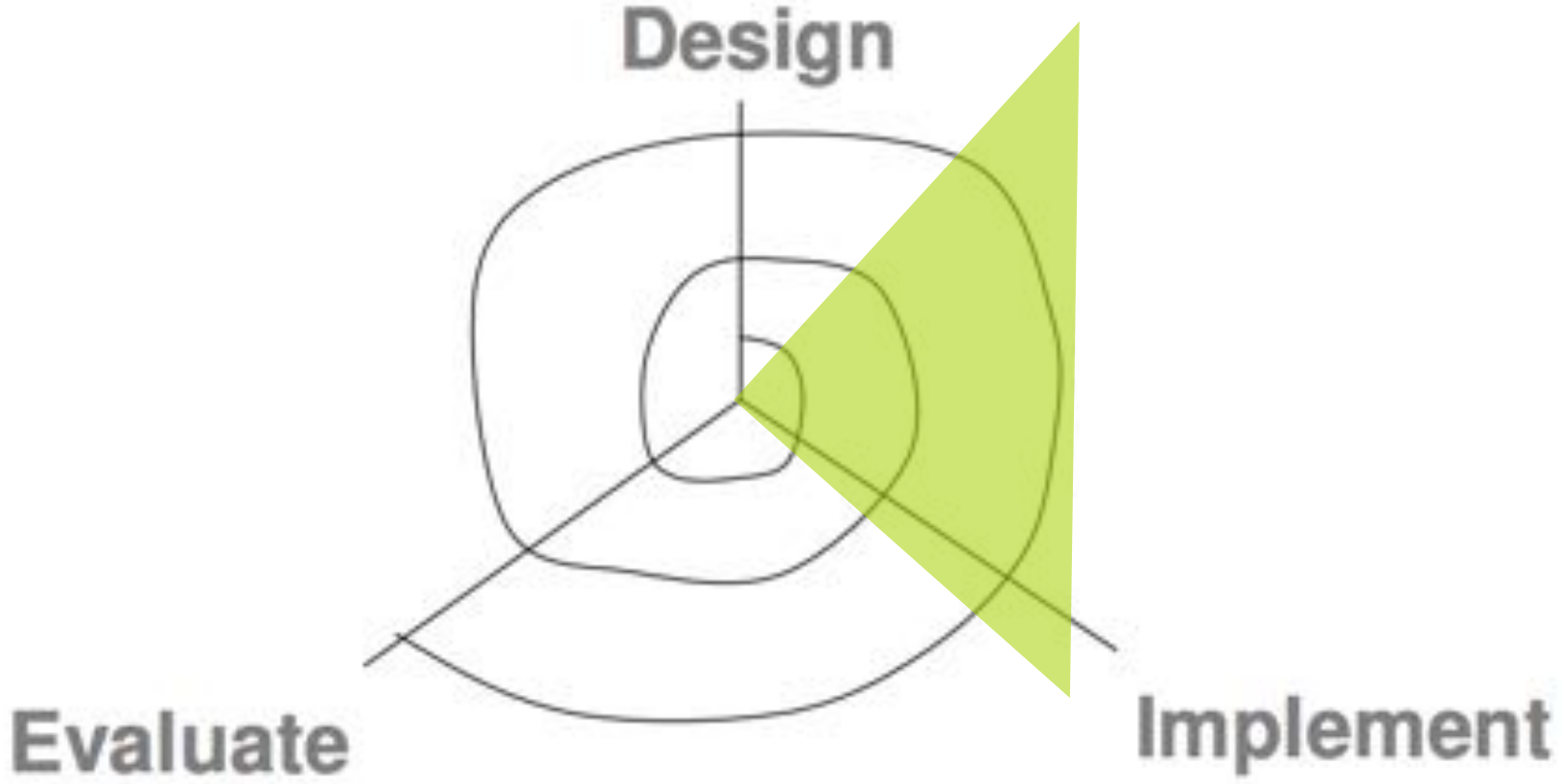
Landauer and Nielsen ("A Mathematical Model of the Finding of Usability Problems", INTERCHI '93)

for **qualitative evaluation**, **more users is not better**

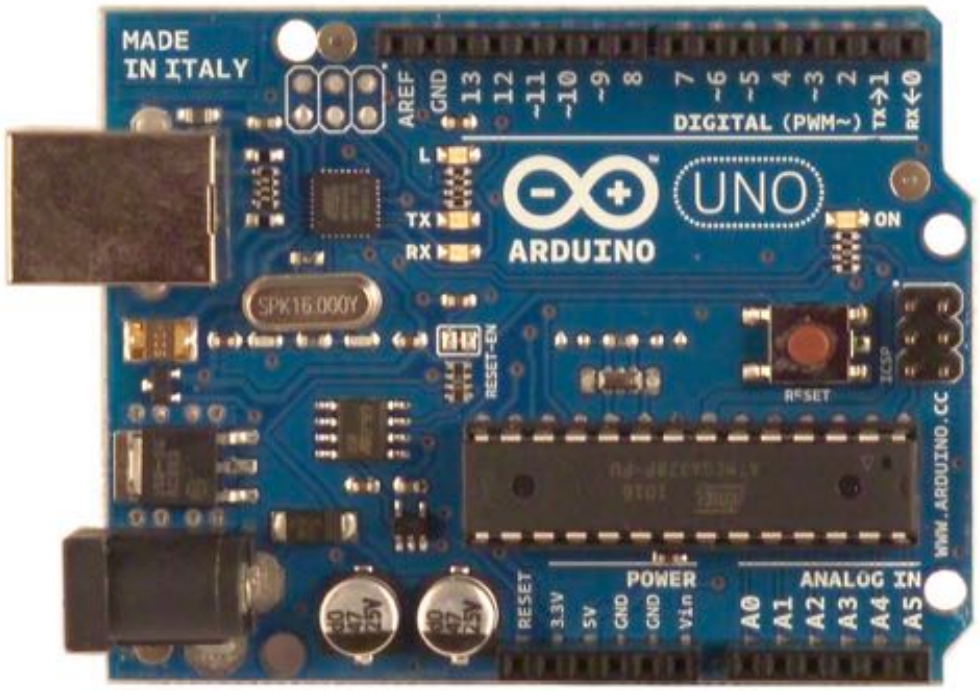
rather than 15 users to find almost all usability problems with one design iteration, it's wiser to run fewer users in each iteration, and thus squeeze in more iterations.



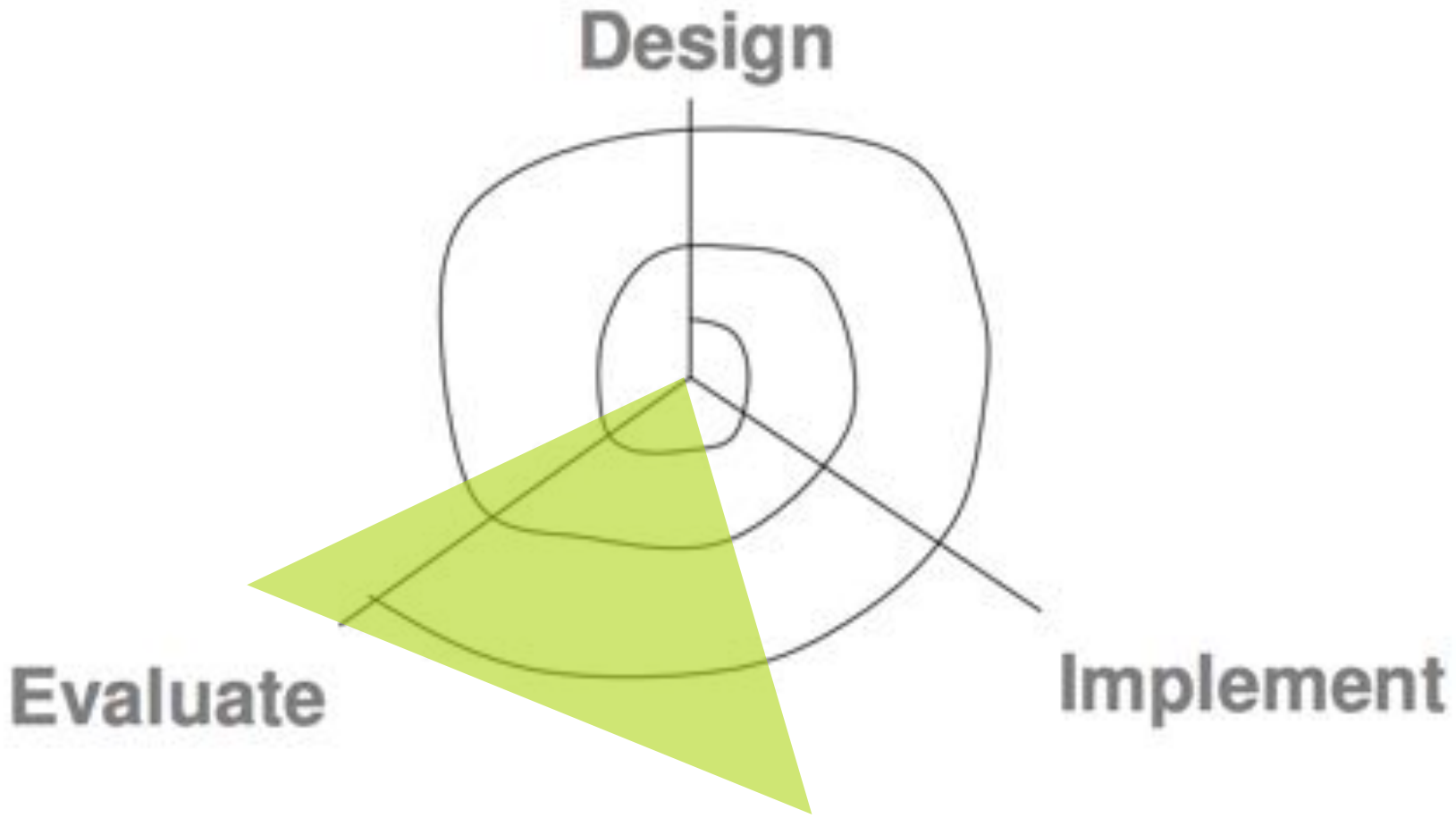
generate more ideas, refine designs



hi-fi prototypes



interactive prototype (e.g. arduino)

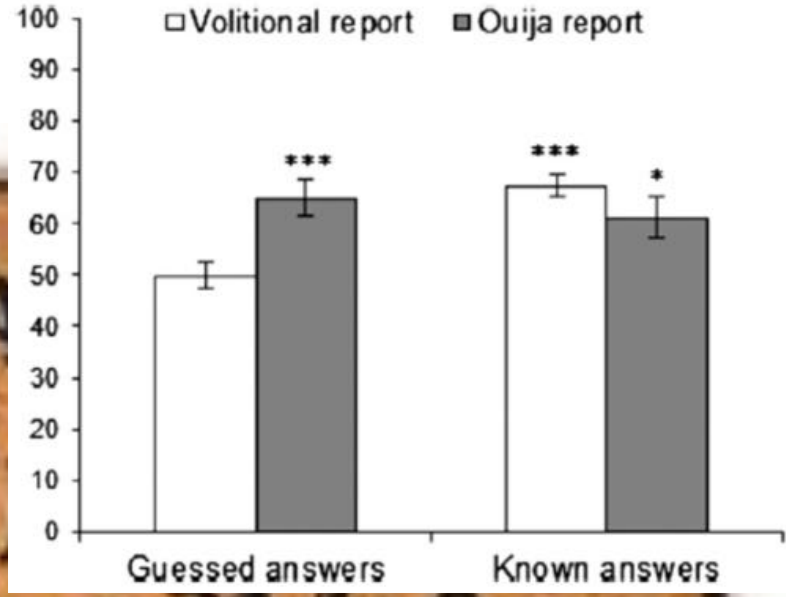


quantitative user studies

with a functional device we tend to switch to **quantitative** studies

… and you know them quite well now

<30 sec brainstorming>



controlled experiment (can be longitudinal, e.g. over several months)

quantitative data::

empirical, i.e. capable of being verified or disproved by observation, measurements, experiments

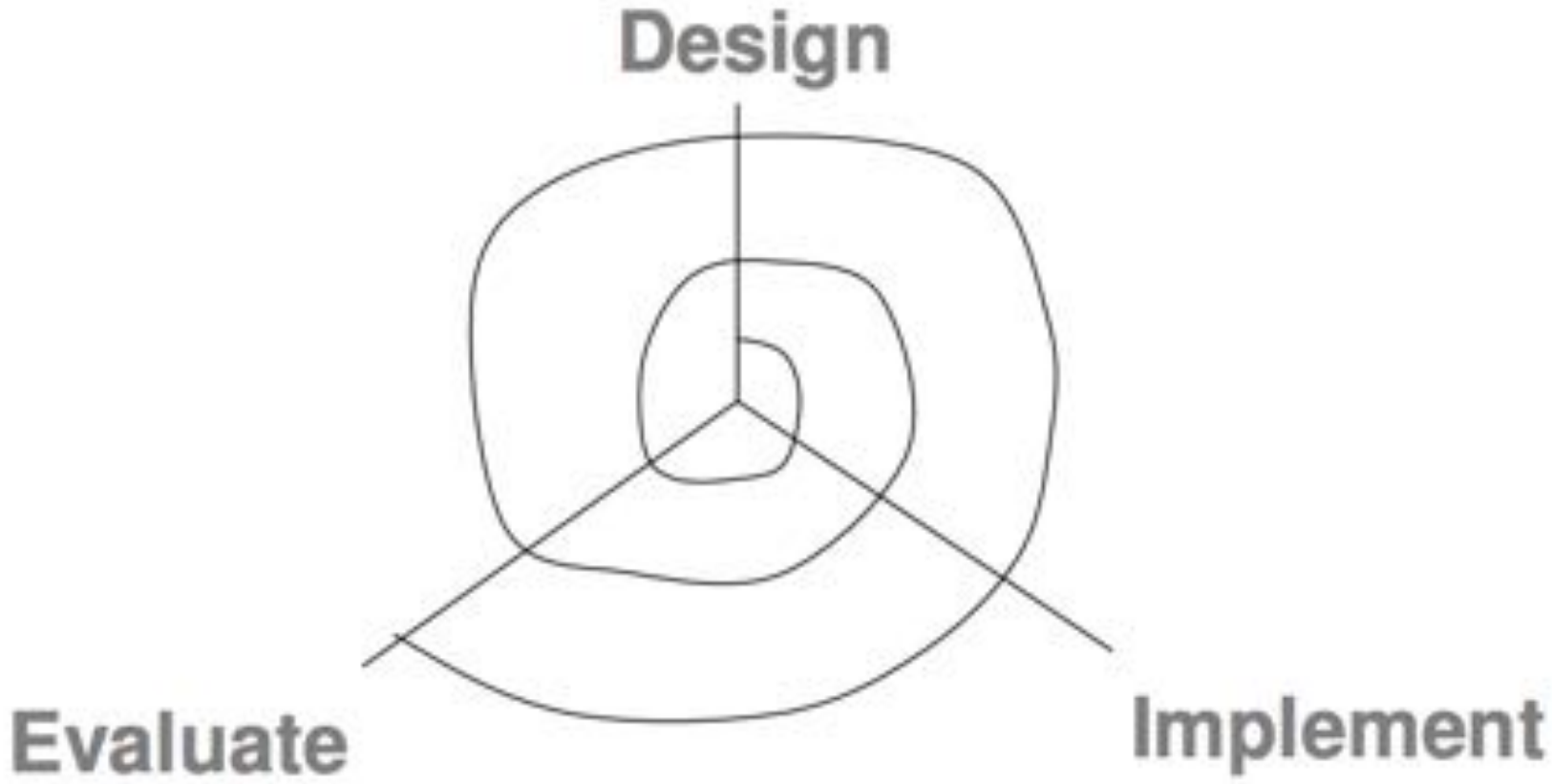
validate or not a set of hypothesis

how many users?

why?

<30 sec brainstorming>

need more users (depends on experimental design) in order to reach **significance level**



iterate until final product

end