UX&AI

How we used UX to improve AI: Case studies where UX played a role in the design of better AI

by **Jordan** Deja

UST IICS| 04 013 2019 | @jrdndj

the two types of people listening to my talk...

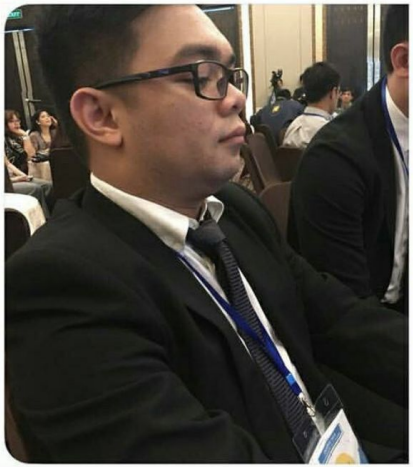
cramming professor meme

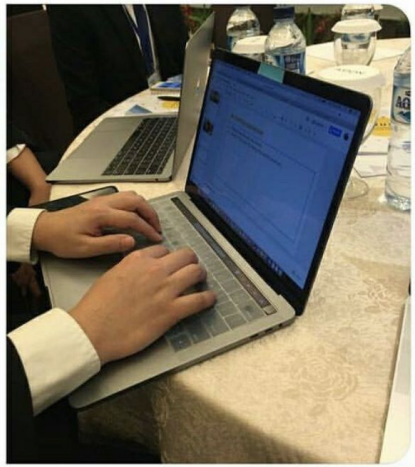
Google Search I'm Feeling Lucky

Google offered in: Filipino Cebuano

Blaise Cruz
@finelined_

If you think you're good at cramming, my prof makes his slides and prepares his presentation for an international conference IN THE CONFERENCE ITSELF





Hello,

I'm Jordan!

My name is Jordan Deja.

Im a ~~slavedriver~~ student motivator @ DLSU

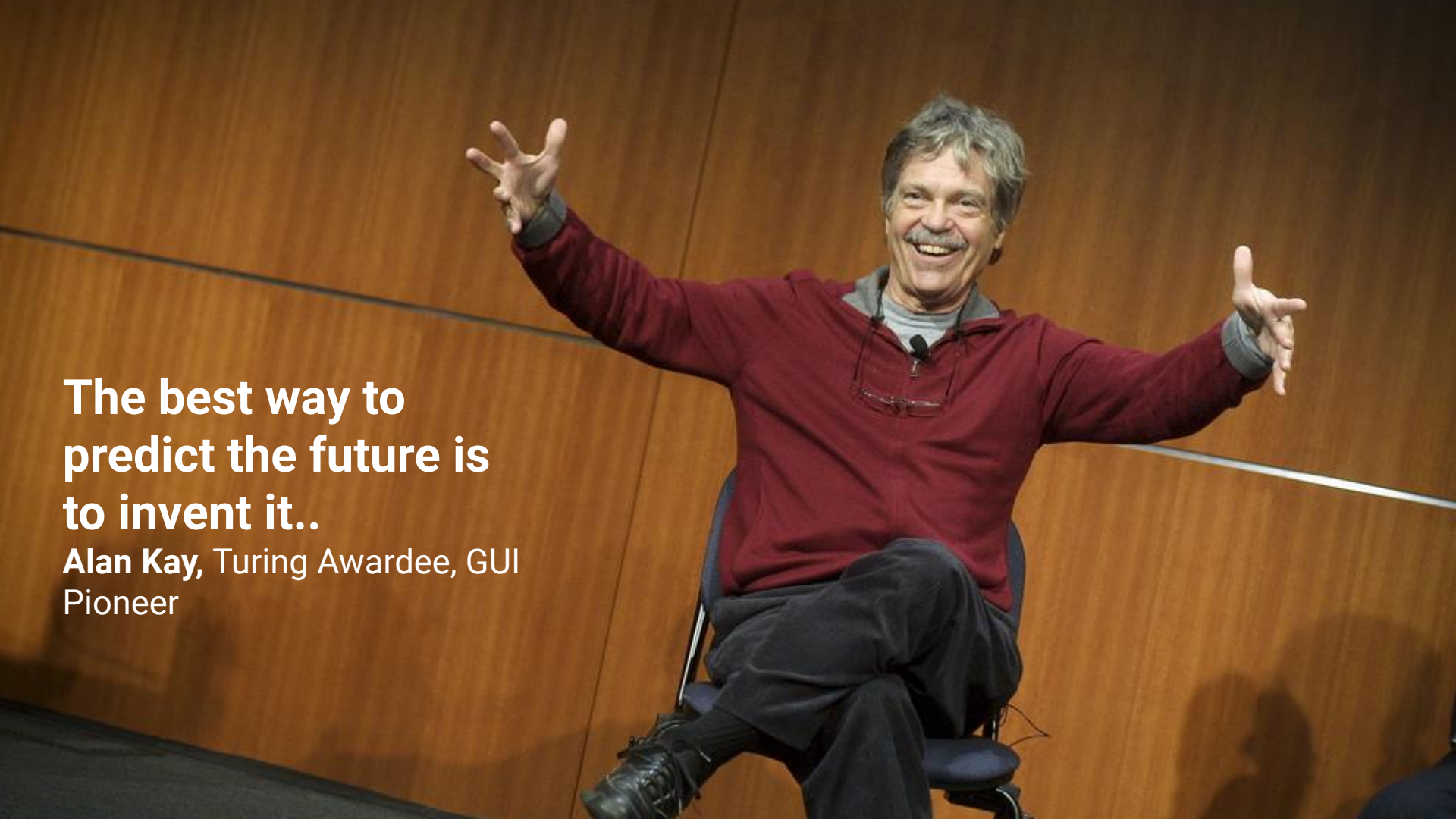
@jrdndj

Previous Affiliations:
Instructor, UST
Project Mgr, Senti Tech Labs
Instructor, MCL
Computer Teacher, LBASS
Jr Project Mgr, HP AP ROHQ

Education/Training:
Visiting Scientist, Osaka University
MSCS, De La Salle University
BSCS, De La Salle Canlubang

Current Affiliations:
Assistant Professor, DLSU CCS
Head, DLSU COMET
Core, UXPH
Member, ACM SIGCHI


NERD


The best way to predict the future is to invent it..
Alan Kay, Turing Awardee, GUI Pioneer

> if you aren’t aligned with a human need, you’re just going to build a very powerful system to address a very small—or perhaps nonexistent—problem.
>
> - Lovejoy (2018)

what's UX?

Lets begin with an activity:

STAND UP!

GRAB A PARTNER!

FACE YOUR PARTNER!

1 - 2

1 - 2 - 3

HUMANS DONT LIKE BREAKING THE PATTERN

CONSISTENCY IS A PATTERN

breaking patterns make things harder

1 - 2 - 3 - 4

ON HUMANS AND LONG THINGS

LONGER IS NOT ALWAYS HARDER IF THERE ARE PATTERNS

It is not all the time that long is ayt. It is not all the time short is better.

CONTACT US

If you would like to get ahold of us, please fill in the form below...

Salutation (optional)

Mr.

First and Last Name

Company or Organizaiton (optional)

Email Address

Phone Number (optional)

1 ( ) -

Fax Number (optional)

1 ( ) -

Subject or Topic

Technical support

Comments or Questions

Newsletter (optional)

☑ Yes, I would like to receive a monthly newsletter about deals and offers!

SEND

CONTACT US

If you would like to get ahold of us, please fill in the form below...

Name

Email Address

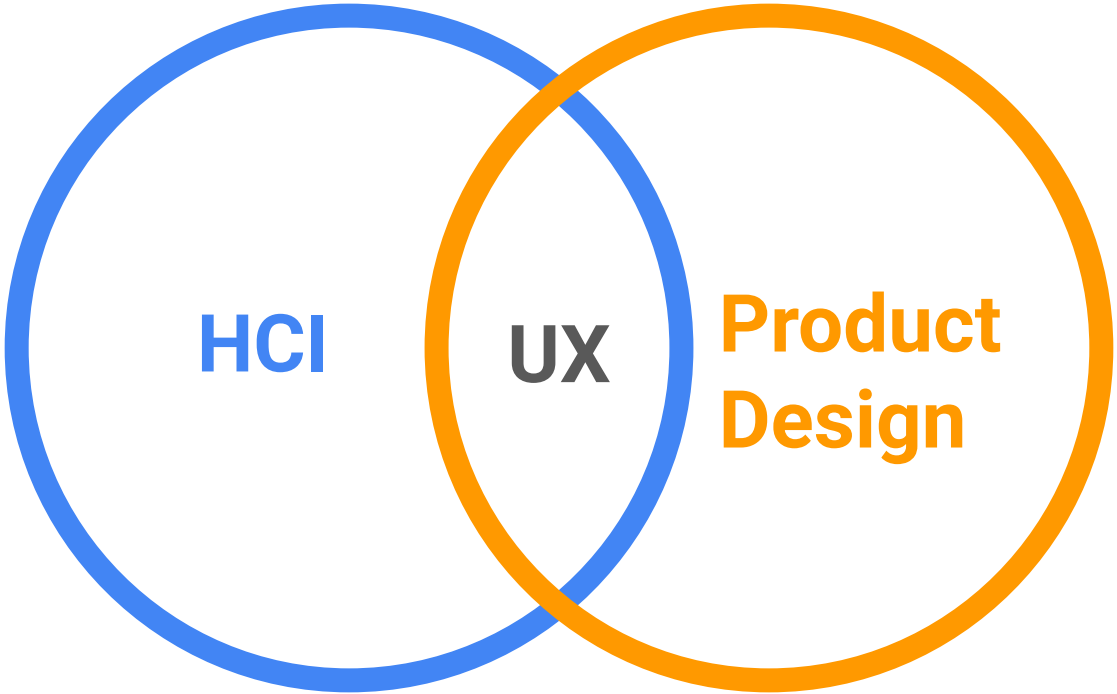
Comments or Questions

SEND

1 - CLAP - 3

JUMP - CLAP - 3

JUMP - CLAP -


HCI
UX
Product
Design

UX&UI

Let’s remove the ‘U’, what do we have left?

UX&UI

Experiences
Interfaces

Let’s remove the ‘U’, what
do we have left?

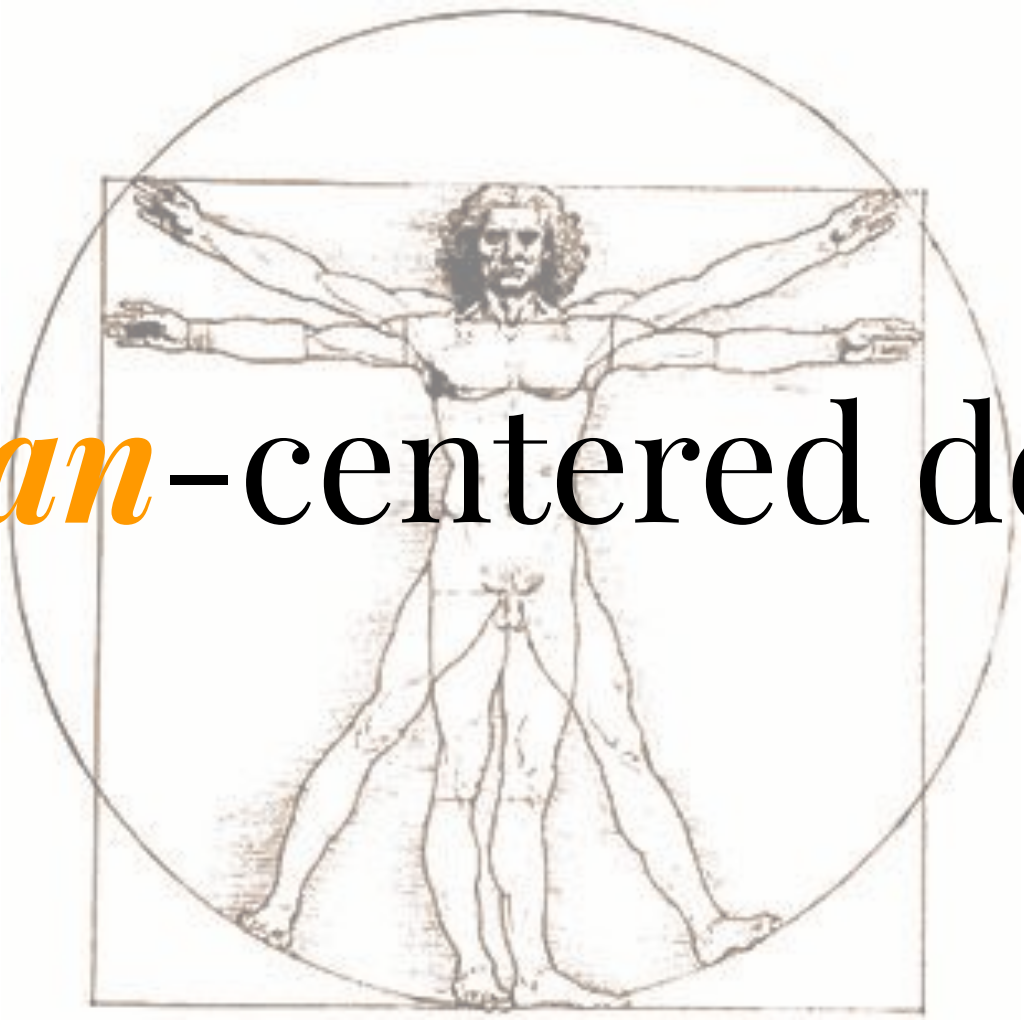
UX&HCI

Let’s look at the first words shall we?

UX&HCI

User Experience
Human Computer
Interaction

Let’s look at the first words shall we?



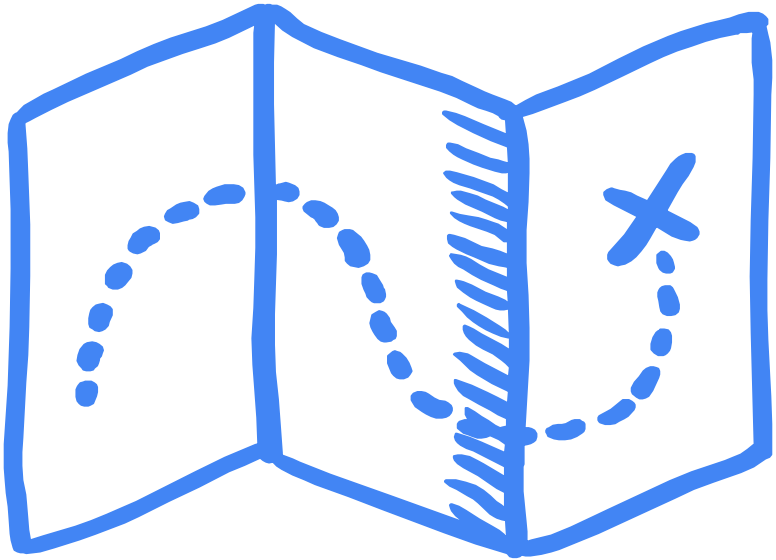
human-centered design


VORTEX
PULL
DOOR
SERVICE
Vox

UXareas

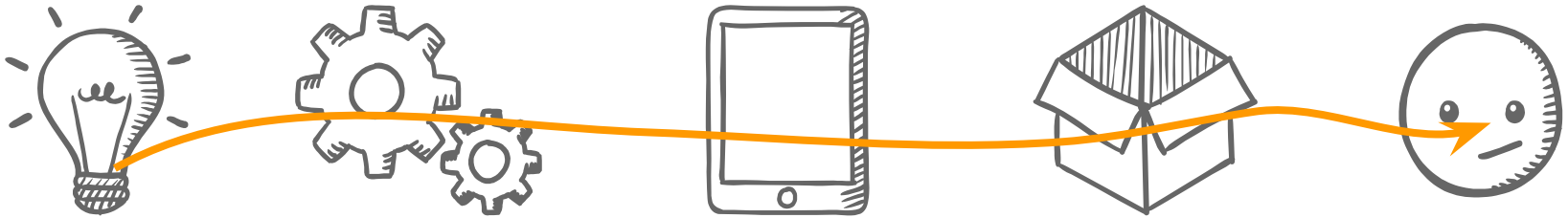
Experience Design
Interaction Design
User Research
Visual Design
Information Architecture
Service Design
Product Design

the product journeys of



an AI product

the
typical design journey
of an AI product



ideation

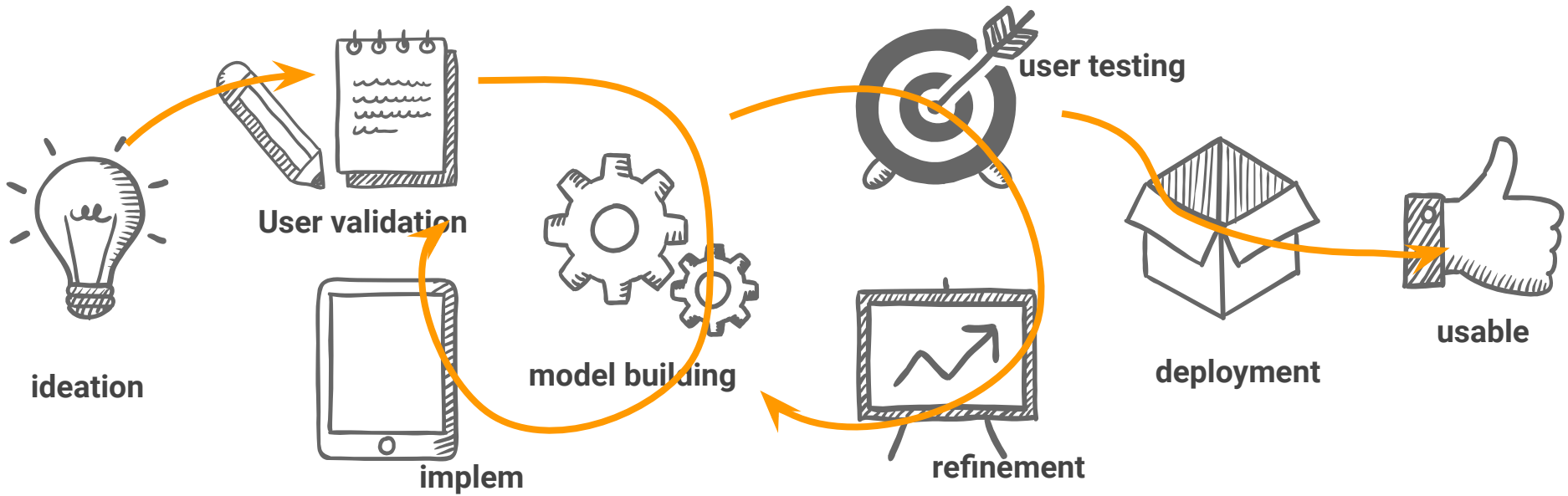
model
building

implem

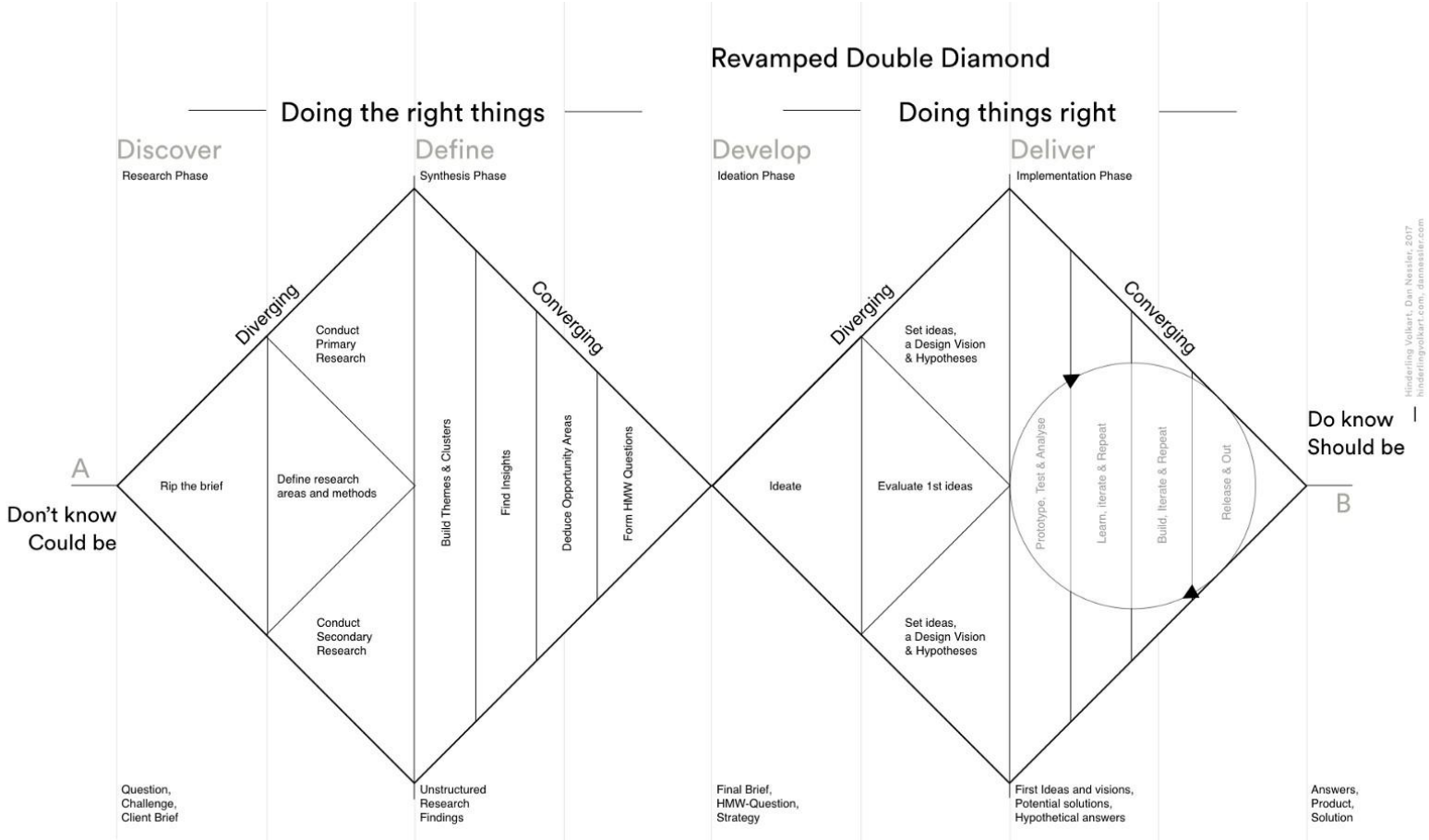
packaged

not
usable

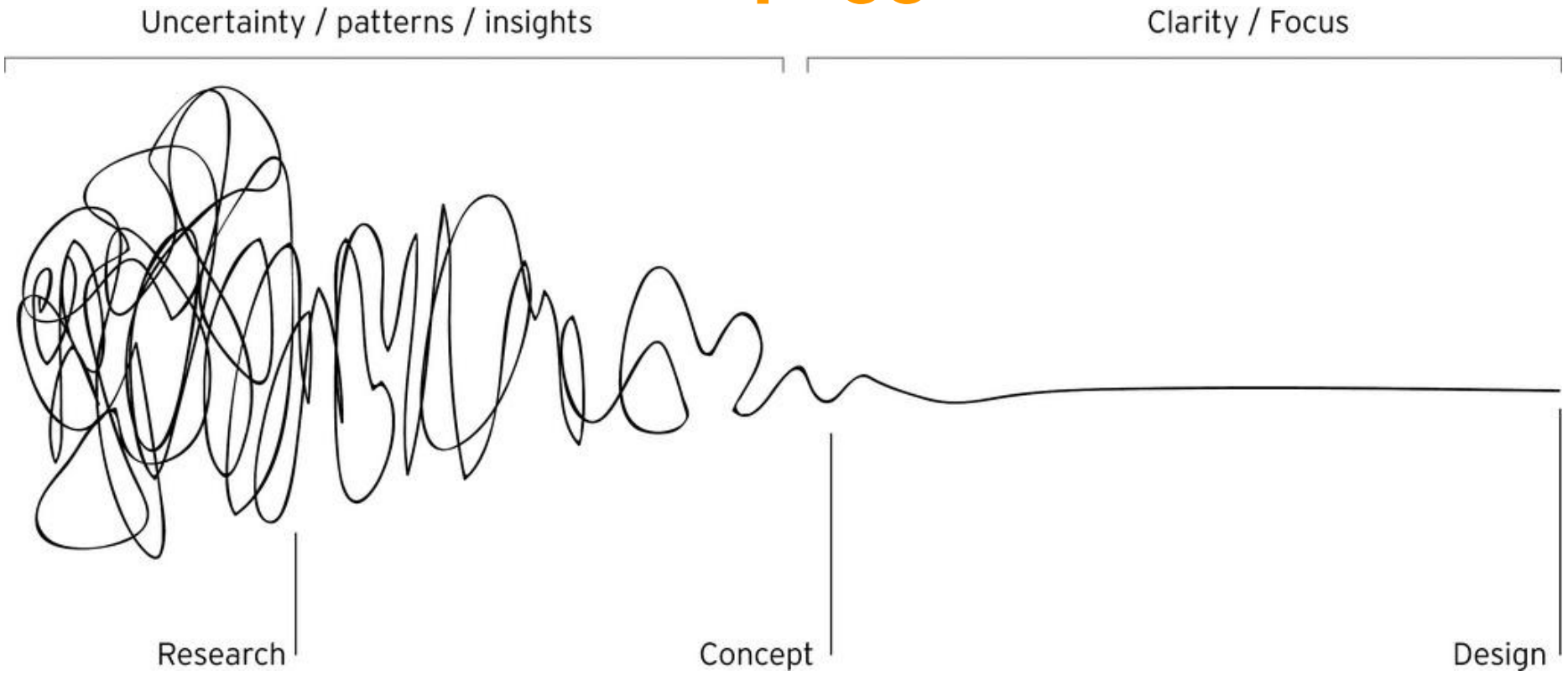
the ideal design journey of a usable AI product



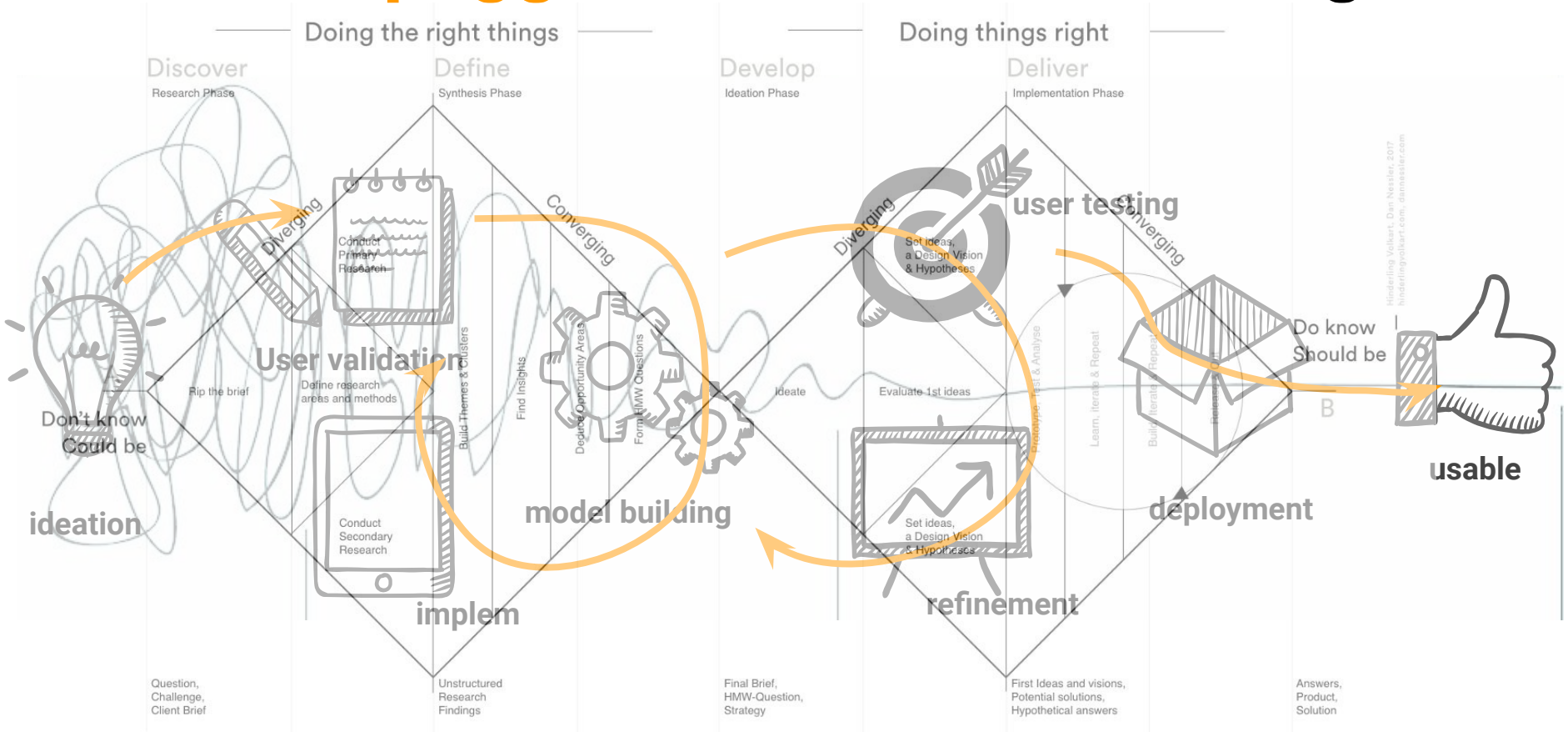
the Double Diamond of UX



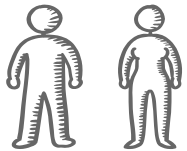
UX Squiggle


Uncertainty / patterns / insights
Clarity / Focus
Research
Concept
Design

“UX Squiggle” in AI Product Design



specific UX methods for a usable AI product



Participatory design

eye tracking

Customer feedback

User inspection

A/B Testing

field studies

And many more...

https://www.nngroup.com/articles/which-ux-research-methods

Didn’t we mention a usable, sustainable AI product?

solves a problem

is a usable product

profitable, provides opportunities

Didn’t we mention a usable, sustainable AI product?

solves a problem

is a usable product

profitable, provides opportunities

does not kill jobs

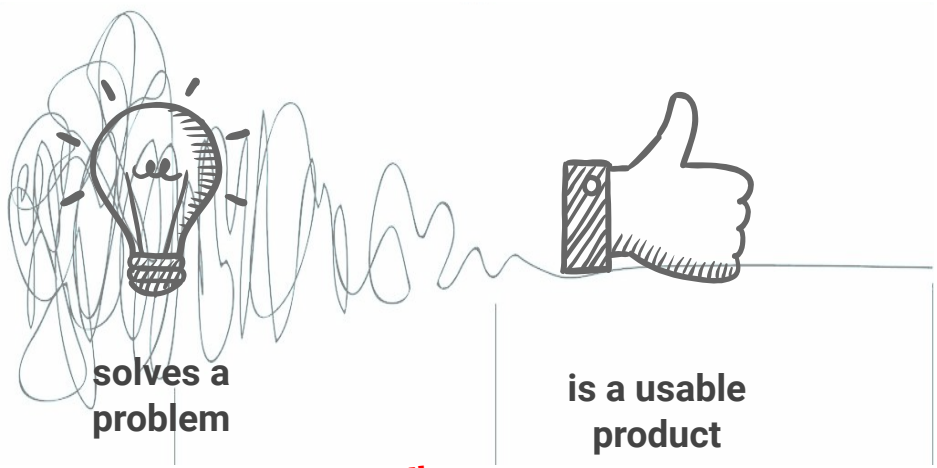
What should be the journey towards a usable, sustainable AI product?

solves a problem

is a usable product

profitable, provides opportunities

What should be the journey towards a usable, sustainable AI product?



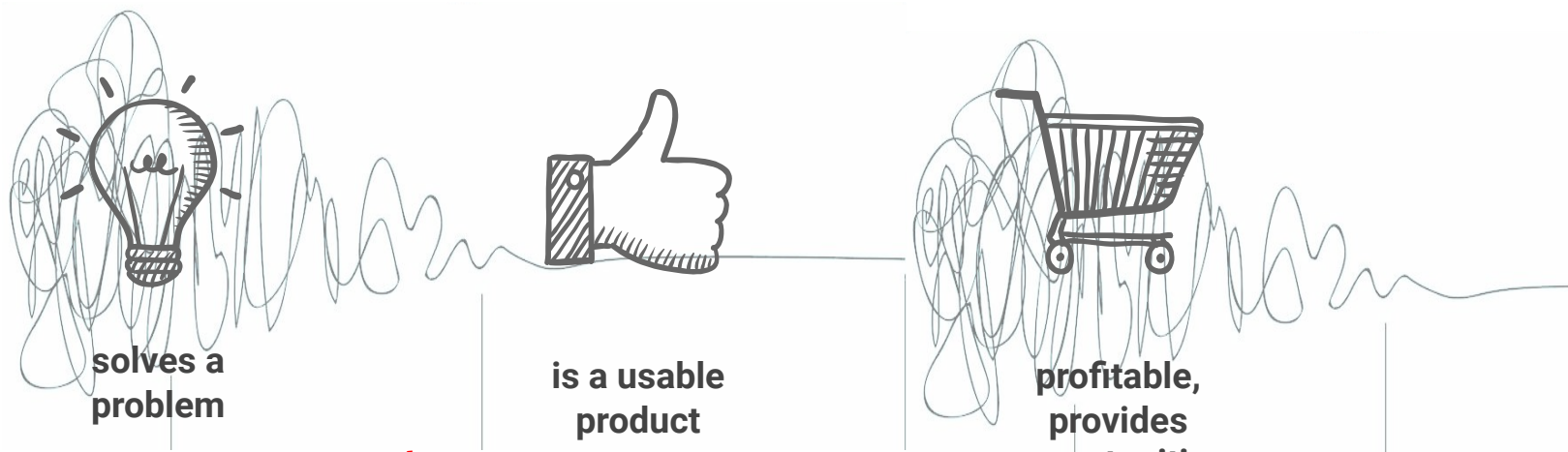
solves a problem

is a usable product

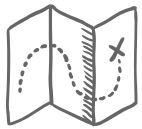
profitable, provides opportunities

Just add UX!

What should be the journey towards a usable, sustainable AI product?



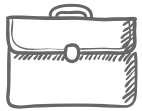
+specific UX methods for a sustainable AI product



Journey mapping

Service blueprint

personas

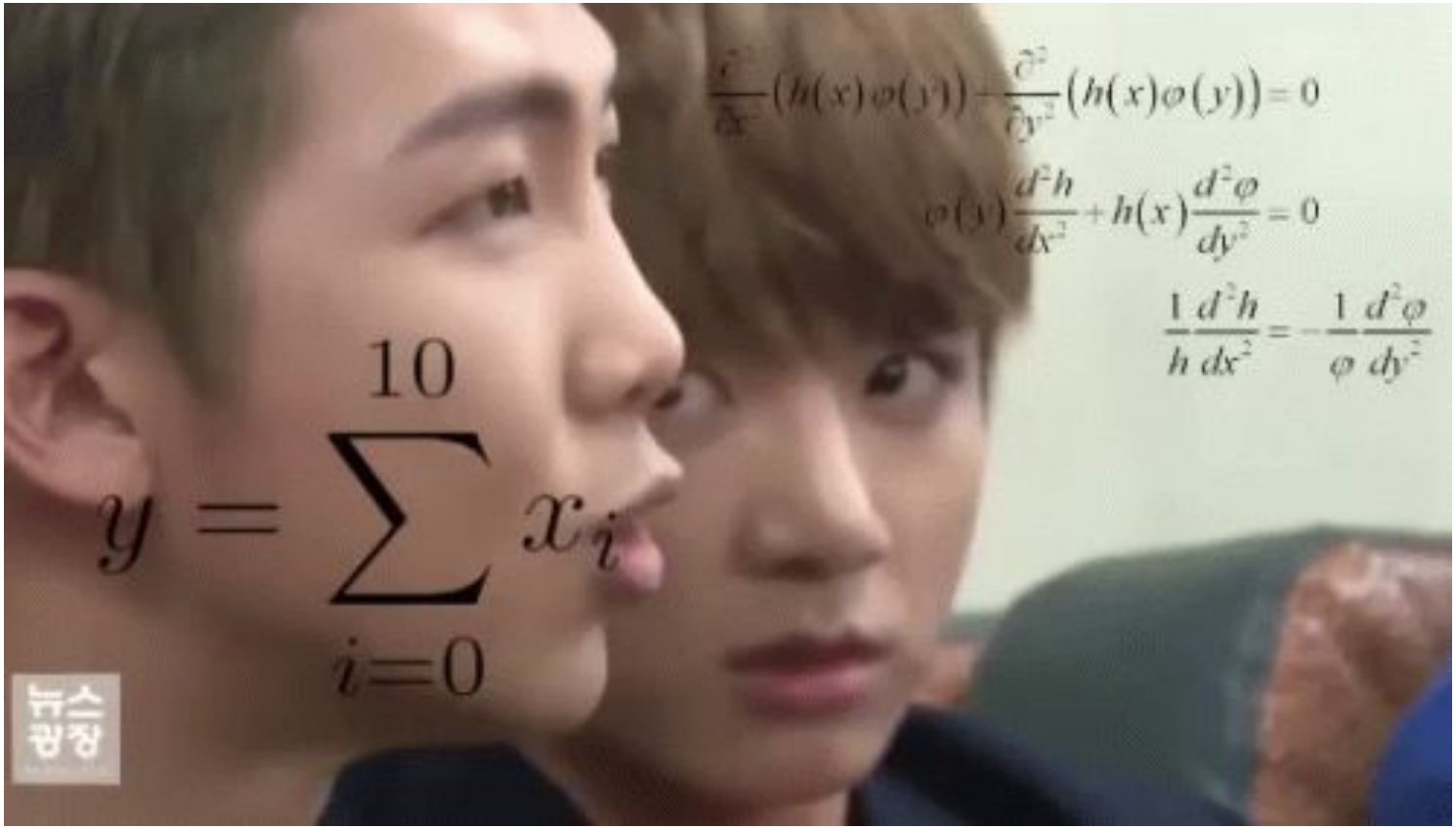


business origami

AIDA Storyboarding

User empathy and value proposition

And many more...



Me thinking if this will even work in real life?

Design Challenge

Form groups composed of at most 4 members each. Assume that you are in the scenario.

Individually:

Write each idea you think of in your post-it.

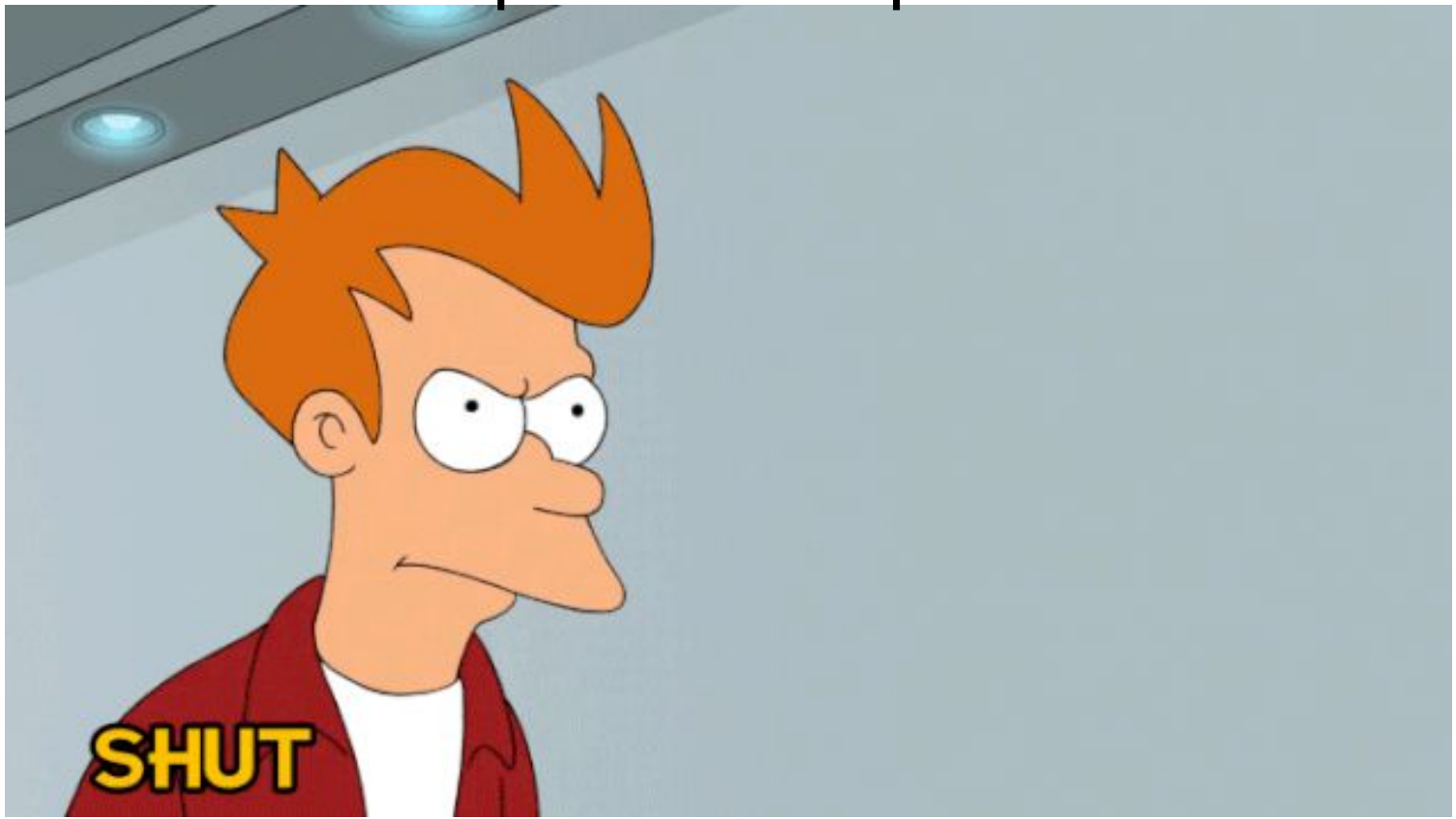
As a group:

Discuss and collaborate on your ideas.
Then sketch and present your findings.

Design Challenge

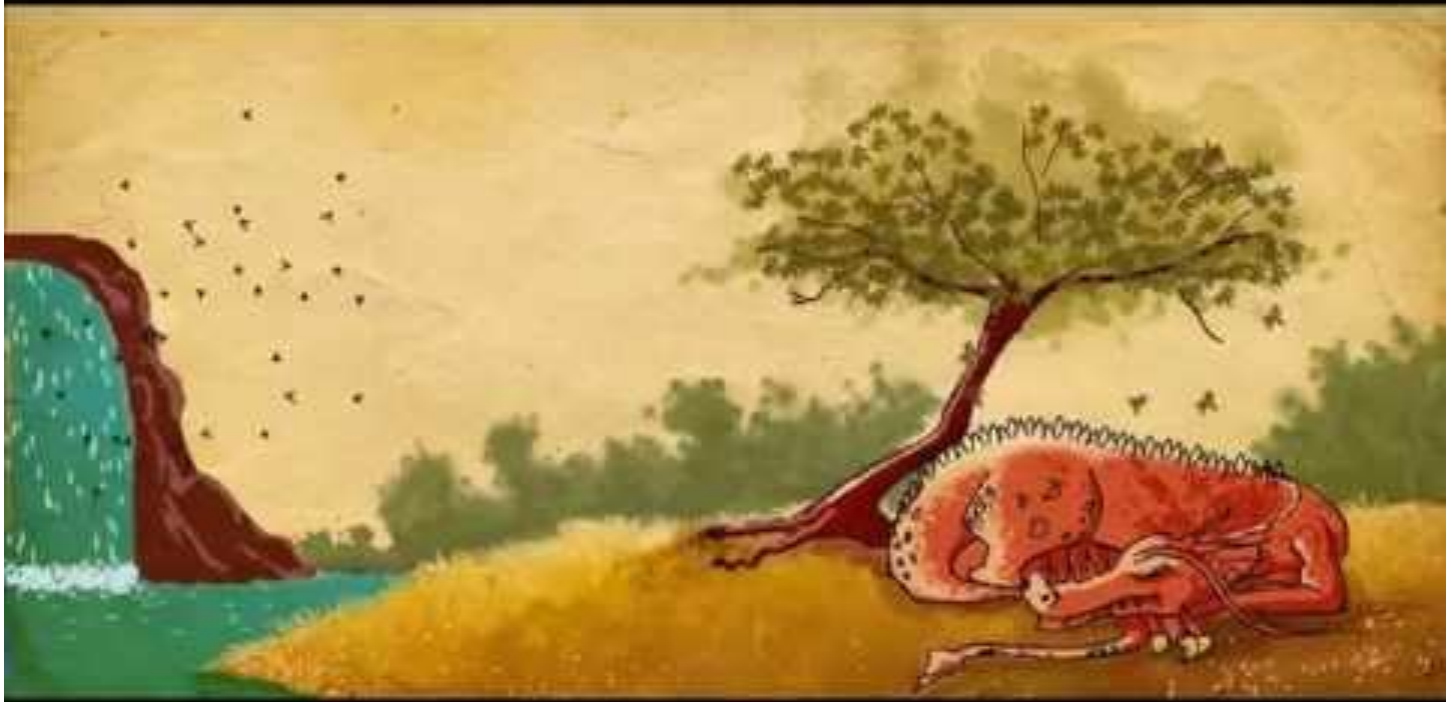
I want to book a flight online because there is an ongoing sale. However, due to server issues, I cannot book a flight properly. My company thinks we should develop a FB Chatbot to solve this problem. How might we design a chatbot to address this scenario?

Is there an example of such product? If so then...



Draco: animating drawings using kinetic motions

https://www.youtube.com/watch?v=l84YK1_ytks&list=PLl81bJ6jBktwh0BrSYn2prx9WQ7GnJDPK&index=3



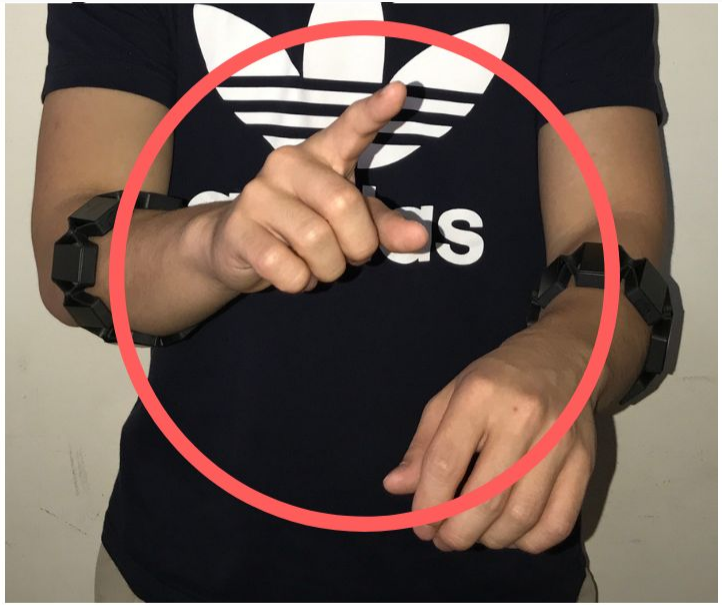
Em-sense: combining Wearables and machine learning for context sensing


https://www.youtube.com/watch?v=fpKDNle6ia4
OFFICE DOOR

MyoSL: a usable gesture-based Filipino Sign Language interpreter

SCEPTRE (Paudyal et. Al, 2016)


adidas

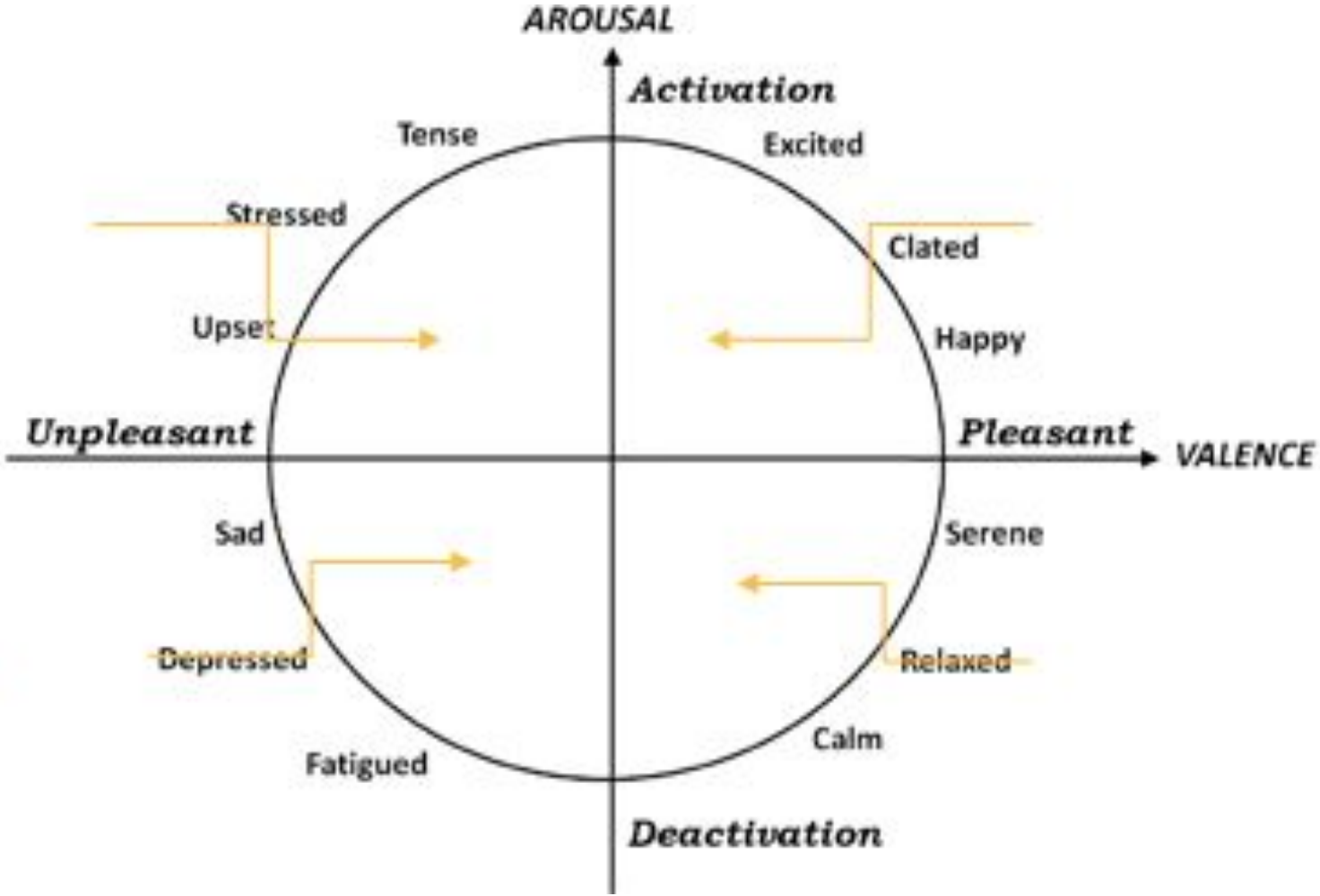


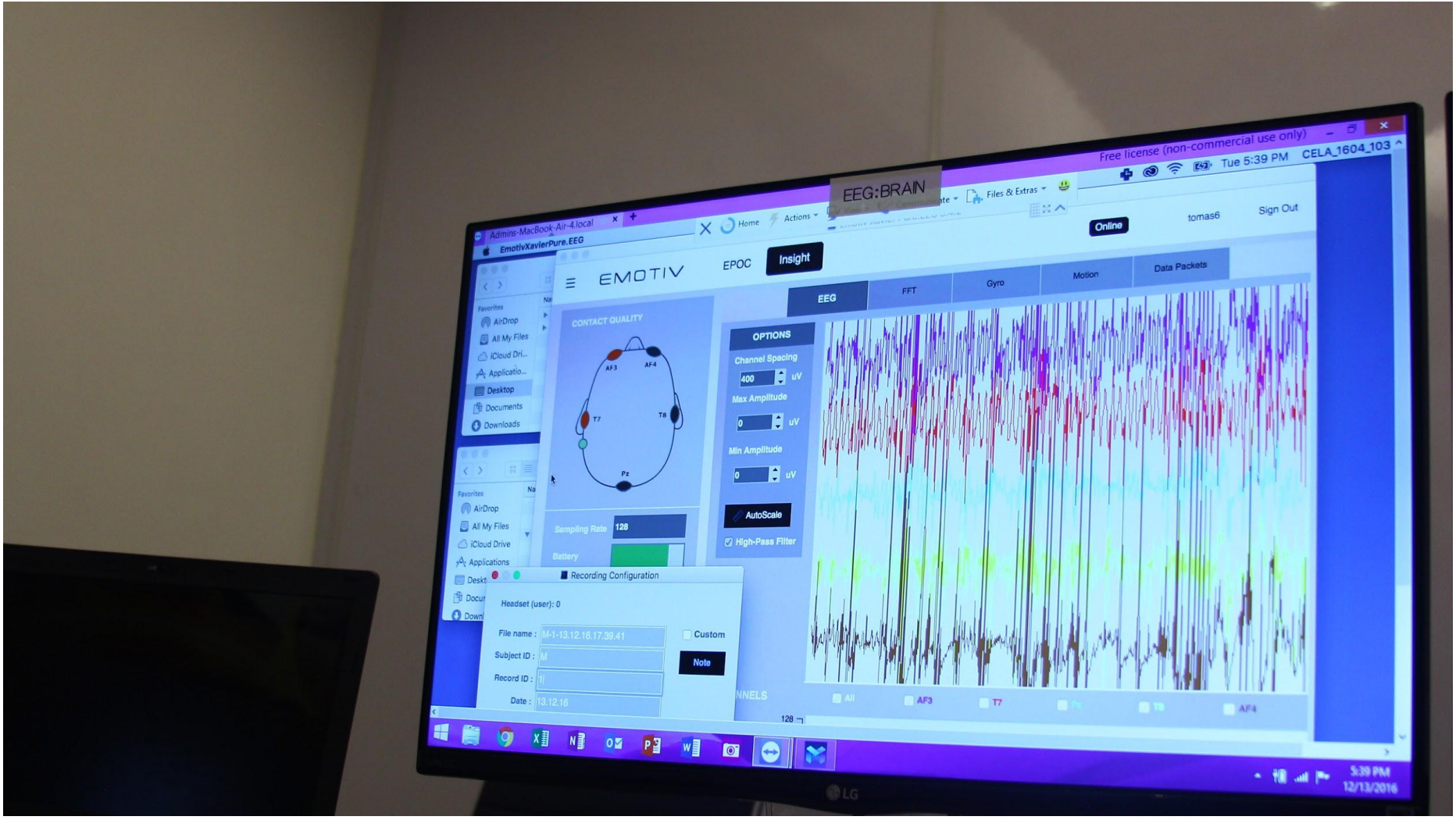
DeepDive: combining marketing and science using brainwaves and AI

in partnership
with

NUWORKS
INTERACTIVE


EMOTIV


AROUSAL
Activation
Tense
Excited
Stressed
Clated
Upset
Happy
Unpleasant
Pleasant
VALENCE
Sad
Serene
Depressed
Relaxed
Calm
Fatigued
Deactivation


EEG:BRAIN
Free license (non-commercial use only)
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Admins-MacBook-Air-4.local
EmotivXavierPure.EEG
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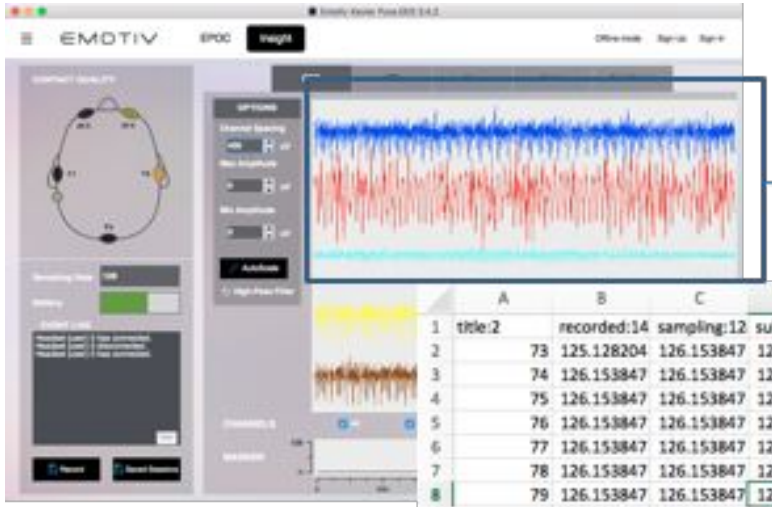
EMOTIV
EPOC
Insight
EEG
FFT
Gyro
Motion
Data Packets
CONTACT QUALITY
AF3
AF4
T7
T8
Pz
OPTIONS
Channel Spacing
400
uV
Max Amplitude
0
uV
Min Amplitude
0
uV
AutoScale
High-Pass Filter
Sampling Rate
128
Battery
Recording Configuration
Headset (user): 0
File name :
M-1-13.12.16.17.39.41
Custom
Subject ID :
M
Note
Record ID :
1
Date :
13.12.16
All
AF3
T7
AF4
128
5:39 PM
12/13/2016



Raw visualization of EEG signals

Raw data outputs of EEG Signals

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	title:2		recorded:14	sampling:12	subject:16	labels:COUN	chan:12	units:emotiv						
2		73	125.128204	126.153847	127.179482	56.9230766	145.128204	118.974358	70.2564087	153.846146	167.179489	27873	869.230774	
3		74	126.153847	126.153847	127.179482	57.9487152	143.07692	120	70.2564087	152.820511	168.205124	27873	877.435852	
4		75	126.153847	126.153847	127.179482	56.9230766	145.128204	118.974358	69.2307663	153.846146	168.205124	27873	885.128174	
5		76	126.153847	126.153847	127.179482	56.9230766	146.153839	118.974358	70.2564087	156.92308	169.230759	27873	893.333313	
6		77	126.153847	126.153847	127.179482	57.9487152	144.102554	118.974358	70.2564087	156.92308	169.230759	27873	901.025635	
7		78	126.153847	126.153847	127.179482	56.9230766	145.128204	118.974358	70.2564087	150.256409	168.205124	27873	908.717957	
8		79	126.153847	126.153847	127.179482	56.9230766	143.07692	120	69.2307663	154.871796	168.205124	27873	916.923035	
9		80	126.153847	126.153847	127.179482	55.8974342	145.128204	118.974358	69.2307663	151.794861	168.205124	27873	924.615356	
10		81	126.153847	126.153847	127.179482	55.8974342	144.102554	118.974358	70.2564087	157.948715	168.205124	27873	932.307678	
11		82	126.153847	126.153847	127.179482	56.9230766	144.102554	118.974358	70.2564087	157.948715	168.205124	27873	940.512817	
12		83	126.153847	126.153847	127.179482	55.8974342	146.153839	118.974358	69.2307663	160	167.179489	27873	948.205078	
13		84	126.153847	126.153847	127.179482	55.8974342	146.153839	118.974358	70.2564087	152.820511	169.230759	27873	955.8974	
14		85	126.153847	126.153847	126.153847	56.9230766	145.128204	120	67.1794891	151.794861	169.230759	27873	964.102539	
15		86	126.153847	126.153847	126.153847	55.8974342	145.128204	118.974358	70.2564087	152.820511	168.205124	27873	971.794861	
16		87	126.153847	126.153847	126.153847	54.8717918	145.128204	120	70.2564087	152.820511	168.205124	27873	980	
17		88	126.153847	126.153847	126.153847	55.8974342	143.07692	120	69.2307663	152.820511	168.205124	27873	987.692261	
18		89	126.153847	126.153847	126.153847	55.8974342	144.102554	120	69.2307663	153.846146	168.205124	27873	995.384583	
19		90	126.153847	126.153847	126.153847	56.9230766	143.07692	120	69.2307663	152.820511	169.230759	27874	3.58974361	
20		91	126.153847	126.153847	126.153847	56.9230766	144.102554	118.974358	69.2307663	152.820511	169.230759	27874	11.2820511	
21		92	126.153847	125.128204	126.153847	57.9487152	143.07692	118.974358	70.2564087	153.846146	168.205124	27874	18.9743576	
22		93	126.153847	125.128204	126.153847	57.9487152	145.128204	118.974358	69.2307663	152.820511	168.205124	27874	27.1794872	
23		94	126.153847	126.153847	126.153847	57.9487152	144.102554	118.974358	69.2307663	150.769226	169.230759	27874	34.8717957	


5 ★ threat
3 – ∞ unstoppable
ZGIRLS


2 GIRLS
P6 DC@COOL RCONN @2:38 GSR FLAT
DC:ATW@V1 FDIS
arousal increase @"dandruff"
valence drop @V2 (15s)
P7 DC@V1 ATW RNEV
@negative valence
parts not linked
AXIEV
GSR
P9 DCATW
definite relieved@clean
DC@V2
PD@dirt V3
P10 DC@ATW V1
almost plot/jagged

Sample scene analysis: Bike scene

Avg. Valence: 1.024 (high)

Avg. arousal: 0.512 (high)

Affect: Possible Excitement

Pocket recommendation: **keep**

Notes: confirms interest for bicycles

EEG values display 30% spike of values on arousal for the next 3 seconds from this scene

Sample scene analysis: Enrique dance

Avg valence:1.01 (high)

Avg arousal: 0.481 (low)

Affect: Definite Calm

Pocket recommendation: **dont**

Notes: EEG values 2 seconds before and 2 seconds after hardly changed (also for most selected scenes from 15s videos)

Sample scene analysis: scalp scene

Avg. Valence: 0.998 (low)

Avg. Arousal: 0.5101 (high)

Affect: Probable Disgust

Pocket recommendation: **keep**

Notes:

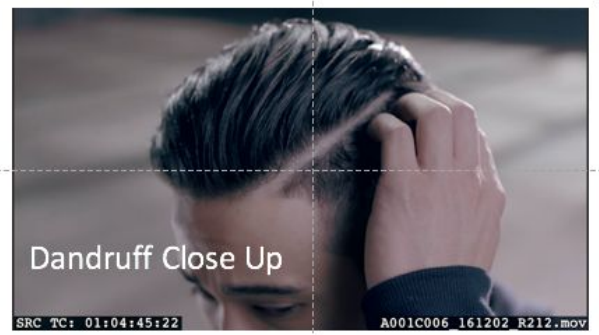
Some participants remembered dandruff on this scene even there was none as this was offline.


Bedroom
SRC TC: 03:13:47:19
A003C019_161202_R212.mov


Motor Bike
SRC TC: 01:18:27:03
A001C034_161201_R212.mov


Dancing
SRC TC: 02:01:18:08
A002C001_161202_R212.mov


Dandruff Guy
SRC TC: 01:31:49:16
B001C015_161202_R20B.mov


Dandruff Close Up
SRC TC: 01:04:45:22
A001C006_161202_R212.mov


CLEAR
DANDRUFF-PROOF
YOUR STYLE
No visible flakes with regular use

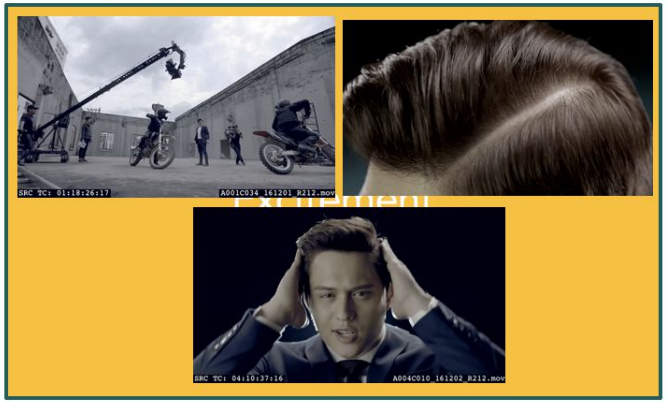

Party / Singing
SRC TC: 03:13:01:16
A003C004_161201_R212.mov

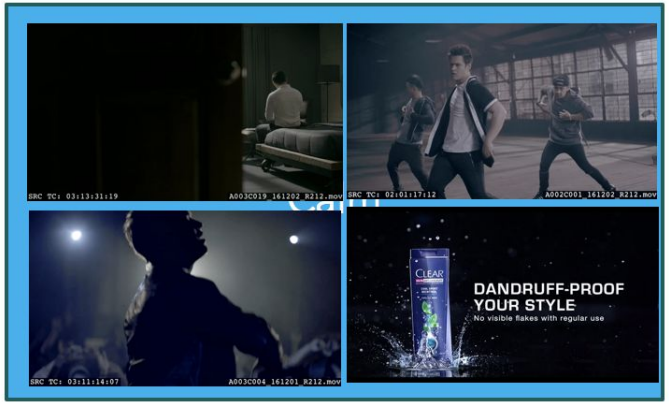

Clean Scalp


Nothing to Hide

Arousal

Valence





















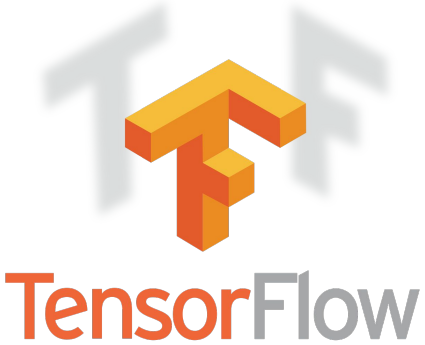


In collaboration with NuWorks Interactive Labs


UNSTOPPABLE
DANDRUFF-FREE FRESHNESS
no visible flakes with regular use

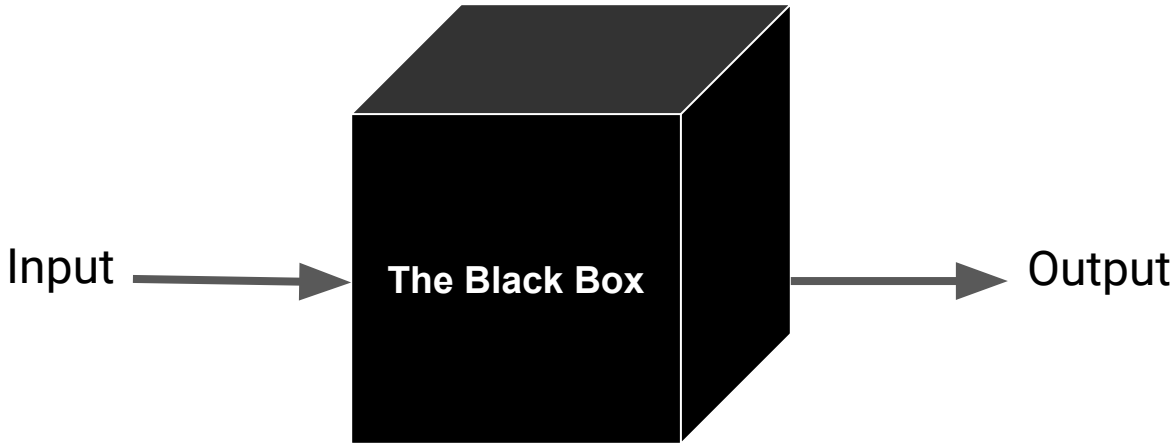
TREX: Toolbox for Regression Experiments (sandbox) for machine learning

Current Machine Learning Suites



Tools	Description	Interactive Visualizations?	Abstracts Algorithm Code?	User Feedback?
RapidMiner	Set of tools used to build ML systems from scratch.			Limited
Weka 3	Java integrated ML algorithms for data mining tasks.			Limited
Tensorflow Playground	Helps visualize the process of building Neural Networks.			Limited
Scikit Learn	Open source ML tools for Python.			N/A

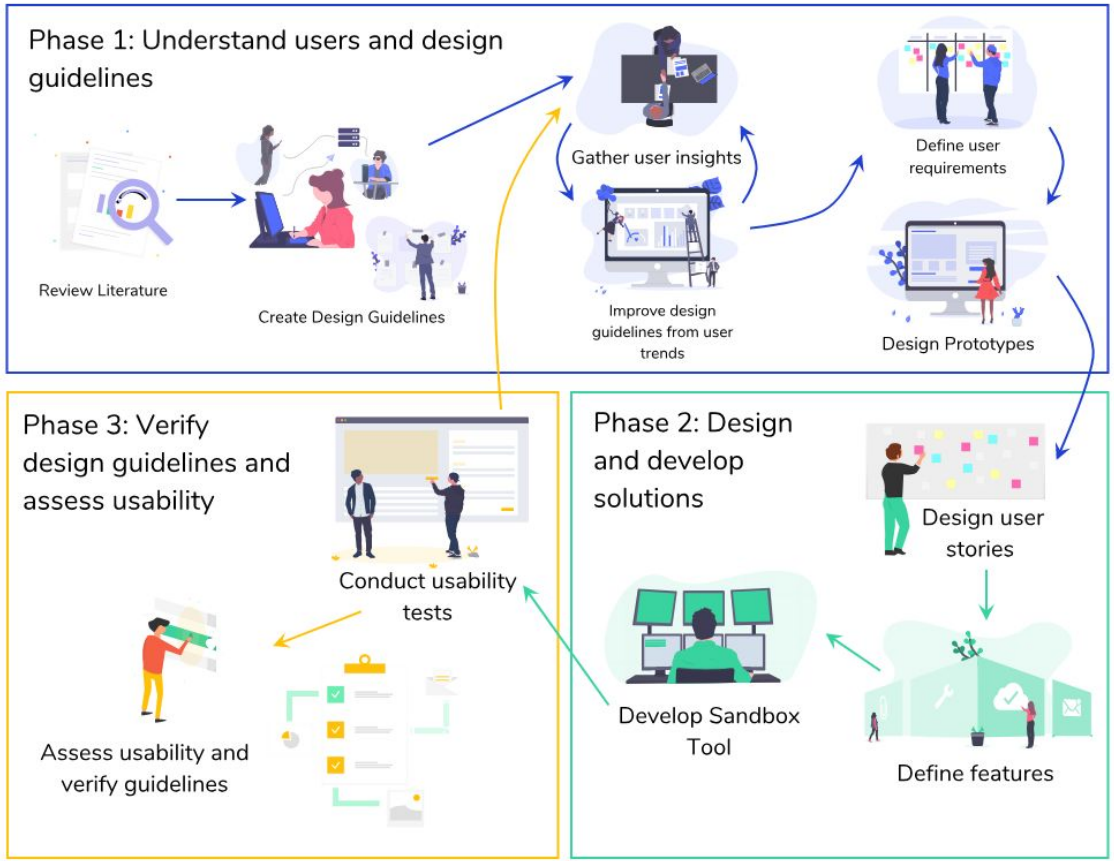
The “Black Box” Effect



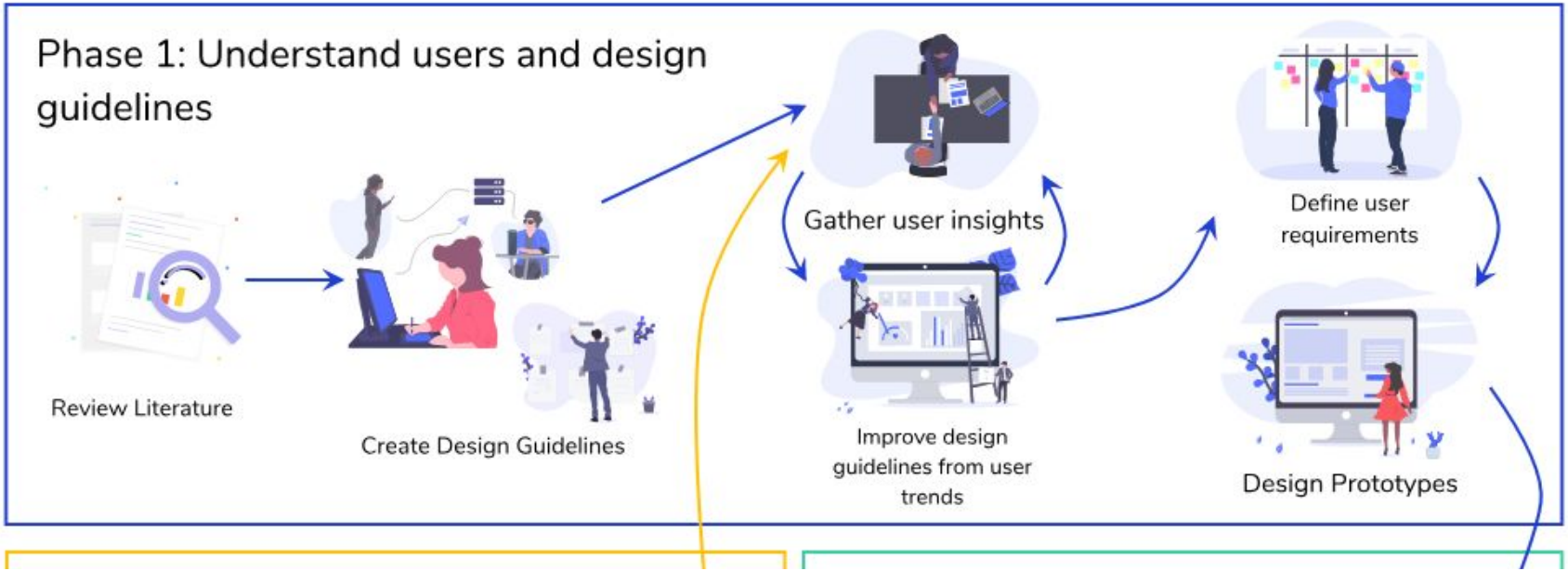
Teng Lee, James Johnson, and Steve Cheng. 2016. An Interactive Machine Learning Framework

How might we use a sandbox approach to design an interactive machine learning system?

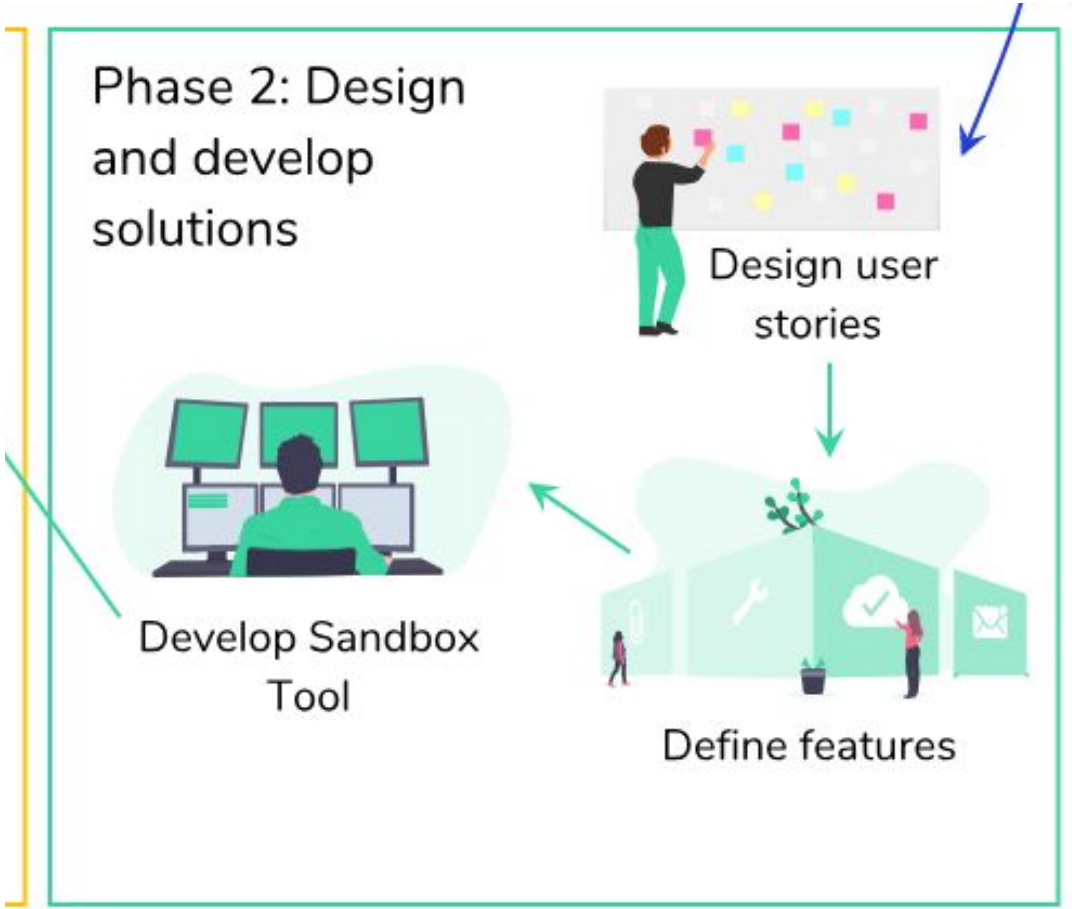
Research Methodology



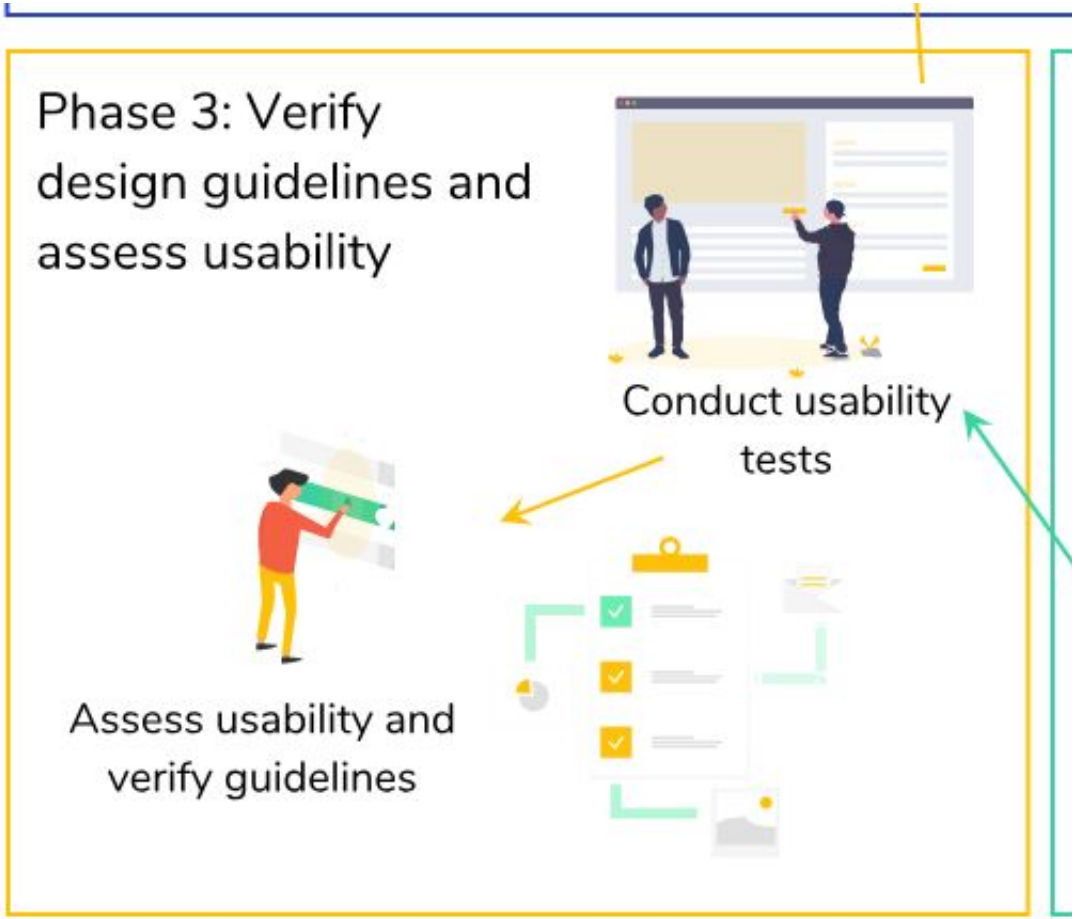
Research Methodology



Research Methodology



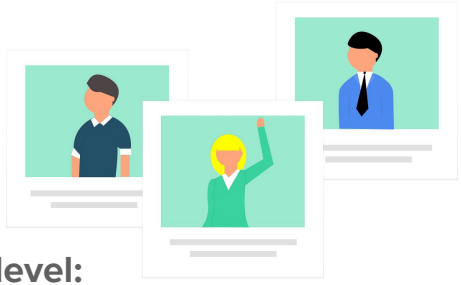
Research Methodology



Phase 1 User Study Participants

Age Group: 19 - 25 Years Old

10 people (Snowball Sampling)



Expertise level:
1 - 4 Years Programming Experience
0 - 4 Year Machine Learning Experience

User Interviews

Study Design and Protocol

- Participants were contacted all in one week
- Interview times were specified by the participants availability
- Informed consent administered before interview
- Interview proceeds with consent to be recorded
- User insights were noted during the interview and verified with the recording
- Initial Design Guidelines were verified by the participants

Results

Results: General User Insights

- **Studying machine learning concepts was interesting** in application based on their experience with ML tools.
- Novice participants stated that they **struggle with mathematical theories and concepts** from their ML classes.
- Expert Participants stated that **it is up to the learner to seek a deeper understanding** in ML

Results: User Insights Per Tool

RapidMiner

- Visual interface that shows ML process
- Elicited frustration due to restrictions with certain datasets
- Confusing technical terms in functions and error messages
- Lack of feedback

WEKA

- Visual interface
- Complicated visualization
- Data incompatibility errors that limit usable datasets
- Confusing technical terms
- Lack of feedback

Scikit-learn

- Flexible functions
- Lacks visualization
- Reliance on documentation for process understanding

Initial Design Guidelines

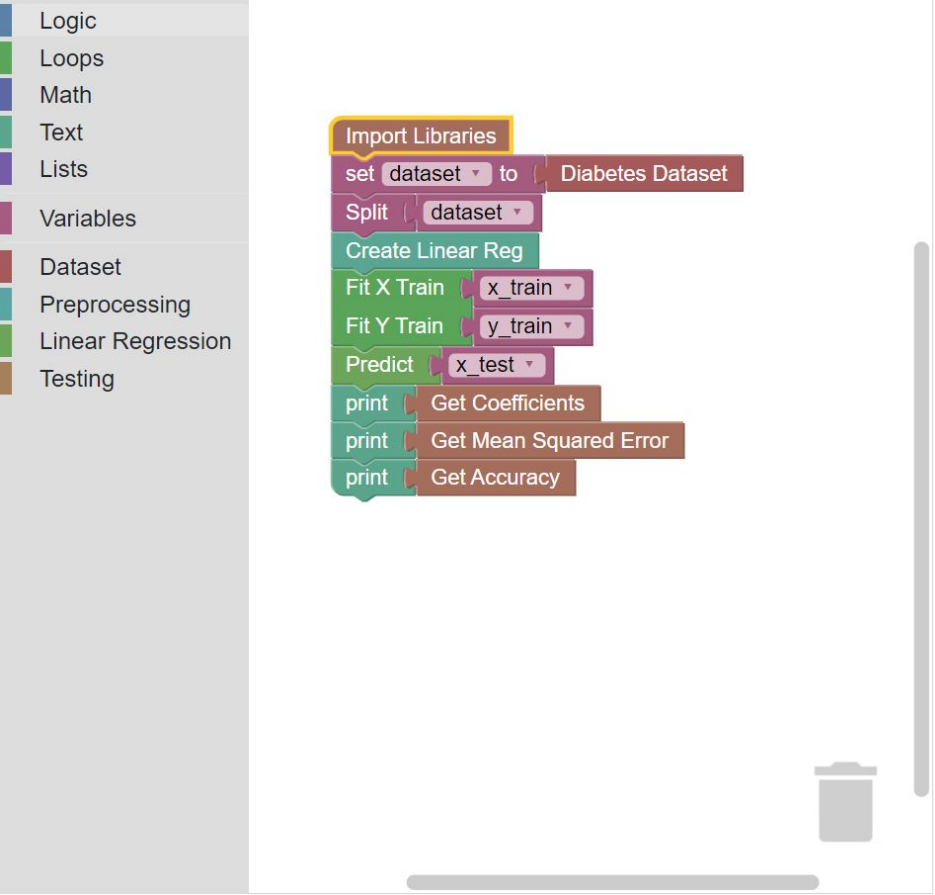
	1 Strongly Disagree	2	3	4 Strongly Agree
1. The system should indicate to user its state of change with every interaction.	0%	0%	10%	90%
2. The components of the interface should be laid out in an organized manner and explicitly labelled.	0%	0%	10%	90%
3. The visualizations should be simple enough to understand. They should not overload the user.	0%	0%	70%	30%
4. The intent of the system should be clear to the user upon interacting with the system.	0%	0%	10%	90%
5. Indicate explicitly when and why errors occur and how users can recover from them.	0%	10%	30%	60%

Conclusion

- We **created design guidelines** for an Interactive Machine Learning Sandbox Application based on related works
- We **conducted a user study** on the current problems that novice and expert users of ML face when starting out in ML
- We **gathered insights** about common ML suites
- We **validated and improved the guidelines** from the user insights

Future Work

- Designing and developing the sandbox system for testing and experimentation.
  - Tool for Regression Experiments (TREX)
  - Creates basic prediction models using online sample datasets.
  - Translates code blocks into actual Python (3.0) code and produces the respective output.
- Conducting usability testing to verify the design guidelines proposed.



Run CodeBlocks

```
dataset = None
x_train = None
y_train = None
x_test = None


import numpy as np
from sklearn import datasets, linear_model
from sklearn.metrics import mean_squared_error, r2_score
dataset = datasets.load_diabetes()
d = dataset
x = d.data[:, np.newaxis, 2]
```

```
// Your output is displayed here.
Coefficients: 938.237861251263
Mean Squared Error: 2548.0723987259703
Accuracy: 0.47257544798227136
```

TREX Prototype v2

DE LA SALLE UNIVERSITY MANILA
College of Computer Studies
CENTER FOR COMPLEXITY & EMERGING TECHNOLOGIES

UX&AI

Some final takeaways from this presentation

UX&AI

first take away

Humans come first when designing AI products

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second take away

Products are usable not if we change the interface but if we improve the experience it offers

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third take away

Applying UX in AI goes a long way in making a product usable and sustainable.


Planes **dont flap** their wings to fly, but
birds **dont take off** from trees either...


A car can **run faster** than a
cheetah but it can **never climb**
a tree..

UX&AI

How we used UX to improve AI: Case studies where UX played a role in the design of better AI

Talk to me!

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