Human Computer Interaction (HCI)

Week 9: Sketching, HCI Research through Pictorials, and Portfolios

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THE UNIVERSITY of EDINBURGH

Week 9 Outline

- Introduction to sketching for ideation
- Examples of HCI research through pictorials
- Notes on CW2 pictorials
- From HCI reports and pictorials to UX portfolios

CW2 process

- Design suggestions (CW1)
- Ideation
- Generate 5 new design ideas that respond to your CW1 findings and design suggestions (and other evidence)
- Sketching
  - Sketch two of the most promising or interesting ideas
- Prototyping
  - Select one of the two sketched ideas to turn into a prototype
- Pictorial
  - Present and discuss your design process and outcomes

CW2 process

- Design Suggestions (CW1)
- Ideation [Tutorial Week 07]
  - Generate 5 new design ideas that respond to your CW1 findings and design suggestions (and other evidence)
- **Sketching**
  - Sketch two of the most promising or interesting ideas
- Prototyping [Tutorial Week 09]
  - Select one of the two sketched ideas to turn into a prototype
- **Pictorial**
  - Present and discuss your design process and outcomes

introduction to sketching

Activity – taking a pencil for a walk [5min]

- Put your pencil on the paper
- Close your eyes and start listening to the music
- “Walk” your pencil across the paper while you are listening – the line should reflect what the music makes you feel

[Dave Brubeck Quartet; Unsquare Dance]

Activity – taking a pencil for a walk

- Share and discuss your created lines with the person sitting next to you

the point of this exercise

- Realising the expressivity of a single line
- The intentions of the person creating the sketch will not necessarily match the viewer’s interpretation

- Critique = discovery & interpretation
- Critique is about honest observation

sketching for ideation & prototyping

- Sketching should be
  - Quick
  - Easy
  - Not get in the way of thinking about your problem and related ideas
  - Not constrain your ideas too much
  - Flexible
- Everyone can sketch!
- Sketching ≠ drawing
  - A sketch can be messy
  - A sketch does not have to look pretty
  - A sketch does not have to stand on its own
- All your sketch has to do is help you communicate your ideas

The sketcher is ..

Programmer
Person with the challenge
Understands the data
Interacts with client
Working alone /
working in a group
Makes quick renditions
Draws lots of designs
Follows FdS structure
Tidy drawings not artistic
No need to color-in

The physical medium is ..

Tangible
Tactile
Disposable
Visible
Explicit
Obvious
Signifier
Manifest
Evident
Clear
Common place
Sharable
Cheap

The sketch appearance is

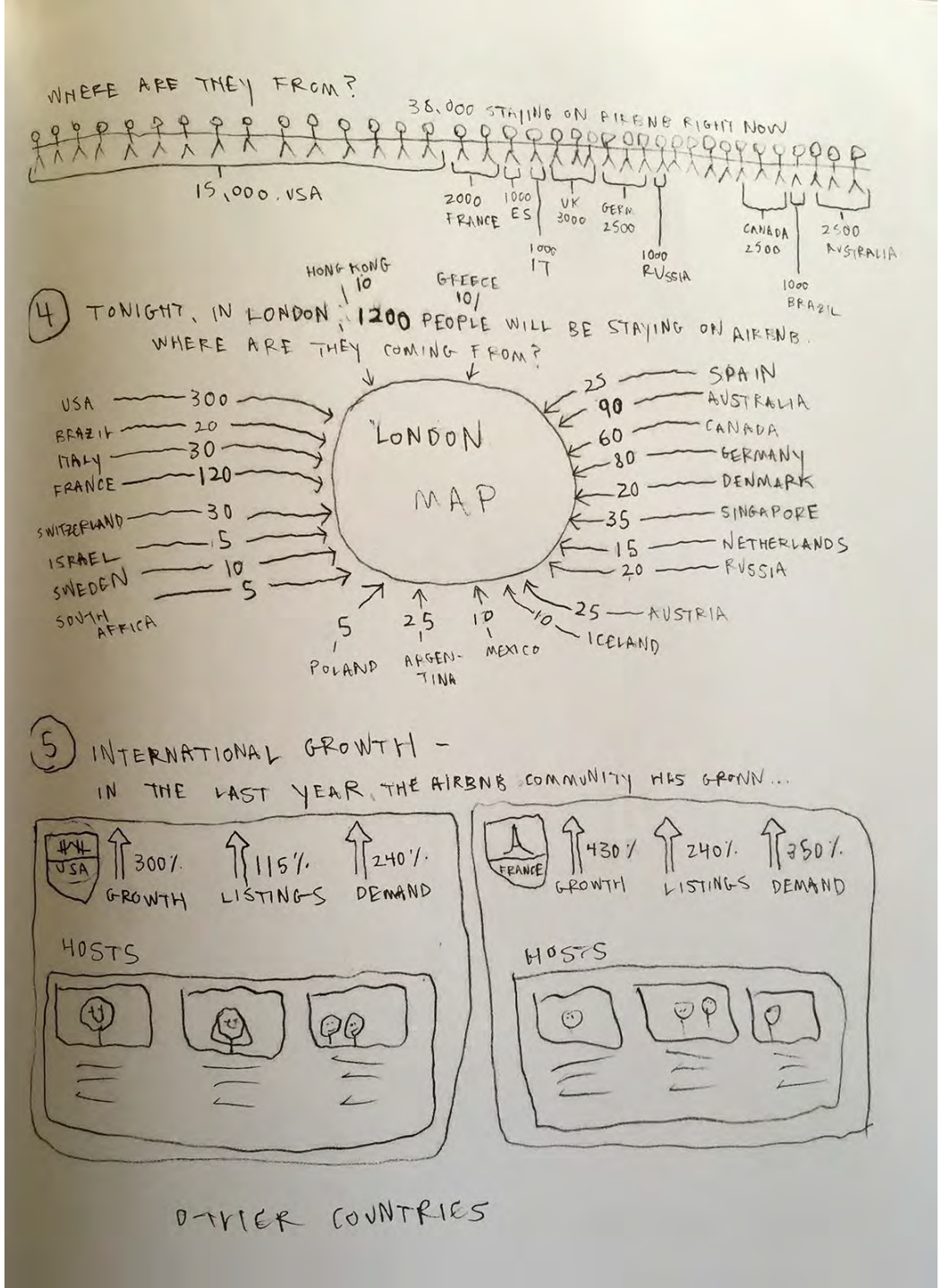
Outline
Rough
Unfinished
Sketchy
Not strict
Representation
An impression
Bare bones

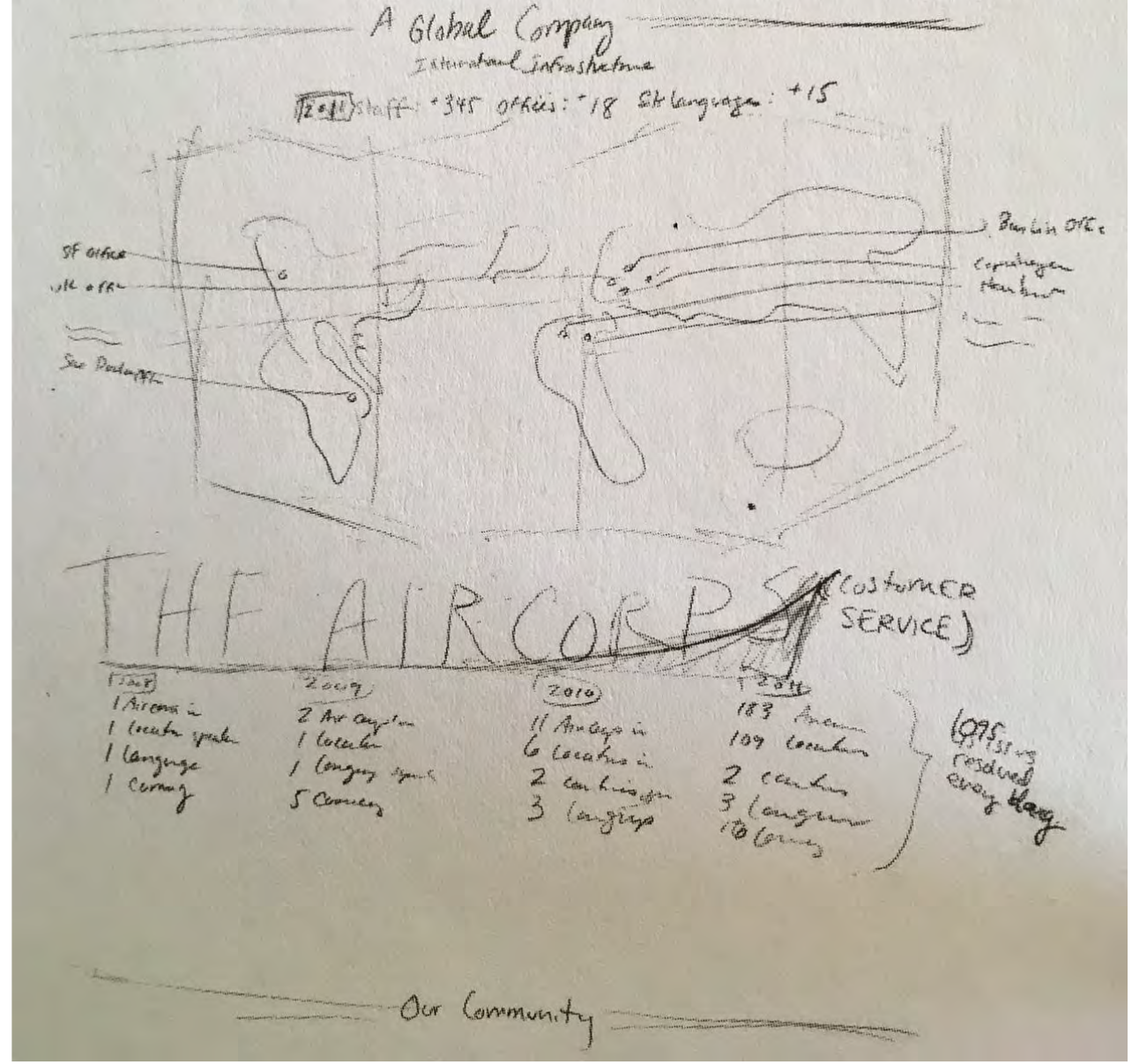
.. has multiple purposes

Presentation
Evidence
Articulation
Alternatives
Possibilities
Expressive
Communication
Mediating
Help us think
Organise thoughts
To preserve
Record

Allows change, it's ..

Dynamic
Changes
Evolves
Quick
Transitive
Playful
Persistent
Organic
No wrong answer
Forgiving
Creative





Raw Data: Infographic Designers' Sketchbooks.
Steven Heller and Rick Landers

Sketching tools

- Pen & paper
  - \+ Cheap, portable, “always on”, little preparation required
  - \+ Can used by everyone
  - – Can be tedious to use and feel limiting
- Digital tools
  - Miro, Figma, Canva, Inkscape, Illustrator, …
  - \+ Sketches can be easily modified or used repeatedly
  - \+ Use of templates
  - \+ Linked to interaction or animation
  - – Require a certain level of expertise which can cost time and get in the way of your ideas
  - – Can be difficult to use collaboratively

→ Use pen & paper for early ideation; digital tools to flesh out selected in later design stages

Activity – basic sketching [3min]

- Lines & basic shapes
  - Lines in different thicknesses
  - Circles
  - Squares

Activity – basic sketching [3min]

- People
  - A full body person
  - A face

Activity – basic sketching [3min]

- Devices
  - A mobile phone
  - A laptop

Activity – basic sketching [5min]

- People & actions
  - A full body person
  - A person walking
  - A person holding a mobile phone

Activity – basic sketching [5min]

- Emotions
  - A person receiving positive message on their phone
  - A person frustrated with their phone

the point of these exercises

- Sketching is modular – you can re-use elements
- Simple elements can convey complex things
  - A rectangle can be a display
  - A stick figure can be a person
- Focus on the important things you want to communicate; not all the details have to be sketched

the point of these exercises

- Lose the fear
- Try alternatives
- Sketches can convey dynamic movement

- Sketches do not need to stand on their own
  - You can talk people through them!
  - You can describe them in a few words as part of your pictorial!

beyond sketching

storyboarding



Greenberg et al. Sketching User Experiences – The workbook

Tracing

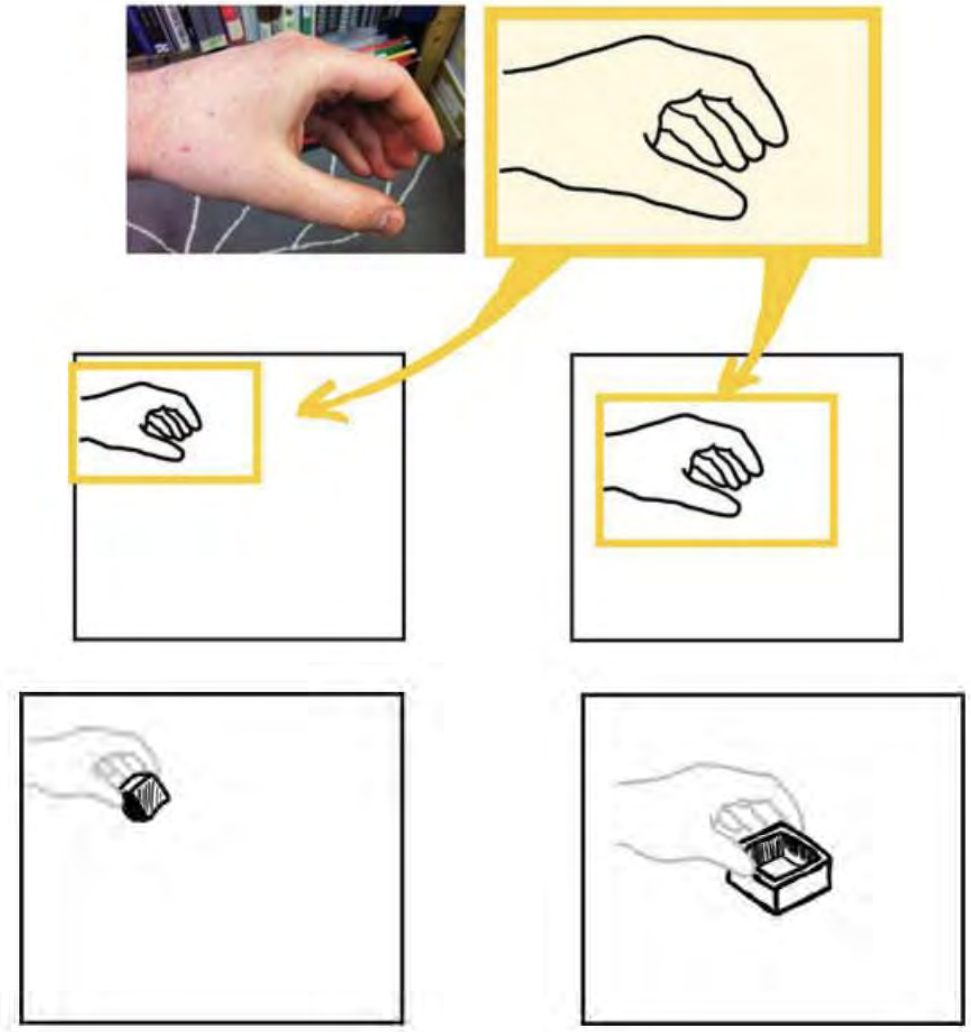
- Some things are difficult to sketch from memory or to copy by looking at them
- Easiest to trace pictures
- You can do it digitally or with paper
- You can reuse (if digitally)



Greenberg et al. Sketching User Experiences – The workbook 3.9 Photo Traces, pp. 117++

Tracing

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Greenberg et al. Sketching User Experiences – The workbook 3.9 Photo Traces, pp. 117++

HCI design research examples conveyed through pictorials

important disclaimer

- The pictorials presented here are to give you examples on how to approach your own pictorial for CW2
- These are examples from research that took months to develop - we don’t expect your work to be at the same level in terms of design ideas, sketches, prototypes or presentation!

Designing Gaming Wearables

From Participatory Design to Concept Creation

- How to design wearable games technology that can add to the player experience in mainstream gaming systems such as consoles, extended reality or mobile platforms?
- What might be the key features of gaming wearables?
- How can they provide novel experiences?

→ 6 participatory design workshops where stakeholders were directly involved in the design process

Jung, Xiao, Buruk, Hamari. Designing Gaming Wearables: From Participatory Design to Concept Creation. Conference on Tangible, Embedded, and Embodied Interaction, 2021. https://doi.org/10.1145/3430524.3446067

Designing Gaming Wearables

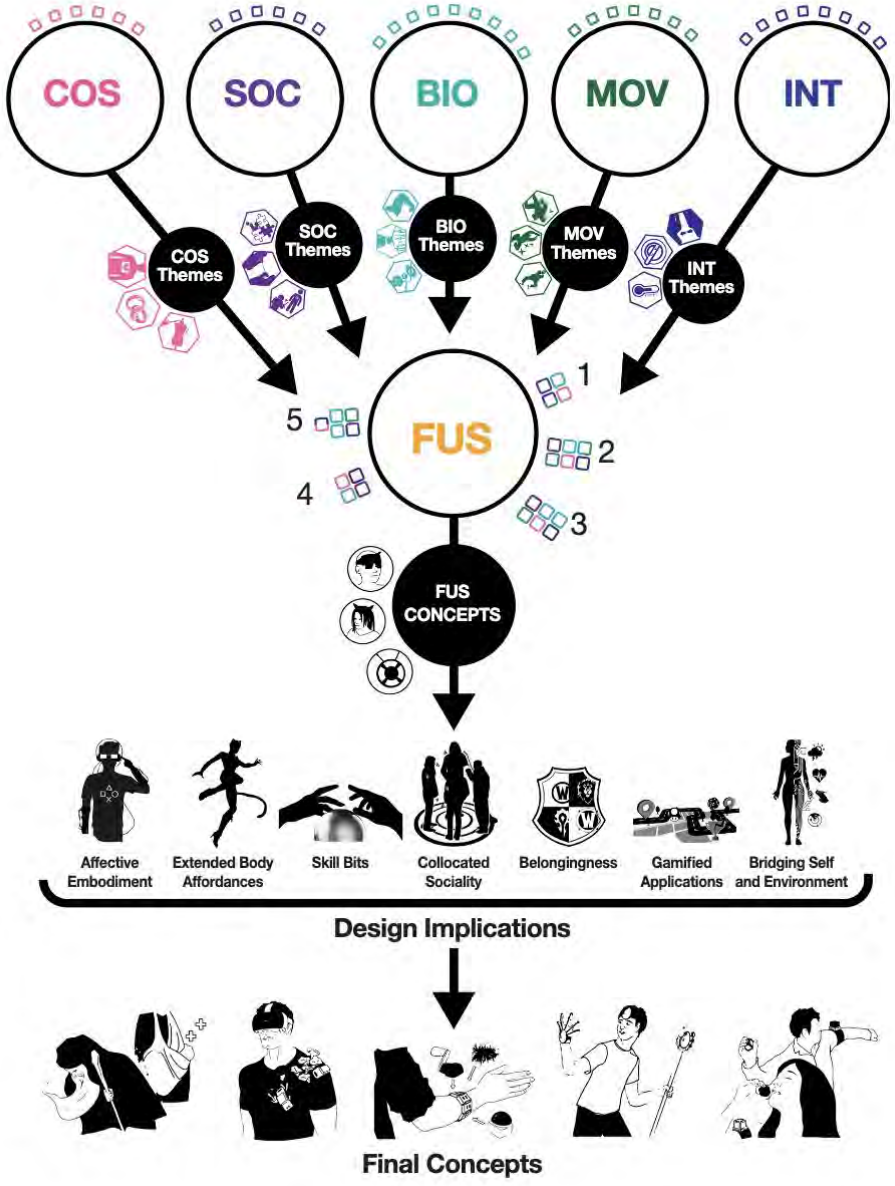
From Participatory Design to Concept Creation

- Costumes as game controllers
  - How can wearables behave as costumes in current gaming systems?
- Social interaction through game wearables
  - How can they support distant and collocated social interaction in games?
- Bioadabtivity in games
  - How can our body signals become a part of games?
- Movement of bodies in games
  - How can body movements be incorporated in main stream game systems?
- Interaction modalities in gaming wearables
  - How can we interact with wearables while playing games?

Designing Gaming Wearables

From Participatory Design to Concept Creation

- Costumes as game controllers
- Social interaction through game wearables
- Bioadabtivity in games
- Movement of bodies in games
- Interaction modalities in gaming wearables



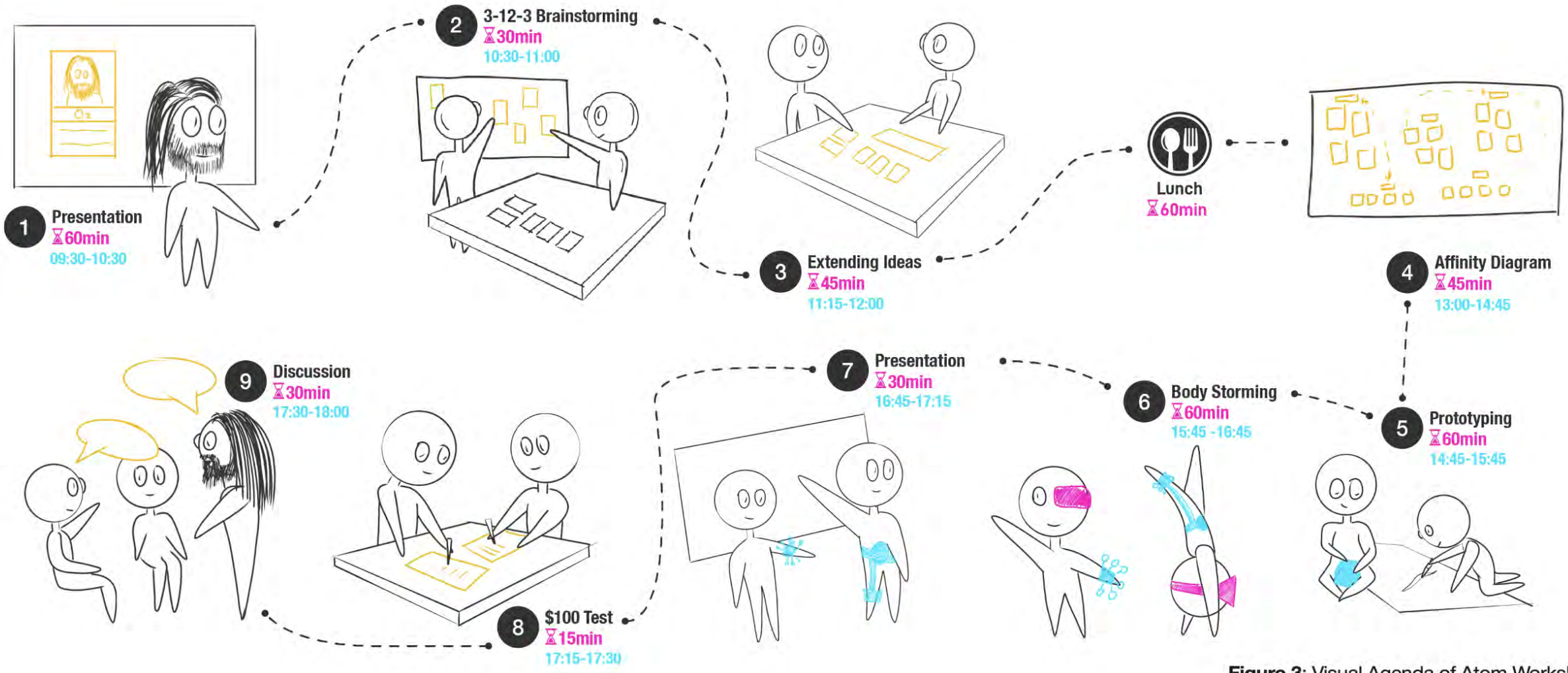
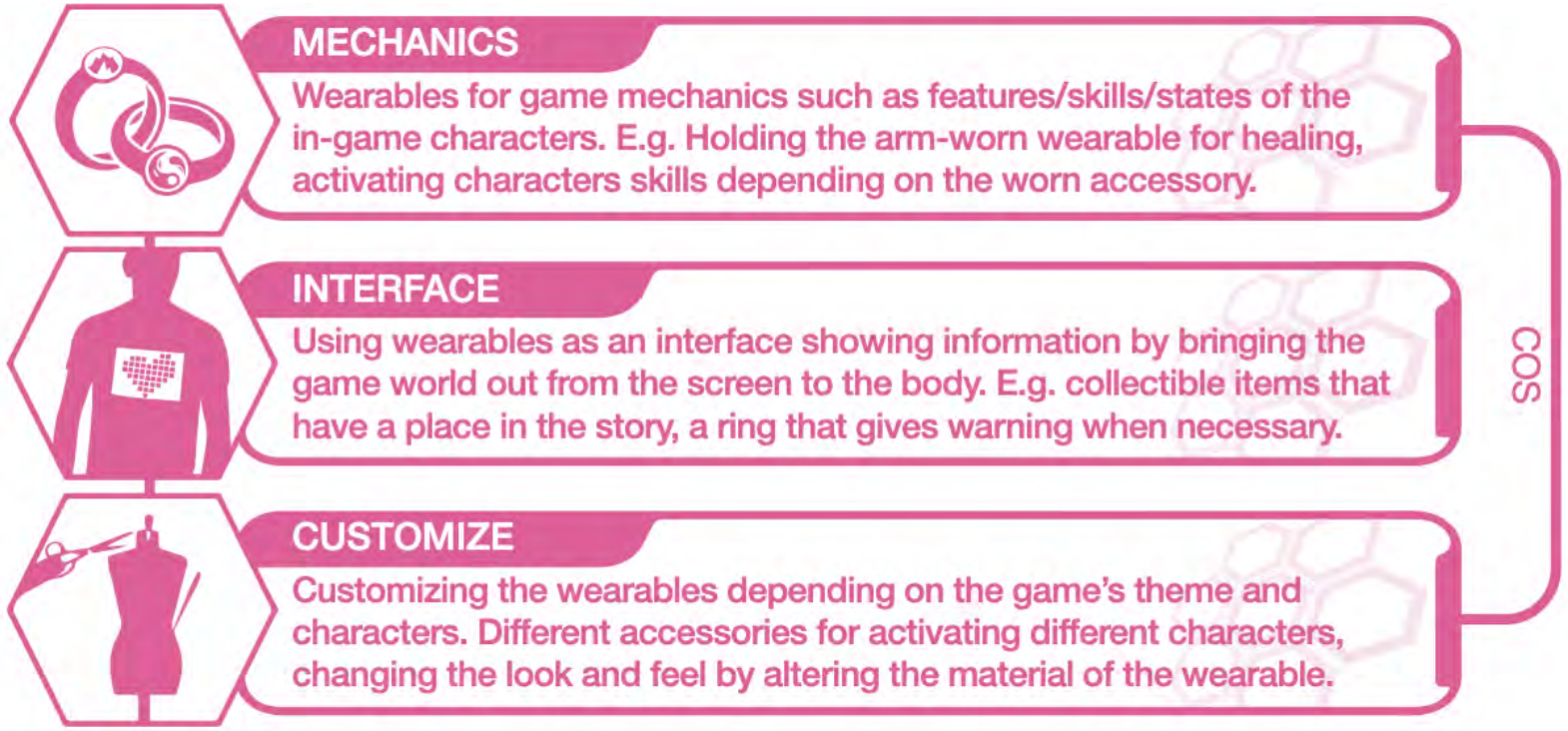


Figure 3: Visual Agenda of Atom Workshops

Designing Gaming Wearables

From Participatory Design to Concept Creation

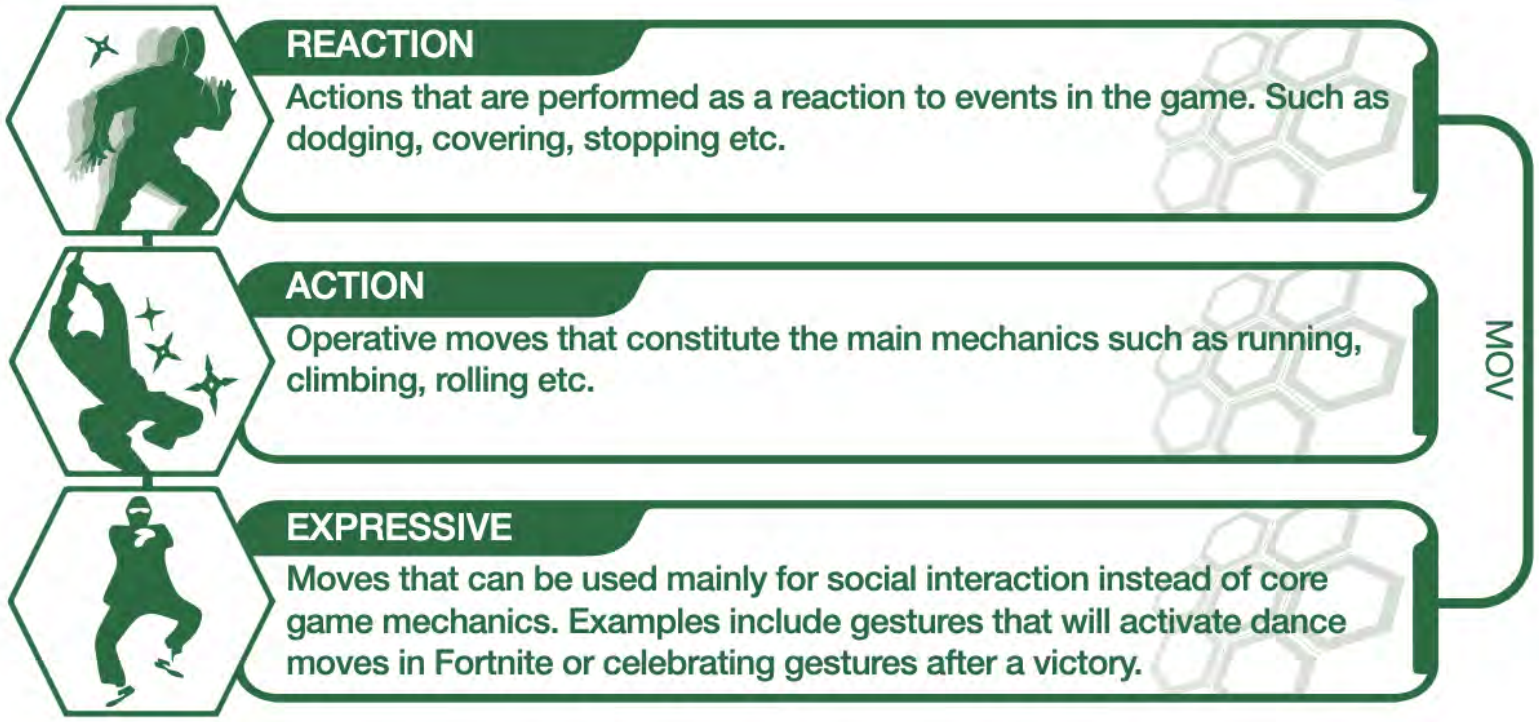
- Costumes as game controllers
  - How can wearables behave as costumes in current gaming systems?



Designing Gaming Wearables

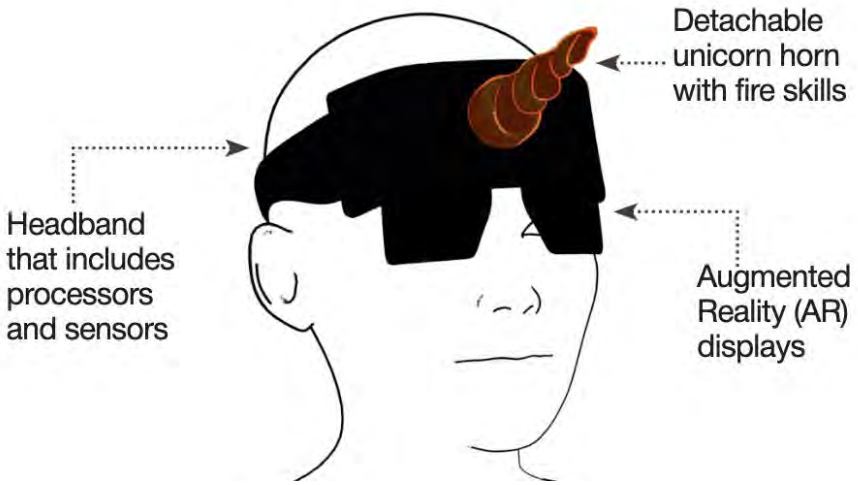
From Participatory Design to Concept Creation

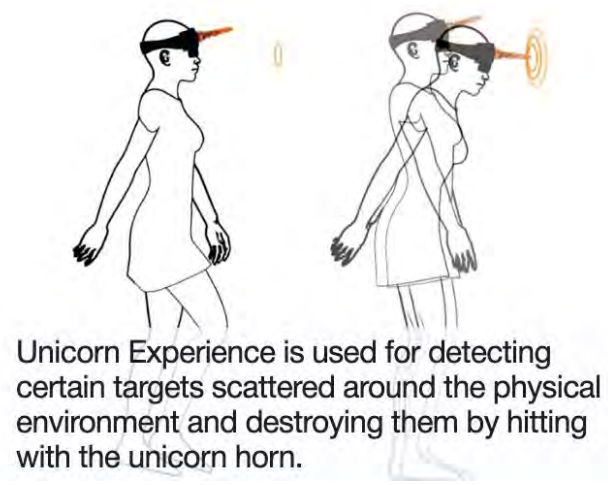
- Movement of bodies in games
  - How can body movements be incorporated in main stream game systems?

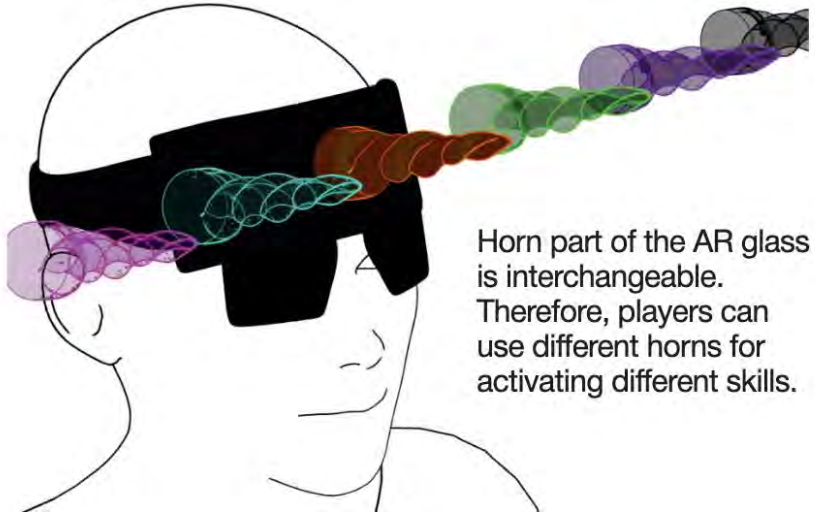


Design concepts developed at the fusion workshops

- Unicorn experience
  - AR glass that has a unicorn extension for hitting certain targets around the augmented environment

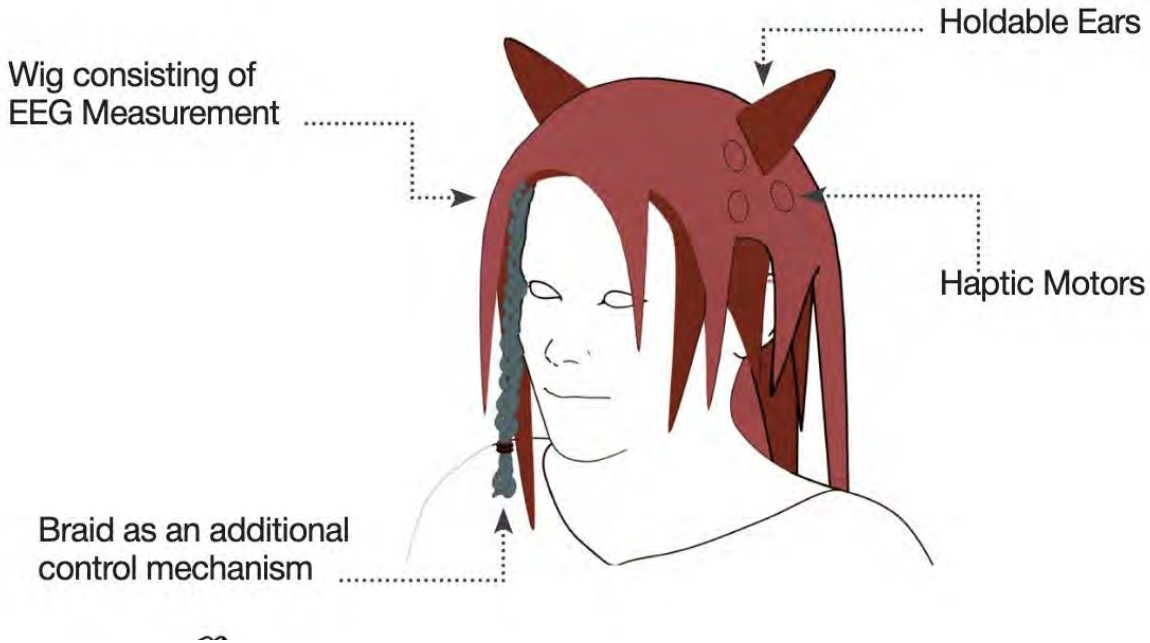


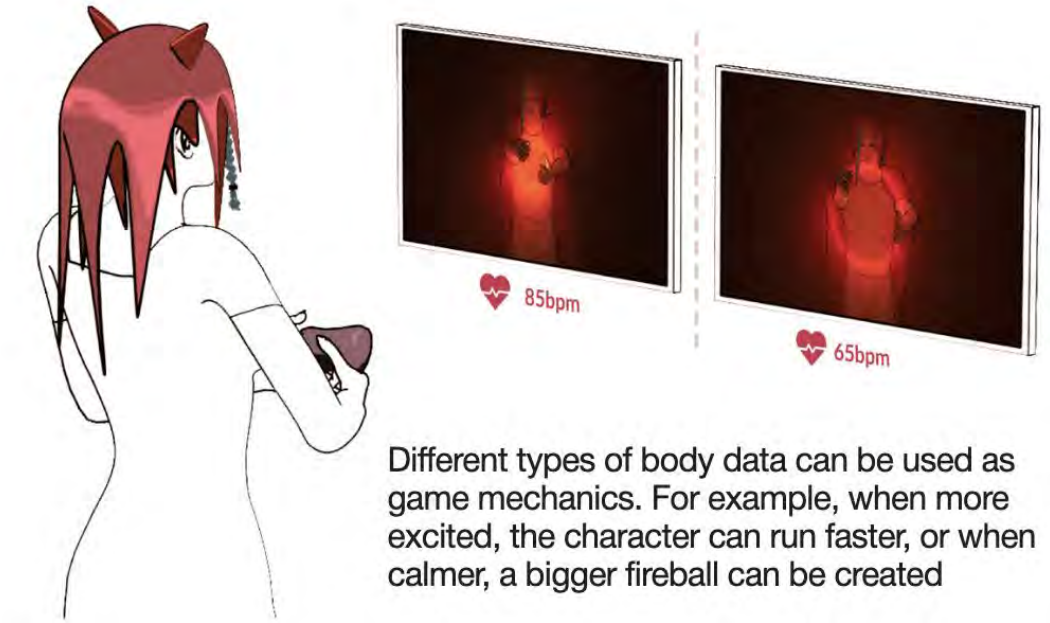

Unicorn Experience is used for detecting certain targets scattered around the physical environment and destroying them by hitting with the unicorn horn.



Design concepts developed at the fusion workshops by participants

- Head-on
  - Wig incorporating an EEG system to collect the emotional state of the player
  - Transforms the players into the digital avatar by changing their appearance and transforming their body data into the game world



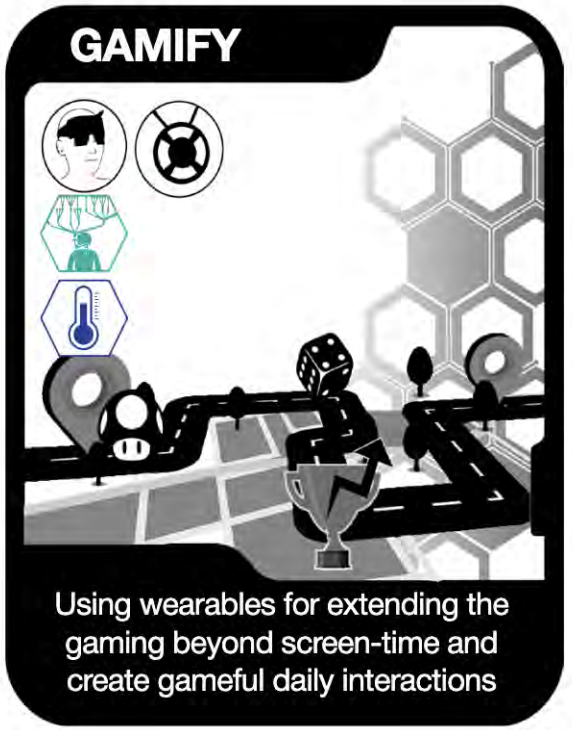


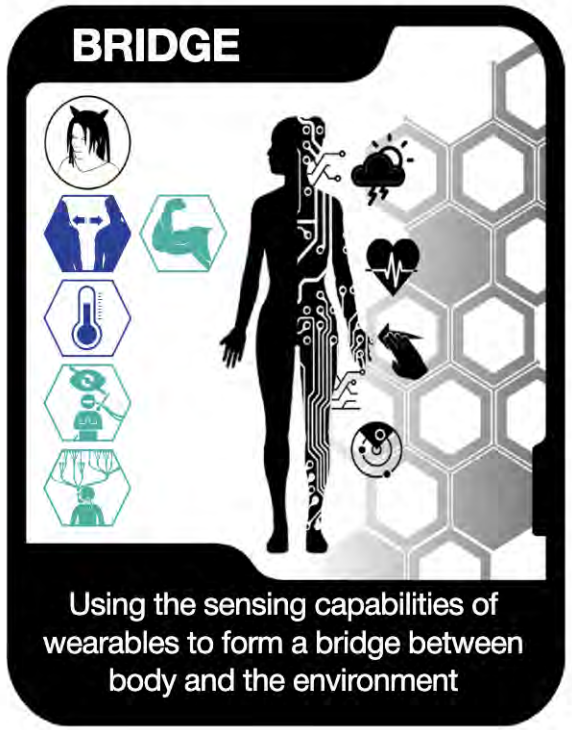
Different types of body data can be used as game mechanics. For example, when more excited, the character can run faster, or when calmer, a bigger fireball can be created

design implications





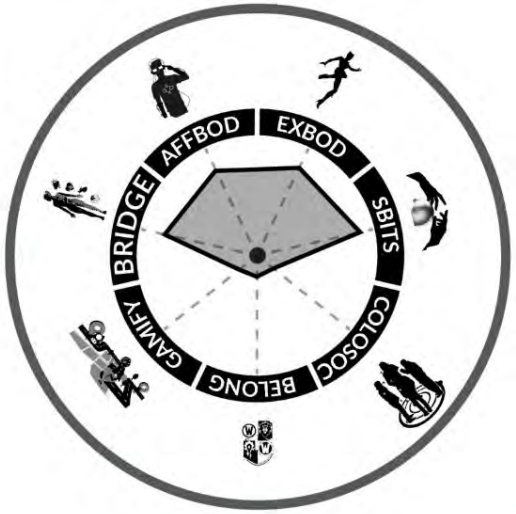




design concepts developed by the authors through sketches and fictional scenarios







GAMING CLOTH

When I see Gaming Cloth, I was quite intrigued by this fabric-based wearable, but also a bit skeptical about its usefulness in games. I first tried Gaming Cloth with a computer role-playing game. The game was specifically designed for the Gaming Cloth and you could use it in many ways. For example, if you cover your body against an attack it was behaving as a shield. If you wrap it around your arm after you are injured, it turns into a bandage. I was fascinated by the idea that you can turn different parts of your body into a gaming surface **(AFFBOD)** and you can even use it as an extension of your body **(EXBOD)**, for example by wrapping it around your head similar to a tentacle. It's basically gaining new skills **(SBITS)** depending on where you wear it. It also has body sensors in specific positions **(BRIDGE)**. For example, if you wear it as if a Wizard Cloak, it senses your heartbeat and if you can stay calm, you can become invisible as long as you can keep your calm. Gaming Cloth is an interesting product that completely changes how I can incorporate my body into games. Yet, currently there are not enough games that support it and hopefully more will release soon.

pictorial structure

- Abstract
- Introduction
- Participatory design workshops
- Key themes extracted from the workshops
- Concepts of fusion workshops
- Design implications
- Final concepts
- Reflections on final concepts

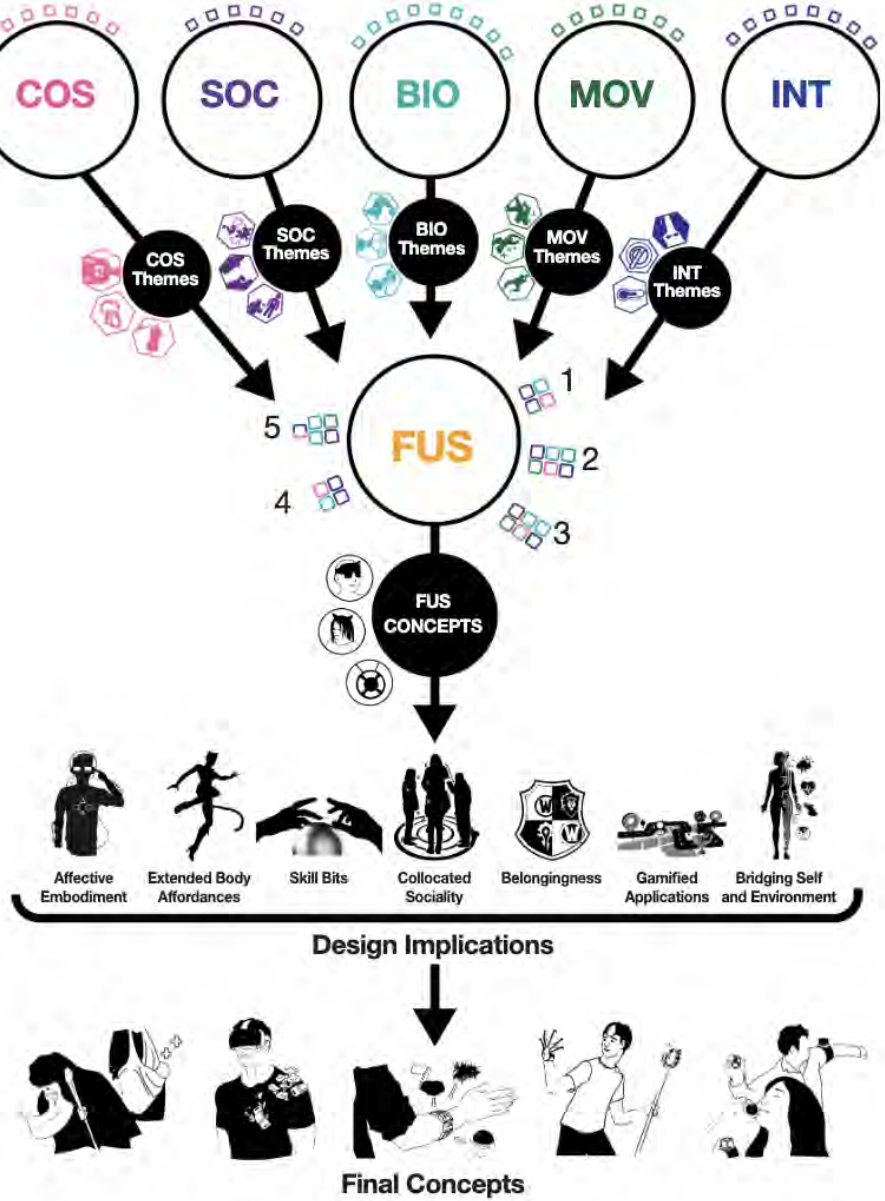


Figure 2: Overview showing our design process starting from workshops to final concepts

INTRODUCTION

Recent developments in the sensorial part of gaming gave birth to an emergent field called gaming wearables. Although, it started to expand recently, there are a few popular trials to commercialize wearables for playing games. Power Glove [8] which was released to be integrated to Nintendo Entertainment System in 1989 is one of the first and most popular examples of gaming wearables. The movement tracking technology through ultrasound was not very accurate at that time and thereby, this product was not a huge success. BCON is a more recent example and also focuses on translating movement into commands with a foot-based and programmable approach [16]. Actually, gaming wearables attracted considerable interest from players before BCON is released. For example, Fallout 4 Pip-Boy Edition was reported as the fastest selling collector edition ever [21], while Pokemon Go+ was sold out in an unexpected pace according to Nintendo [28]. Still, commercial wearables are not many in terms of variety and examples are almost limited to ones mentioned here. These examples also do not provide rich design knowledge, since their connection to game mechanics are limited and the ones who provide better connection to games such as Nintendo Labo Robot Kit lack versatility [18]. So, how can we design wearables that can add to the player experience in mainstream gaming systems such as consoles, extended reality or mobile platforms? What might be the key features of gaming wearables? How can they provide novel experiences?

To answer these questions, we organized a series of six workshops focusing on the different aspects of gaming wearables, with 33 participants. Consecutively, these workshops focused on *costumes as game controllers (COS), social interaction through game wearables (SOC), bidoadaptivity in games (BIO), movement of body in games (MOV)* and *interaction modalities in gaming wearables (INT)*. In the sixth, the *Fusion Workshop (FUS),* we hosted the participants of the first five workshops and created groups that include participants ideally from each workshop and from different disciplines. The reason behind choosing these specific aspects were based on the previous research on playful wearables. Buruk, Isbister & Tanenbaum [6] created a comprehensive design framework for playful wearables emphasizing 1) performativity, 2) sociality and 3) interactivity as the strong parts of playful wearables by drawing on four influential playful wearable projects they developed. Other than that, (4) transferring body signals [29] and (5) movement tracking especially in mobile or low-light settings were indicated as strong parts of wearables [2,33]. Therefore, the topic of our workshops focused on those specific aspects. After the workshops, we extracted design implications and by considering these implications we developed five wearable concepts which will be tested through low-fidelity prototypes in the next step. We visualized all design knowledge created through the process and used these visualizations as a narrative tool and also as part of our design process. Therefore, the contribution of this wearable is two-fold:

1) Five mainstream gaming wearable concepts drawing on the stakeholder-oriented design knowledge in the forms of 15 themes, 7 design implications and 3 intermediary concepts.

2) A design technique that benefits from gameful visualizations demonstrating the transfer of design knowledge between phases.

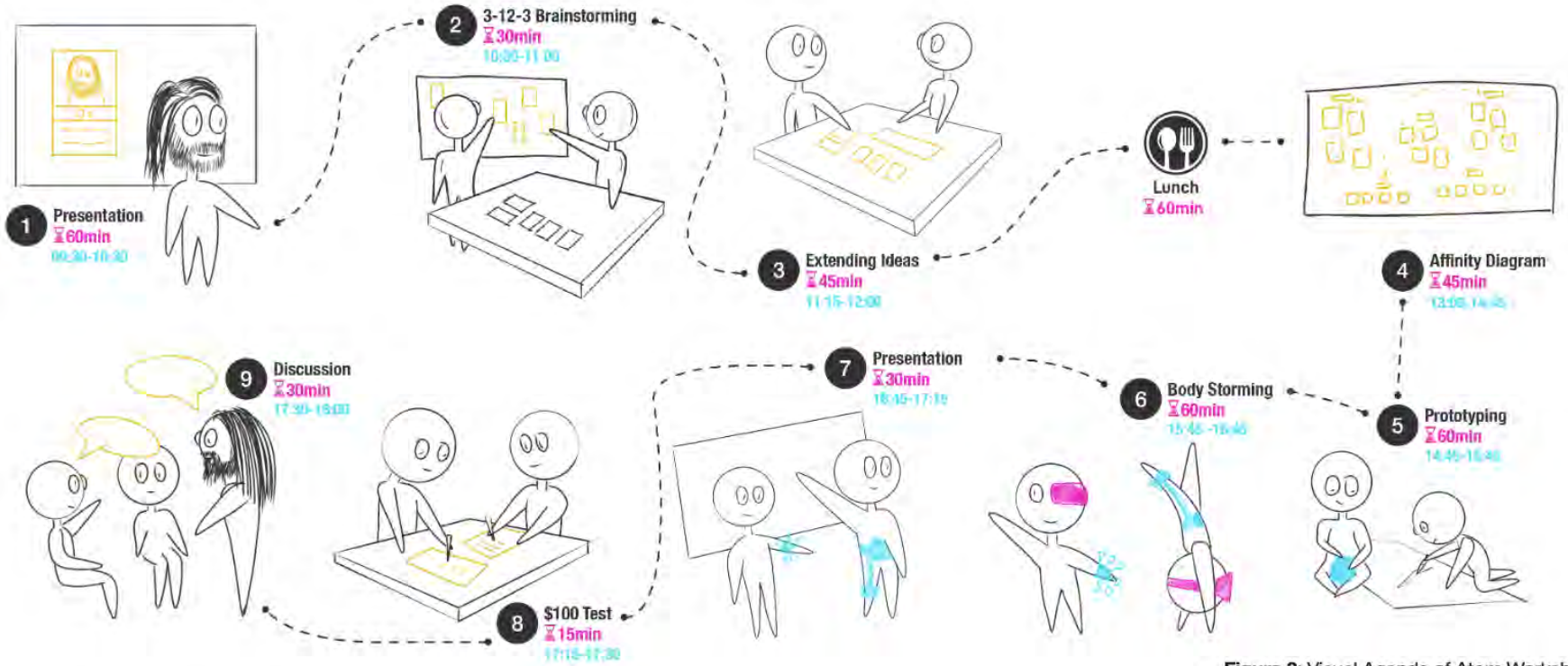


Figure 3: Visual Agenda of Atom Workshops

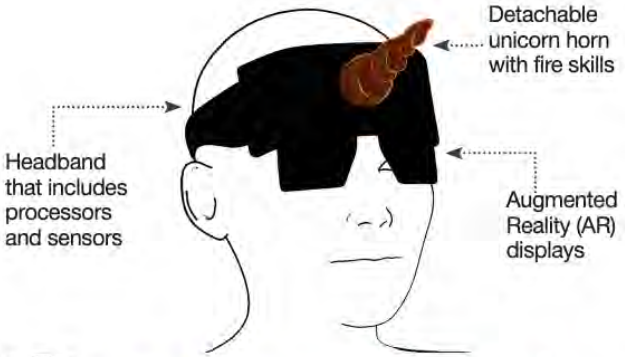
PARTICIPATORY DESIGN WORKSHOPS

In our study, we thoroughly reported the design knowledge and artifacts created through our participatory design (PD) workshops [1,22] that reflects the opinions of different stakeholders. PD involves different stakeholders in the design process and the background of stakeholders depends on context and need [3]. We involved stakeholders continuously [3] throughout 6 (5+1) workshops with a fragmented workshop structure that we call "Atom Workshops (Figure 2)" to make sure that a rich design knowledge was generated that can cover all these distinct facets. Atom workshops were similar to Dialogue-Labs [24] method with an extended and modified structure for embodied interaction, by including exercises such as body storming [26], paper prototyping [31], 3-12-3 Brainstorming [17], $100 test [17] and Affinity Diagrams [23]. In multi-faceted topics, it is important to sensitize participants [35] and previous studies had employed different methods such as role-play [35] or embodied performances [27]. In our case, we chose to sensitize our participants with full-day Atom Workshops focusing on strong points of wearables. Sensitized participants came together for a more "doing" oriented Fusion Workshop where they can use the knowledge from Atom Workshops to create unified concepts which were presented through video sketches [37]. Figure 2 and 3 depicts the whole flow of the study and the workshops in detail.

Workshops were part of the "Design Thinking for Wearables, Body and Games" course in Tampere University. We hosted 33 participants who are 22 graduate students, 5 undergraduate students and 6 non-student experts from different fields. Graduate students were from HCI (6), game studies (3), IT (4), electric (4) and biomedical (1) engineering. 8 of these graduate students had extensive professional experiences such as UX lead position in Nokia, consultation in game companies, indie game development experience or artist position in game development projects. Expert participants also had different expertise on topics such as game design, research, psychophysiology and cosplay.

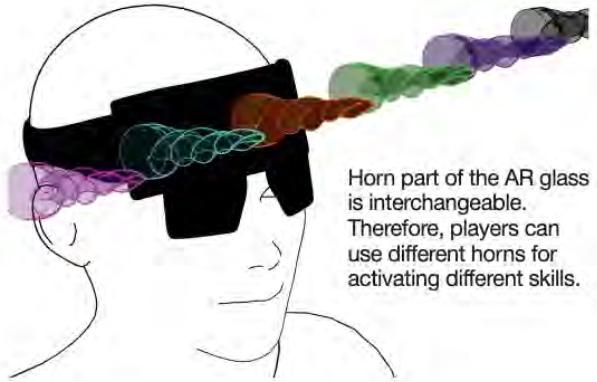
CONCEPTS OF FUSION WORKSHOP (FUS)

In FUS, participants created intermediary gaming wearable concepts by unifying the knowledge created in Atom Workshops. In this section, we present an Annotated Portfolio [12] by mapping the key themes of Atom Workshops to these intermediary concepts. Colors represent themes from different workshops while the icons represent the specific themes. Thus, while more colors mean that the concept draws on various strong aspects of wearables, more icons means deeper exploration of specific topics.





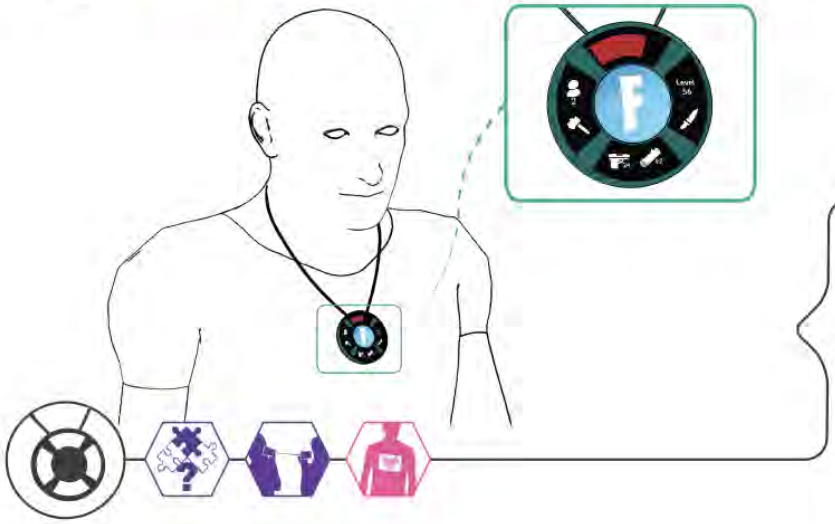
Unicorn Experience is used for detecting certain targets scattered around the physical environment and destroying them by hitting with the unicorn horn.



Horn part of the AR glass is interchangeable. Therefore, players can use different horns for activating different skills.



Unicorn Experience is an AR glass that has a unicorn horn extension. The game played by hitting the certain targets scattered around the augmented environment by reaching them with the unicorn horn. It also has social features such that some targets can only be destroyed when two players with specific skills come together. Here, we can observe that Unicorn Experience plays on the Mid-Distant interaction of **SOC** and Proximity of **INT** by bringing people together. Moreover, it also uses different horn extensions as a game mechanic corresponding to Mechanics and Customize themes of **COS**. It also affords users to perform action and reaction moves (**MOV**) by positioning the horn as an extension of the body!



Glace emphasizes social interaction and self-expression. It is an accessory allowing players to see each others' gaming preferences and skills. As in the figure, one can understand that this particular player is currently playing Fortnite and see specific information such as character level or amount of resources. Aim is to engage collocated players with each other and facilitate social interactions such as "requesting resources as a gift". Glace, besides encouraging verbal social interaction, was also designed self-expression in mind and work towards the sense of belongingness. When associated with the key themes, Glace utilizes showing or hiding information to others which corresponds to the Hidden Info of **SOC**. Other than that, being designed only for collocated interaction, it draws on the Mid-Distant interaction. It is also a game interface that shows related in-game information which is a reflection of the Interface theme of **COS**.

REFLECTIONS ON FINAL CONCEPTS

Through the fictional scenarios depicted, we highlighted the possible user experiences which can be evoked by the final concepts we design and connected them to the design implication. In this section, we will reflect on the possible avenues these concepts can expand to by elaborating these connections.

Gaming Cloth is a fabric-based gaming wearable. As suggested in Affective Embodiment (AFFBOD), wearables placed in the different parts of the body can guide the body movements with buttons and switches [33]. However, Gaming Cloth facilitates the same characteristics by relying on the material qualities of the fabric. For example, players can take on a protective posture while covering themselves with the cloth to activate the shield skill also referring to Skill Bits (SBITS). It can also be used in ways which extends the body boundaries as suggested in Extended Body Affordances (EXBOD) (i.e. wrapping it around the arm for extending the arm) and also collect body and environmental data through sensors to transfer it to the game Bridging the Self and Environment (BRIDGE).

In **Fungilainen**, AFFBOD is provided by markers because players need to interact with them, for example covering to protect it from others, and extensions of the body, the mushrooms, exist in the virtual world by exemplifying another way to incorporate EXBOD. It also adds a social layer to the gaming world by envisioning Collocated Social Interaction (COLOSOC) where people can steal or exchange mushrooms while the same colored markers represent alignment to different global teams, as inspired by the Belongingness (BELONG).

Tangicubes, adopts a literal interpretation of SBITS and AFFBOD by placing tangible bits around the body which, then, needs to be interacted by touching, throwing or dragging them to the different parts of the body. The gameplay sequence depicted above also shows a possibility where Tangicubes interact with the environmental objects (i.e. targeting and hitting the content on the display) by referring to BRIDGE implication.

Inputs concept is heavily shaped by AFFBOD and EXBOD because it extends the body with different kinds of modules and the interactive affordances of those modules (i.e. cranking, pressing, petting) lead to affective interaction methods with the body. It also uses the notions of SBITS since each module attached to the device enables players to perform new skills in the game.

Gaming Core is a smart watch that can be turned into a gaming device by being attached to game props such as gloves or wands. In this sense, it draws on BELONG as an expressive wearable with which players can reflect their gamer identity in daily life. This feature needs further envisioning on the fashionable aspects of Gaming Core since an attractive look that can fit to the clothing style is a critical part of wearable design [15,34]. It also adopts Gamified Applications (GAMIFY) implication by collecting daily physical activity data and integrating it into the game such that it boosts the in-game skills (SBITS). It also facilitates hiding personal data or sharing expressive data with others, as suggested by Social Wearables Framework [10], and leads to a collocated social interaction (COLOSOC) between players who own the Gaming Core.

CONCLUSION AND FUTURE WORK

In this paper, we illustrated the design process of gaming wearables, starting from participatory design workshops to concept creation. We try to illustrate every step of the process as detailed as possible since, in research through design projects, it is critical to reflect the process in detail. In this way, while other designers and researchers could follow our process, they can also try to discover different paths by starting to explore through different phases.

In our process, most of the key themes were incorporated in the FUS concepts. However, generalizing those and administering in the generation process resulted in quite versatile design outcomes that touch on the different implications cards in many different ways. In research through design projects, it can be hard to communicate and process the connections between different phases and understand how the design is evolved. We believe that the gameful visualization method we have used is an effective way to demonstrate and also understand how the design knowledge created in different phases can be transferred to the creation process of designers. This also helps understanding the usefulness of user input in the practical design phase. Other than that, using fictional scenarios to present final outcomes is beneficial both for depicting clear user scenarios but also for reflecting possible problems and detrimental effects on the user/player experience. In this direction, we believe that the design process we conveyed here will be helpful and an exemplar for presenting research through design work.

For the future work, our plans include developing the low-fidelity prototypes of the final concepts illustrated here. By doing this, we want to understand how players will see the benefit of those wearables created through a participatory design process. Understanding the stance of users around these different interaction modalities will help us to formalize design guidelines that can lead to high fidelity prototypes which will shape the future of gaming wearables.

ACKNOWLEDGEMENTS

This publication has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Sklodowska-Curie grant agreement No 833731, WEARTUAL, and Business Finland project named GArMEnt with the decision, 5654/31/2018.



Tied in Knots

A case study on anthropographic data visualization about sexual harassment in academia

→Design process of an interactive visualization of personal stories reported by people who have experienced sexual harassment in academia

Elli, Bradley, Collins, Hinrichs, Hills and Kelsky, "Tied in Knots: A Case Study on Anthropographic Data Visualization About Sexual Harassment in the Academy," *IEEE VIS Arts Program (VISAP)*, 2020. doi: 10.1109/VISAP51628.2020.00010. https://tiedinknots.io/#/

context

- Sexual harassment in academia is an issue not only in society at large, but also in academic contexts
- However, it is little discussed or addressed in academic circles and at the institutional level
- To start to address this topic anthropologist and academic advisor Karen Kelsky released an online survey to collect the experiences of people who have faced sexual harassment in the academy

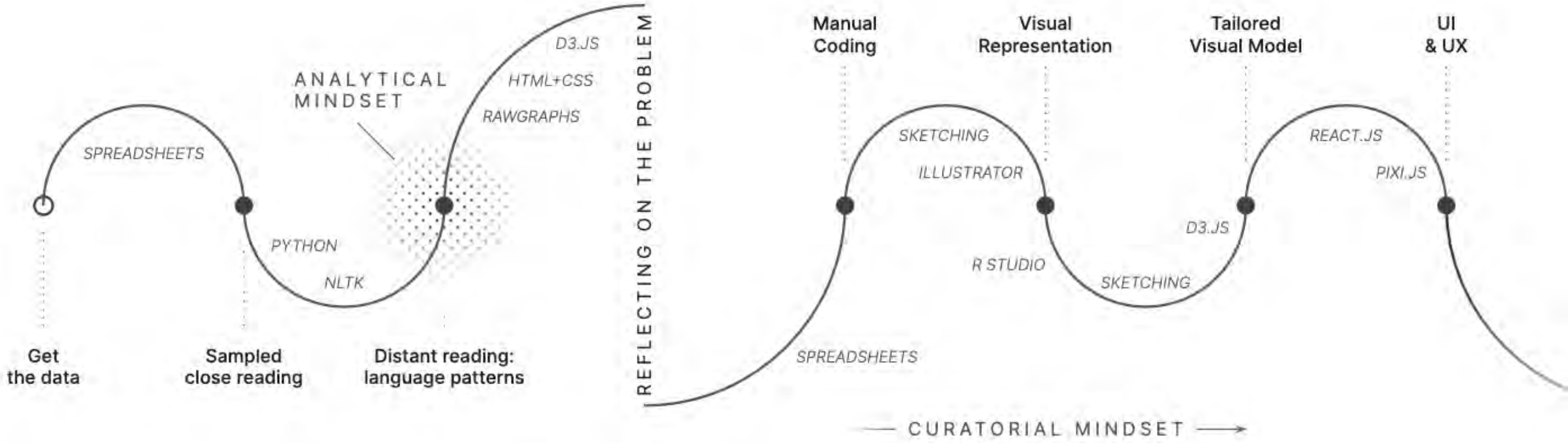
2017 online survey

01	**Describe the incident(s)**	[free text field]
	«When I was an undergraduate student in my final year in 2005, I was groped and kissed by a professor while in his office during a private meeting.»	
02	**What was your status when the incident(s) happened**	[free text field]
	«I was an undergraduate student in his class»	
03	**What Was the Status of the Perpetrator(s) (Particularly, relative to you)?**	[free text field]
	«He was the professor of a class I was taking. He was the thesis supervisor of my roommate.»	
04	**What Was the Gender of the Harasser?**	[select from certain options or specify in a text field]
	«Male»	
05	**What type of institution was it?**	[select from certain options or elaborate more in last field]
	«Elite Institution/Ivy League»	
06	**[Optional] What Was The Name of the Institution(s)**	[free text field]
	«McGill University»	
07	**Your Field/Discipline**	[free text field]
	«Communications»	
08	**Institutional Responses to the Harassment (If Any)**	[free text field]
	«None. Unreported»	
09	**Institutional/Career Consequences for the Harasser (If Any)**	[free text field]
	«N/A»	
10	**The Impact of the Harassment on Your Career**	[free text field]
	«I currently work at the University where this harassment took place. I have taken steps to avoid encountering the harasser.»	
11	**The Impact of the Harassment on Your Mental Health**	[free text field]
	«Distrust of authority figures. Depression.»	
12	**The Impact of the Harassment on Your Life Choices/Trajectory**	[free text field]
	«Unsure.»	
13	**Other Comments You'd Like to Add [...]**	[free text field]
	«Thank you so much for doing this. When the #Metoo movement started, I finally told my friends and family about what happened. I am still too afraid to report the harassment at the University, even though I know that this man has most likely continued to harass women in his classes. I felt that no one cared about what happens in the academic environment. I feel it is one of the most patriarchal environments to study and work in.»	

motivation for “Tied in Knots”

- How can we represent sensitive, uncomfortable yet important personal experiences and stories through data visualization?
- How can we navigate computational vs. manual approaches to foreground relevant themes?

overview of the design process



from close reading to computational text mining

- Goal: Extract structured information from survey participants' open-ended answers, for example
  - Patterns in language
  - Recurring phrases

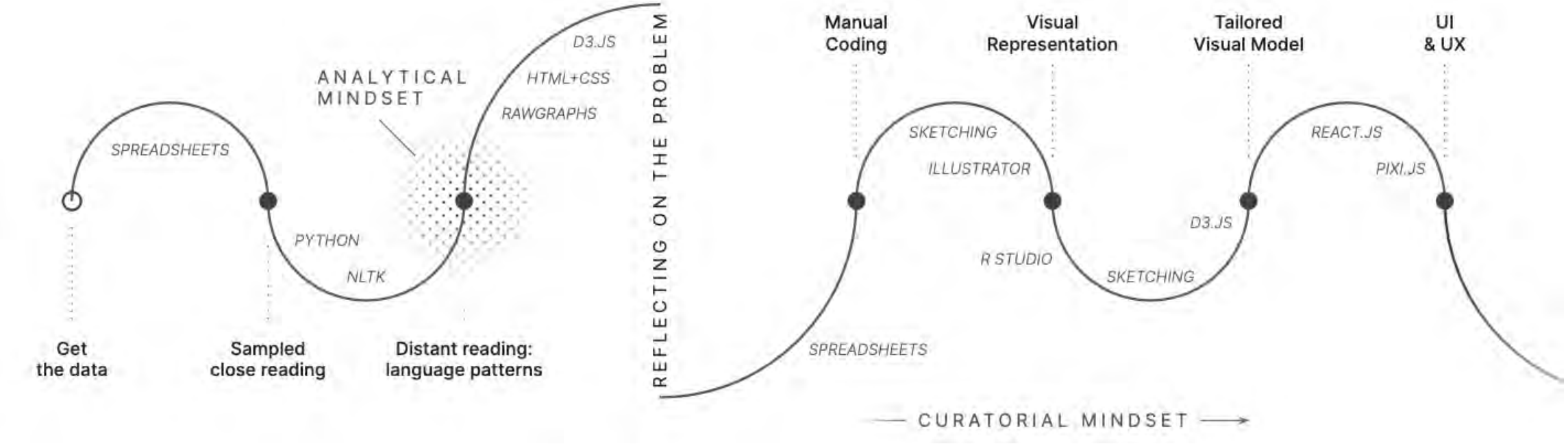
Impact on your career
I left academia
I left academia & my honors degree without a referral letter, and spent several years in low-paying jobs before working my way u
I left academia and found a job at a consulting company in Victoria where I was also sexually discriminated against (that's anoth
I left academia and have had a varied career track including a short period in diplomatic service (where my first assigned mentor
I left academia and I would recommend anyone who is not happy in academia, for any reason, to leave and fine something for lif
i left academia and still feel ashamed and traumatized. i also feel like i didnt do enough because i didnt file the complaint.
I left academia and went into an adjacent field. My confidence was destroyed, I think irrevocably.
I left academia as a result of the harassment

initial computational sketches: top 50 bigrams

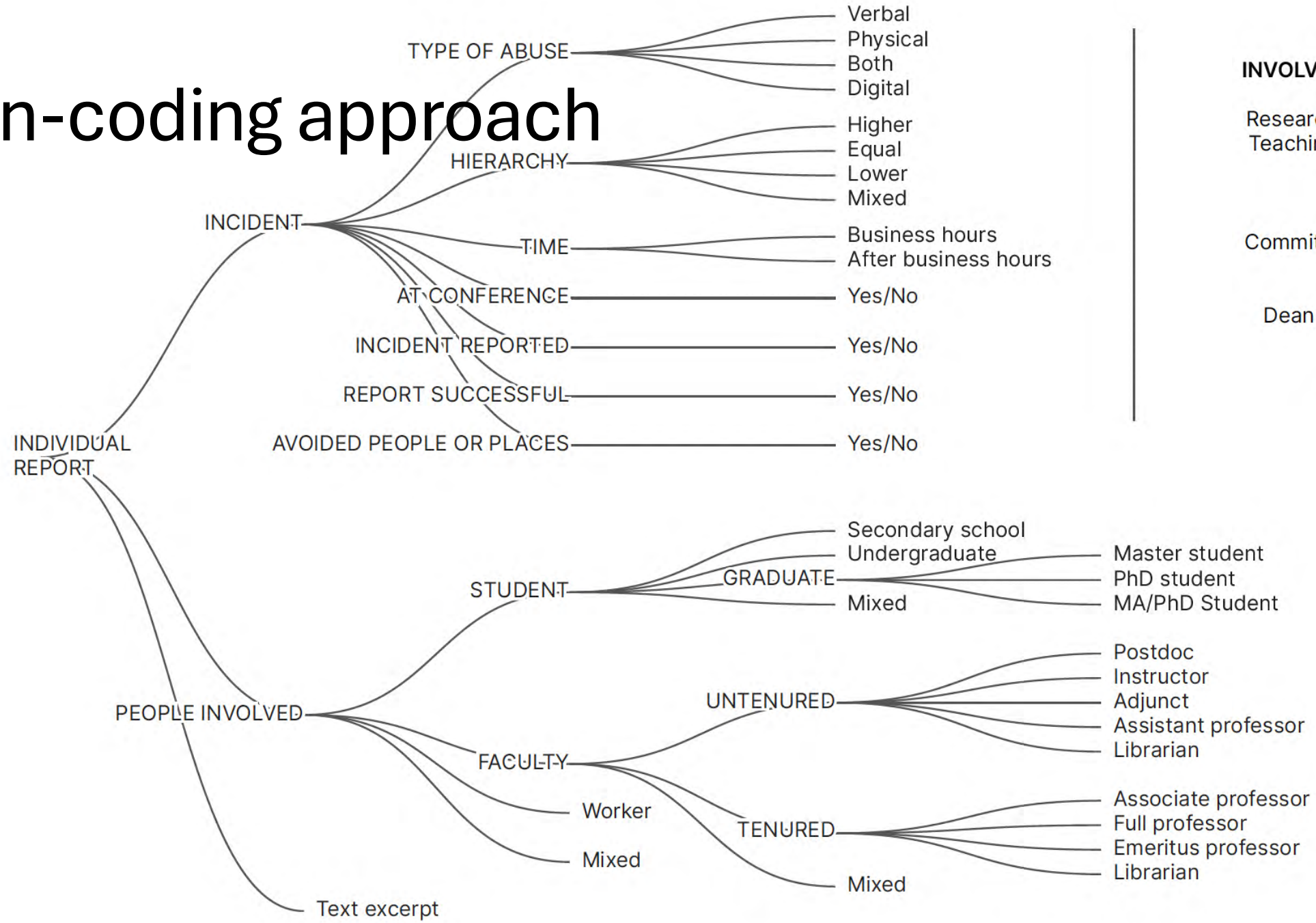


reflection on initial sketches

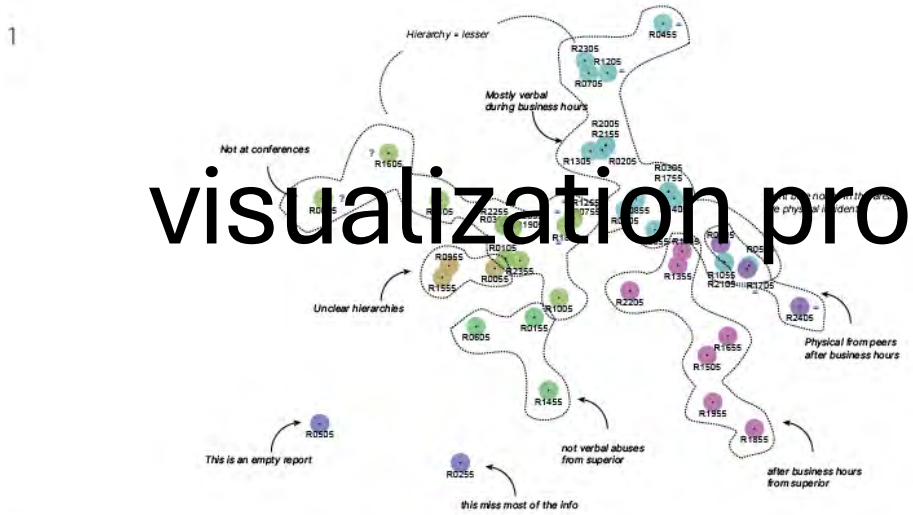
- Aggregate, high-level visualizations inappropriate to
  - Represent unique individual experiences in a respectful way
  - Promote engagement, reflection and self-criticism among members of

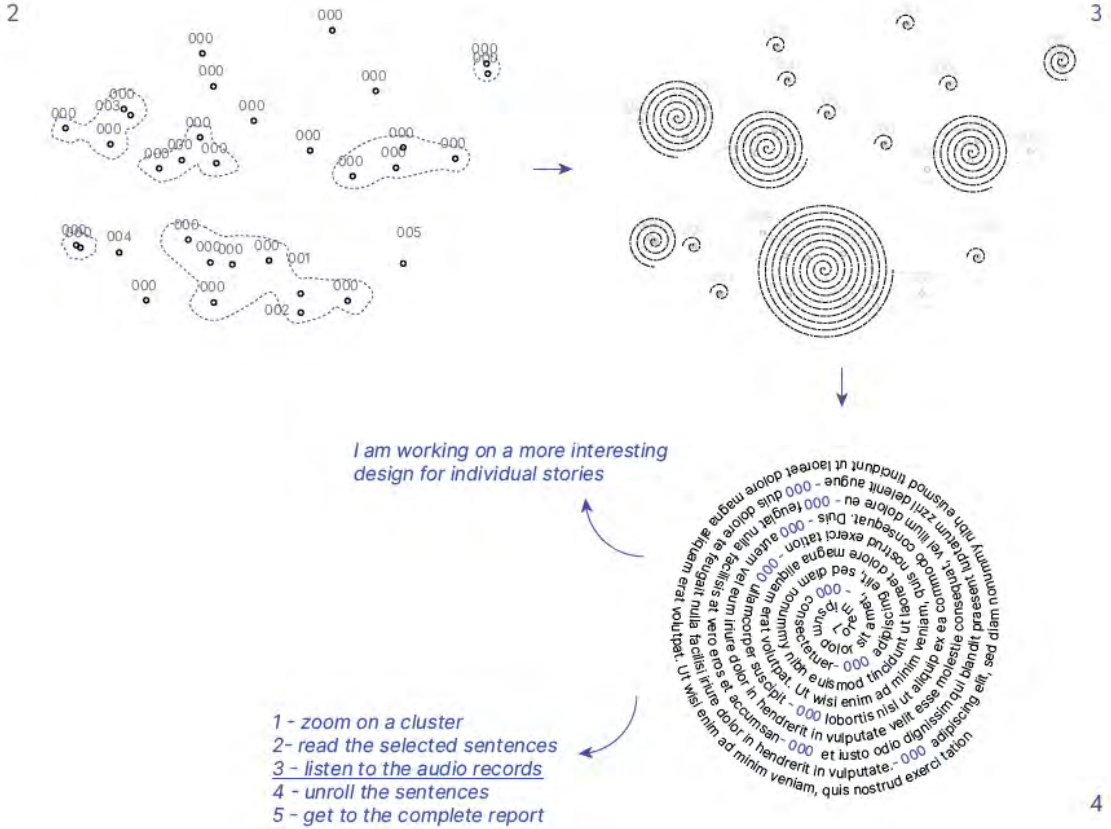


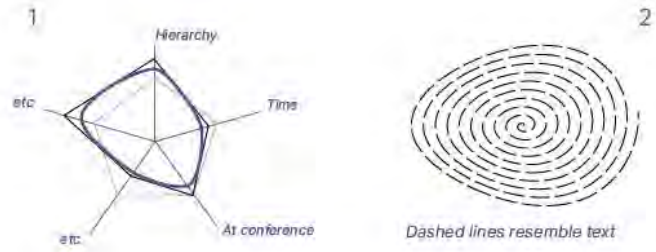
open-coding approach



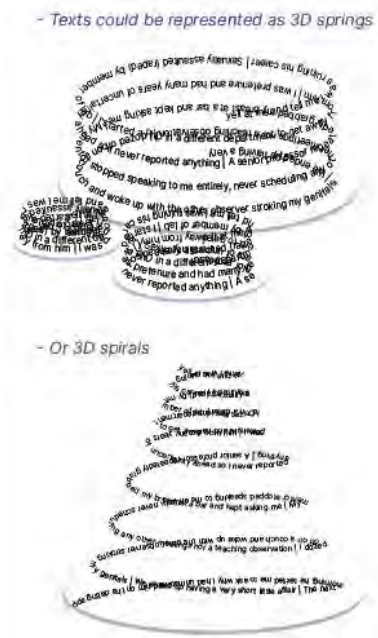
visualization process

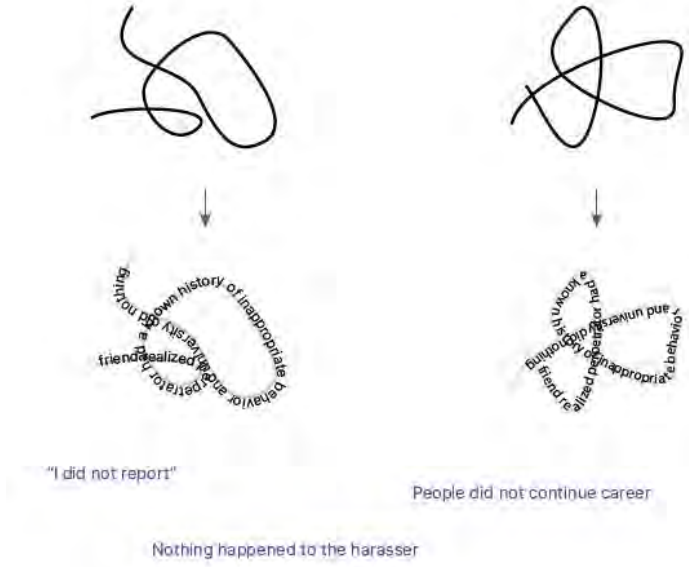






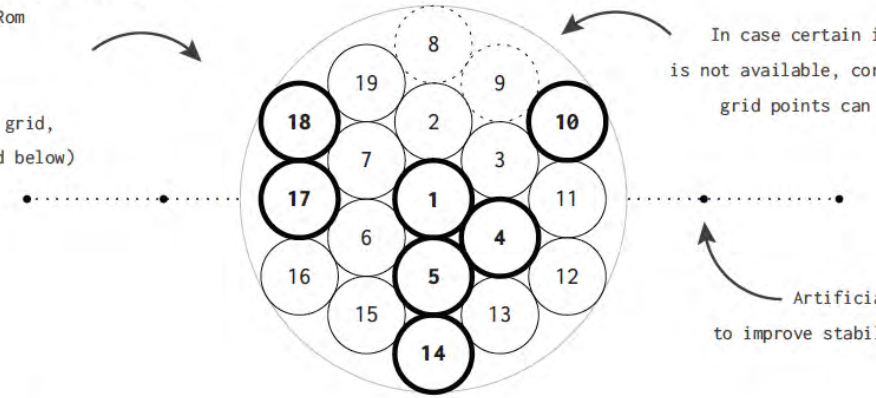






Data mapping and control-points grid

Knots are created using a CatmullRom curve interpolation that uses as control-points centers of the enumerated circles of this grid, that represent data values (legend below)



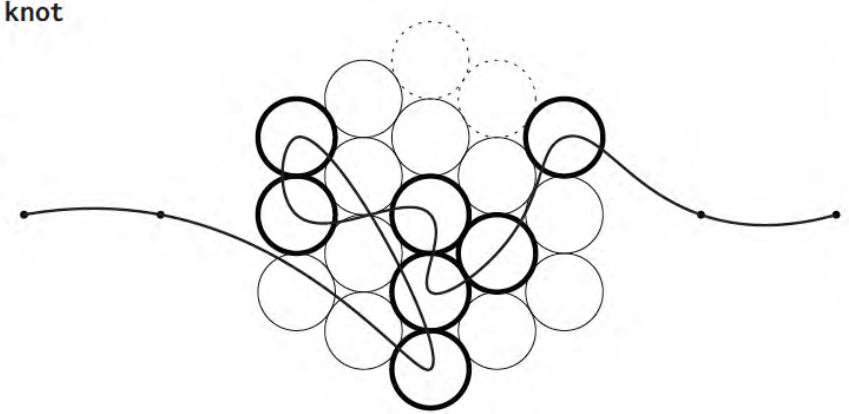
In case certain information is not available, corresponding grid points can be skipped

Artificially added control points to improve stability in curve extremities

Parametric drawing of a knot

Testimony #38

«He hit on me repeatedly, which freaked me out b/c he was much older and had all the power»

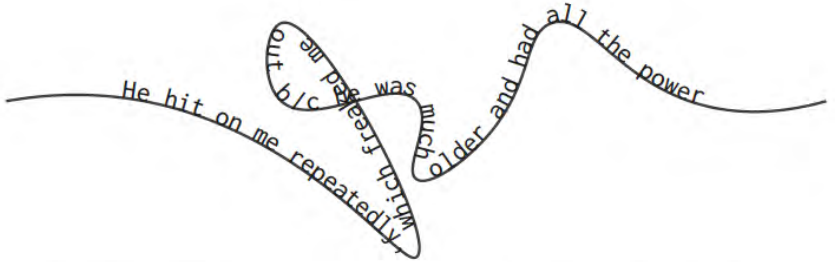


Incident description

- Verbal abuse (14)
- Higher hierarchy (18)
- During Business Hours (17)
- Not at a conference (1)
- Incident not reported (5)
- [impossible to evaluate successfulness of report]
- Victim stayed in Academia (4)
- Victim avoided people or places (10)

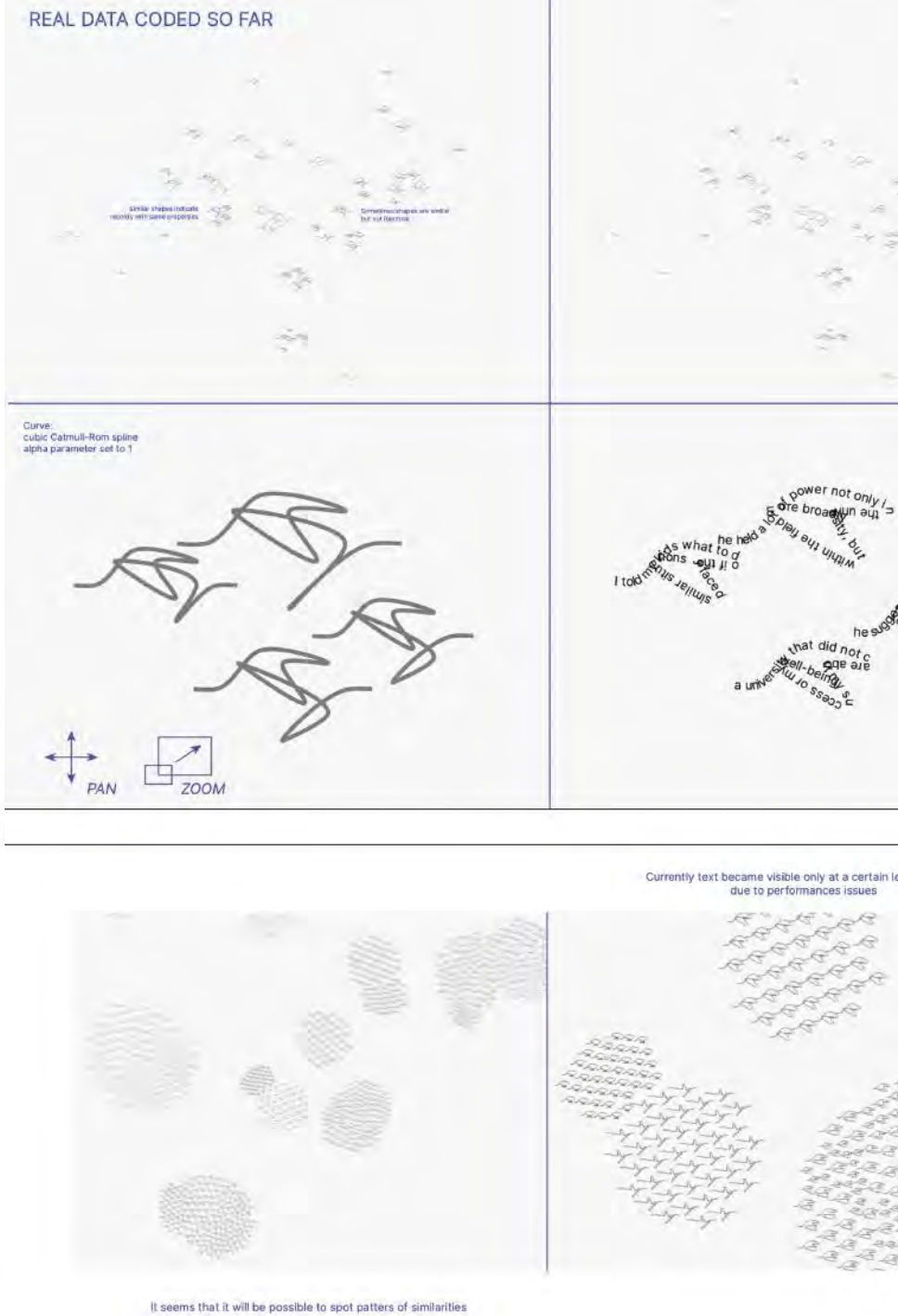
Final result

Testimony #38



Grid legend

1: At conference, No. 2: Hierarchy, Lower. 3: Hierarchy, Mixed. 4: Stayed in academia, Yes. 5: Incident reported, No. 6: Incident reported, Yes. 7: At conference, Yes. 8: Report successful, Yes. 9: Report successful, No. 10: Avoided people or places, Yes. 11: Avoided people or places, No. 12: Stayed in academia, No. 13: Type of abuse, Both. 14: Type of abuse, Verbal. 15: Type of abuse, Physical. 16: During business hours, No. 17: During buness hours, Yes. 18: Hierarchy, Higher. 19: Hierarchy, Equal.



ZOOM CONTROL

3

2

1

0

AUTO ZOOM

VOICES

ELEMENTS POSITION

VICTIM STATUS

INCIDENT DESCRIPTION

HARASSER STATUS

HIERARCHY
Equal

REPORT SUCCESSFUL
Yes

AVOIDED PEOPLE OR PLACES
Yes

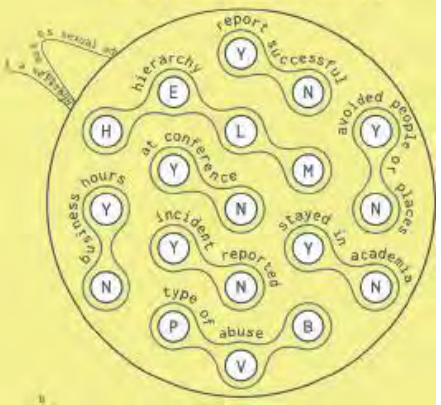
STAYED IN ACADEMIA
Yes

CASE REPORTED
Yes

Delayed the completion of my dissertation

read full testimony

FILTER BY DATA CATEGORIES



pictorial structure

- Abstract
- Introduction
- High-level overview of the design process
- Data exploration, interpretation, transformation
- Visualization design process
- Final prototype
- Discussion/Reflection

TIED IN KNOTS:

A CASE STUDY ON ANTHROPOGRAPHIC DATA VISUALIZATION ABOUT SEXUAL HARASSMENT IN THE ACADEMY

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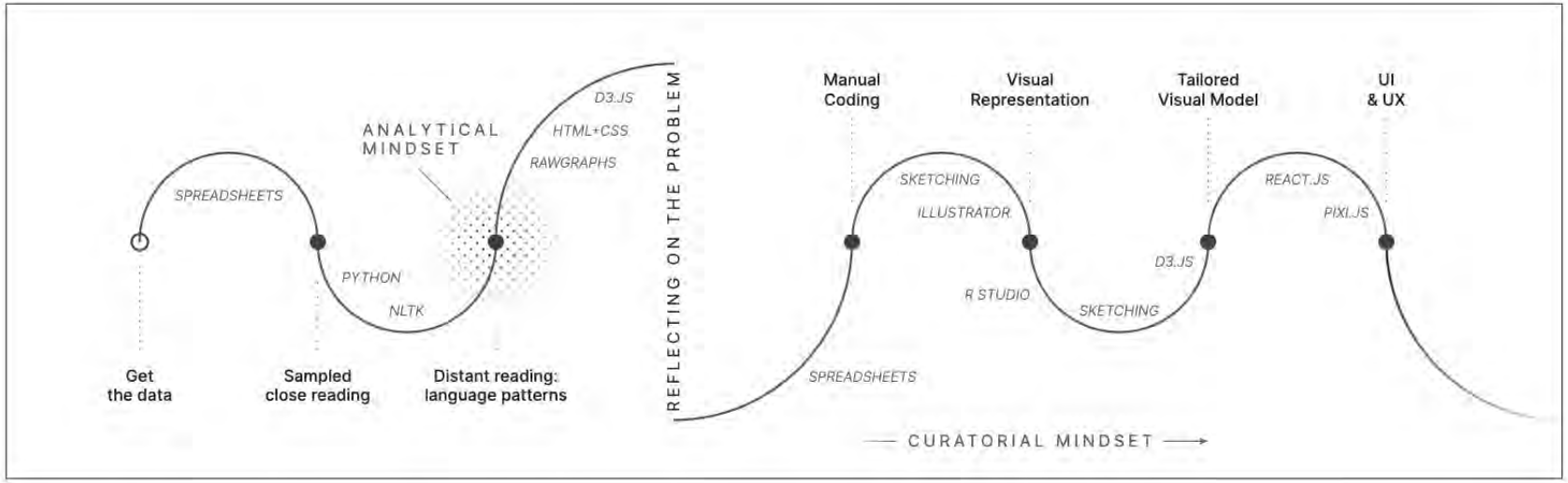
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Karen Kelsky
The Professor Is In
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Abstract
With this pictorial we present the design process of "The Academia is Tied in Knots", an interactive visualization based on sensitive and qualitative data, namely personal stories reported by people who have experienced sexual harassment in academia. We discuss how we approached the task of visualizing sensitive, uncomfortable, yet important topics in terms of data-mapping and visual representation, including the appropriateness of computational vs. manual approaches to help foreground relevant themes. We also describe the design process behind the visualization and we discuss it from a feminist data visualization perspective.

Authors Keywords
Sexual harassment; antropographic data visualization; qualitative data; data curation; tailored visual models

Introduction
Sexual harassment (SH) is a serious issue at workplaces across all sectors - and academia is no exception. Yet, SH in the academy has only recently started to become acknowledged and addressed. SH has a negative impact on individuals' lives and careers but also affects the educational environment as a whole; it threatens academia as a place that, ideally, should create a safe and supporting environment that fosters knowledge generation and discussion, free of individual suppression. Although the issue of SH is widespread and has a damaging impact not only on academia but also on society at large, until recently, it has been little discussed or addressed in academic circles and at the institutional level. In late 2017, the anthropologist and academic advisor Karen Kelsky released an online survey with the aim of anonymously collecting the experiences of people who faced SH in the academy. These testimonials were collected in the form of semi-structured textual data [1]. Kelsky's goal was to provide a platform for people to share their stories, highlight the extent and impact of SH on people working in academia, encourage solidarity and, ultimately, to inform change. The survey consisted of predominantly open-ended questions asking participants to describe their experience of SH in their own words, the academic context in which the incident occured, and the impact the incident had on their own (academic) life as well as repercussions for the harasser (if any) - see the list of questions and an example testimonial in the figure at page 3. Within approximately one year, more than 2000 people participated in contributing their experiences with SH in academia, highlighting not only the spread of the issue across disciplines, institutions, countries, and gender, but also the subtle nuances of SH in academia and its (often severe) impact on the victims. The survey itself received a lot of media attention and inspired articles around the topic of SH in academia. Kelsky also made the survey data publicly available in the form of a spreadsheet [1]. While the individual stories stand for themselves, it became clear that this form of data representation did not do justice to the extent and richness of the data, nor did it provide a powerful entry point to raise awareness and promote discussions around the topic within academia and beyond. Inspired by current discussions on data feminism [2], ethical considerations of visualization [3], critical InfoVis [4], approaches to data visualization in the digital humanities [5], and anthropological approaches to visualization that focus



on the people behind the data [6], we as visualization researchers and designers became interested in the following questions. (1) How can visualization help to give visibility to the issue of SH in academia? (2) When visualizing this type of data, how can we honor and empower the individual voices within this data in a sensitive way, rather than silencing them within abstract and aggregated views? (3) How can visualization promote sensitivity and awareness of the nuances of SH in a way that encourages constructive discussions of how to make academia a space that is safe for everyone?

These questions pose interesting visualization challenges such as how to create tailored visualizations that uniquely reflect on the given data set and represent people's individual and deeply personal experiences behind this data. A second challenge is coming up with appropriate visual representations that are effective and understandable by a wide audience, yet act as a defamiliarization with concepts [3,4] that we often take for granted and provoke discussion.

In this pictorial we describe and reflect on our design process of visualizing the SH survey data which involved the interdisciplinary collaboration between researchers with a background in graphic design, visualization, human computer interaction, natural language processing, social sciences, and anthropology. We illustrated this process through unfinished visualizations [7], also described as "visualization sandcastles" [4], that we built as part of this process and that finally led to our web-based visualization "Tied in Knots" (see page 2) which - based on the metaphor of knotted threads - represents evocative statements by contributors to Kelsky's survey in form of text and sound which, in turn, provides an entry point into survey participants' full testimonials.

We start by describing our approach to familiarizing ourselves with the survey data and our subsequent data transformation and interpretation that we applied in preparation of our visualization process. This is followed by an outline of our iterative visualization design process, and a reflection on lessons learned in terms of visualization design methodology when it comes to visualizing qualitative sensitive data - see figure above for an overview of our design process.

Data Exploration, Interpretation, Transformation

Sampled Close Reading.

Our first step was getting to know the data in the search for potential angles that our visualization could provide on these personal

Above: research process summarized in a diagram

Previous page: "Tied in Knots". Accessible from: vialab.github.io/tied-in-knots

01	**Describe the incident(s)** *«When I was an undergraduate student in my final year in 2005, I was groped and kissed by a professor while in his office during a private meeting.»*	[free text field]
02	**What was your status when the incident(s) happened** *«I was an undergraduate student in his class»*	[free text field]
03	**What Was the Status of the Perpetrator(s) (Particularly, relative to you)?** *«He was the professor of a class I was taking. He was the thesis supervisor of my roommate.»*	[free text field]
04	**What Was the Gender of the Harasser?** *«Male»*	[select from certain options or specify in a text field]
05	**What type of institution was it?** *«Elite Institution/Ivy League»*	[select from certain options or elaborate more in last field]
06	**[Optional] What Was The Name of the Institution(s)** *«McGill University»*	[free text field]
07	**Your Field/Discipline** *«Communications»*	[free text field]
08	**Institutional Responses to the Harassment (If Any)** *«None. Unreported»*	[free text field]
09	**Institutional/Career Consequences for the Harasser (If Any)** *«N/A»*	[free text field]
10	**The Impact of the Harassment on Your Career** *«I currently work at the University where this harassment took place. I have taken steps to avoid encountering the harasser.»*	[free text field]
11	**The Impact of the Harassment on Your Mental Health** *«Distrust of authority figures. Depression.»*	[free text field]
12	**The Impact of the Harassment on Your Life Choices/Trajectory** *«Unsure.»*	[free text field]
13	**Other Comments You'd Like to Add [...]** *«Thank you so much for doing this. When the #Metoo movement started, I finally told my friends and family about what happened. I am still too afraid to report the harassment at the University, even though I know that this man has most likely continued to harass women in his classes. I felt that no one cared about what happens in the academic environment. I feel it is one of the most patriarchal environments to study and work in.»*	[free text field]

testimonials. For this reason, we engaged in close-reading of samples of these testimonials. Close reading in preparation for visualization can be considered a rather unusual approach to visualizing data, and it is better known from visualization projects in the context of humanities research. This approach helped us to gain a deeper understanding of the experiences of the victims of SH in academia and the character of the survey data at a low level; the whole research team engaged in these investigations. The close reading approach revealed the intimate and detailed nature of the testimonials, that often describe victims' personal feelings associated with the incident. It also revealed the varied nature of incidents of SH (e.g. verbal or physical), the characteristics of perpetrators (often males higher up in the academic hierarchy, often in the role of supervisors), and the range of contexts in which incidents happened: private offices, off-campus bars, conferences and social events.

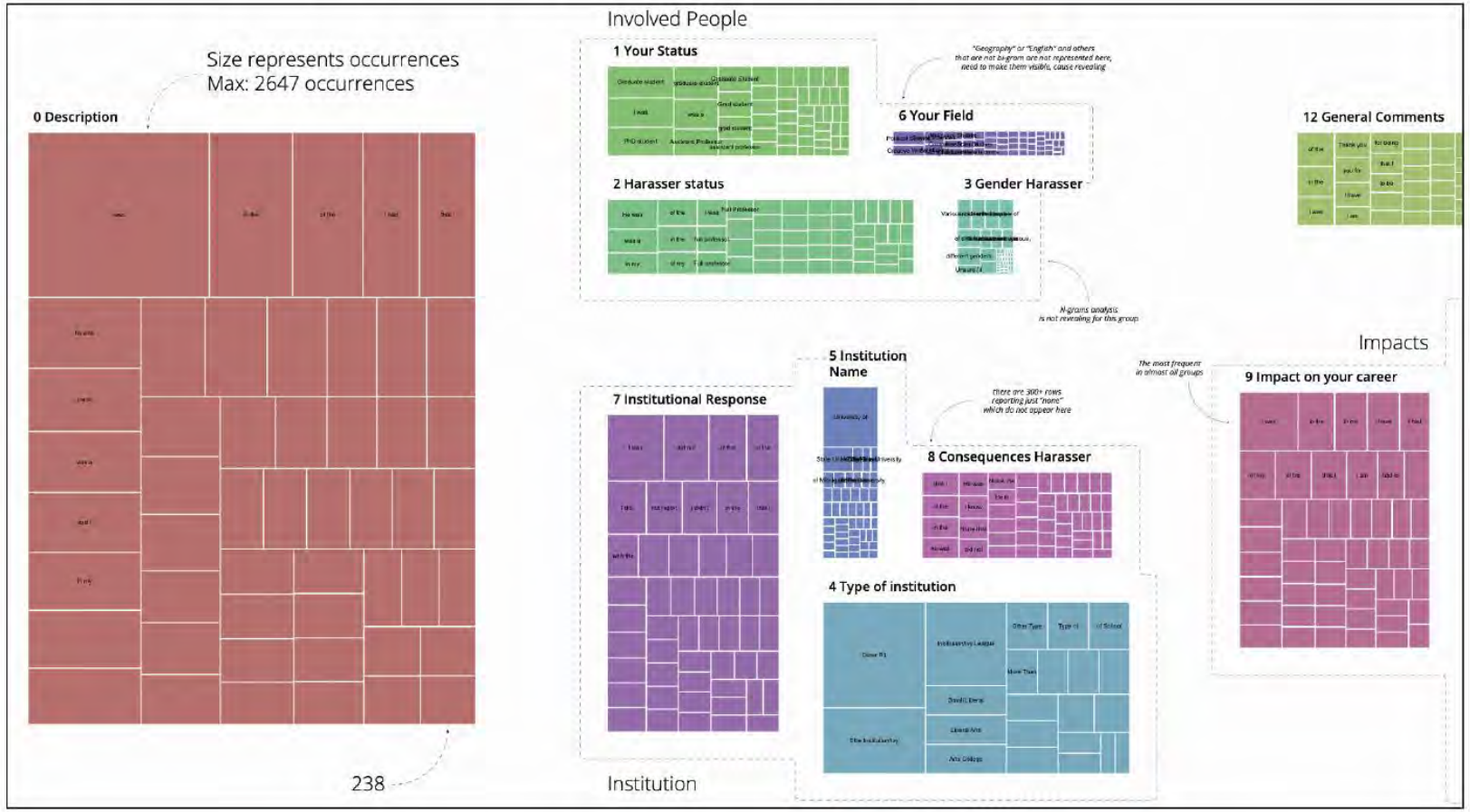
The close reading approach was invaluable in that it provided all team members an in-depth understanding of the overall qualitative nature of the survey data and its (often disturbing) details. However, we also felt the need to incorporate computational methods to explore the data in order to gain a higher-level understanding of survey responses as a whole.

Left: Survey questions and answers taken from report #1055. Data-formats on the right. Data retriavable from: https://bit.ly/survey-sh-academy

The Top 50 Bigrams (raw text)

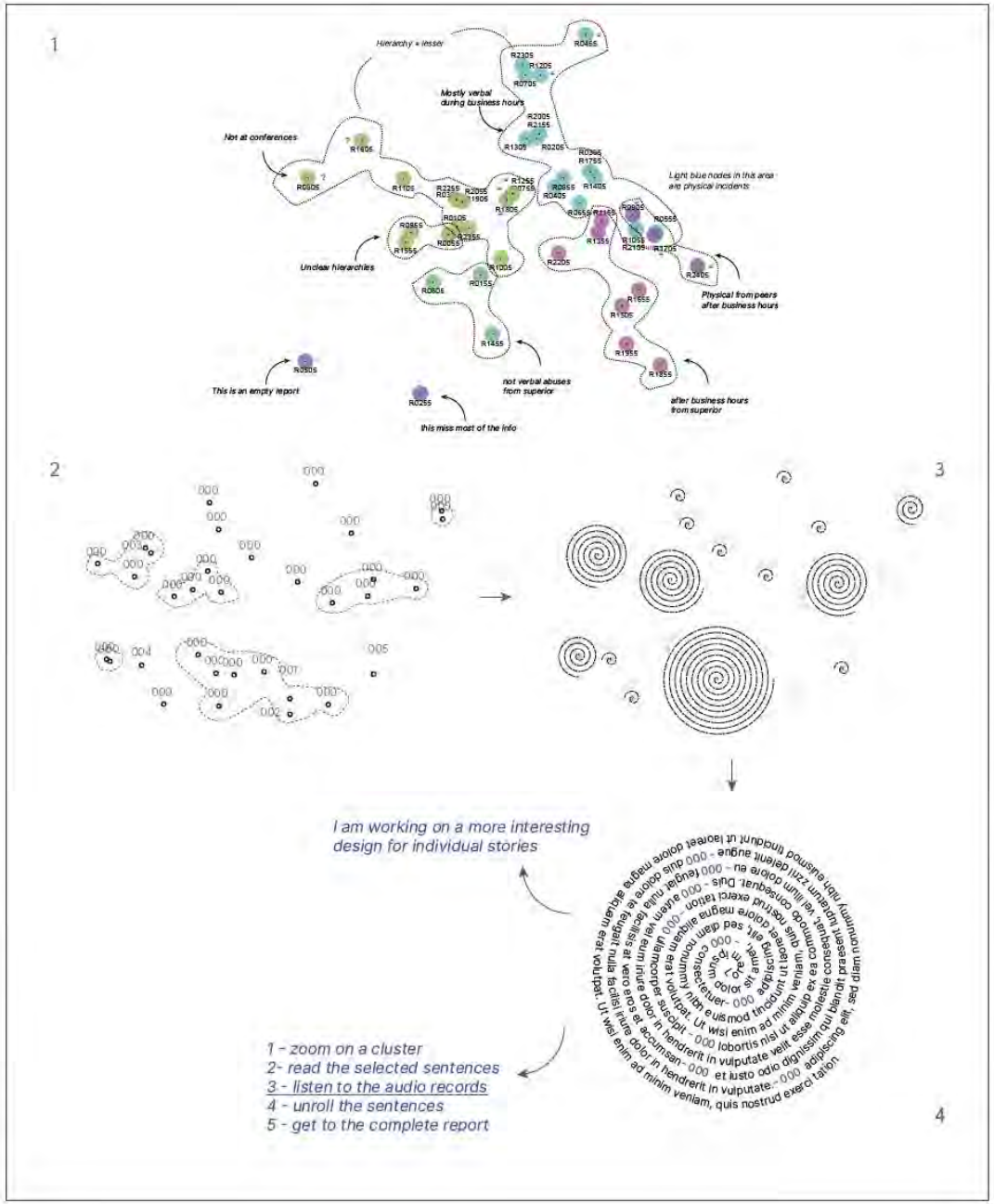
Represented in the form of a broken-down treemap (top 10 highlighted), where related fields are clustered together and titled.

No case transformation, stopwords are preserved, **you can pan and zoom around**. Download viz



Above: one of the visualizations of language pattern extracted with text-mining used as example

Explore the interactive visualization at: vialab.github.io/i-dropped/top-50-2-ngrms.html



data into bidimensional vector spaces, where entries with similar features get positioned near each other. A total of three spatializations were created: a first one depending on incident descriptions only, plus two others, specifically conceived to create self-identification, that position entries according to victims' and harassers' status. In this way the viewers of the visualization have a chance to confront themselves with incidents experienced or caused by someone in a similar position.

The second design requirement was more complicated and required researchers to undertake a longer iterative process. A first attempt was oriented towards the possibility of representing all texts without reductions, insisting on commonalities and intersections. This strategy was abandoned, because it was evaluated to be too chaotic, as could be expected. However, we learned from our previous attempts that it was necessary to produce a reversible operation capable of reducing the amount of displayed text that did not break up the stories into inexpressive fragments. It is due to this reason that we decided to collect report excerpts. Afterwards, we explored different solutions for their representation, including bidimensional and three dimensional springs and spirals. Eventually, our decision fell on the use of bidimensional knots. During this part of the

Left: spatial positioning of stories and first exploration of visual treatment (thoughts annotations in blue)

Previous page: diagram showing the tagging schema adopted for the manual coding of reports

more examples

Wizard of Props: Mixed Reality Prototyping with Physical Props to Design Responsive Environments

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ABSTRACT

Driven by the vision of future responsive environments, where everyday surroundings can perceive human behaviors and respond through intelligent robotic actuation, we propose Wizard of Props (WoP): a human-centered design workflow for creating expressive, implicit, and meaningful interactions. This collaborative experience prototyping approach integrates full-scale physical props with Mixed Reality (MR) to support ideation, prototyping, and rapid testing of responsive environments. We present two design explorations that showcase our investigations of diverse design solutions based on varying technology resources, contextual considerations, and target audiences. Design Exploration One focuses on mixed environment building, where we observe fluid prototyping methods. In Design Exploration Two, we explore how novice designers approach WoP, and illustrate their design ideas and behaviors. Our findings reveal that WoP complements conventional design methods, enabling intuitive body-storming, supporting flexible prototyping fidelity, and fostering expressive environment-human interactions through in-situ improvisational performance.

Authors Keywords
Responsive Environment Design; Design Tool, Rapid Prototyping; Mixed Reality; Embodied Interaction; Tangible Interaction; Haptics

CSS Concepts
• Human-centered computing ~ Systems and tools for interaction design



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TEI '24, February 11–14, 2024, Cork, Ireland
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ACM ISBN 979-8-4007-0402-4/24/02.
https://doi.org/10.1145/3623509.3633395

*The first three authors contributed equally to this work.

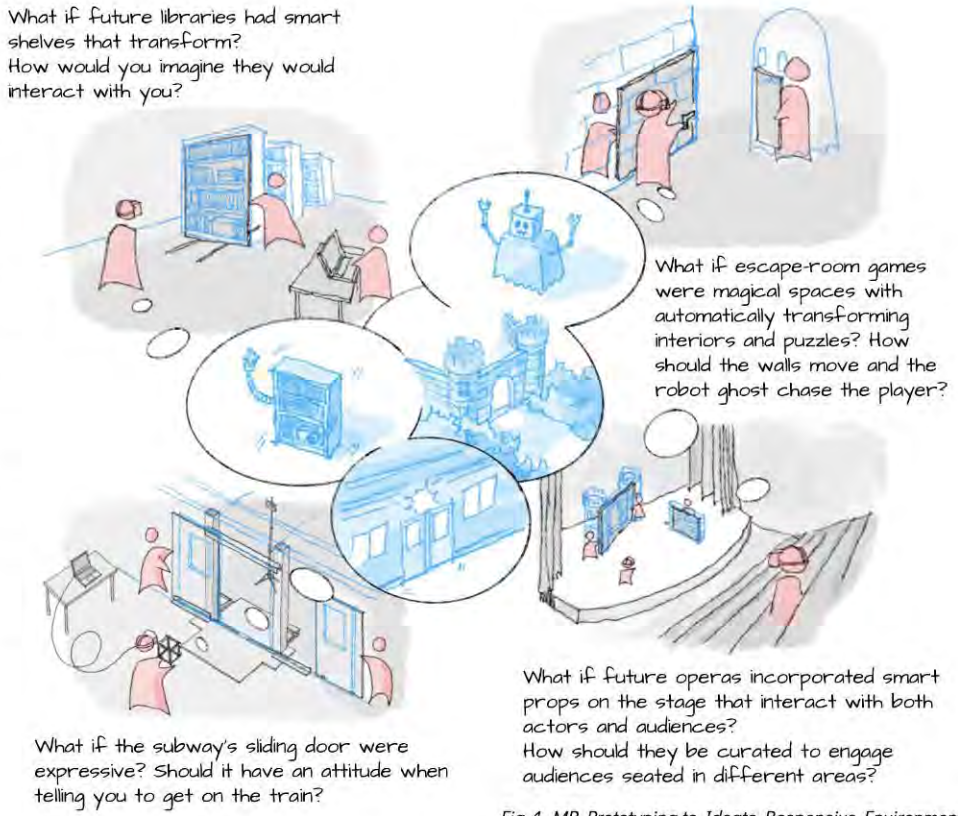


Fig. 1. MR Prototyping to Ideate Responsive Environment

Zhang et al. Wizard of Props: Mixed Reality Prototyping with Physical Props to Design Responsive Environments. Conference on Tangible, Embedded, and Embodied Interaction, 2024. https://doi.org/10.1145/3623509.3633395



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ABSTRACT

Our everyday technologies could have appeared terrifying to our ancestors: instantaneous disembodied communication, access to knowledge, objects with 'intelligence' that talk to us (and each other). Black boxes and intangible entities are omnipresent in our homes and lives without our necessarily understanding the hidden flows of data, unknown agendas, imaginary clouds, and mysterious rules that govern them. Have humanity's ways of relating to the unknown throughout history gone away, or have they perhaps transmuted into new forms?

In an ongoing project, we have inventoried examples, encounters and reflections on contemporary technology, framed through the perspective of the haunted, spectral and otherworldly. In this paper, we excerpt this collection to illustrate the value and opportunity of an unfamiliar, disquieting perspective in helping to frame the frictions, beliefs and myths that are emerging around interactions with everyday technologies. We posit and demonstrate 'spooky technology' as an accessible framework to reflect and respond to our increasingly entangled relationships with technology.

AUTHOR KEYWORDS
Research through design, everyday tech, otherworldly, invisible, spooky, entanglement HCI, hauntology, numinous, disembodied interaction.

CCS CONCEPTS
- Human-centered computing-Human computer interaction (HCI)

INTRODUCTION

We sometimes hear that the technologies in our everyday lives would appear to be 'magic' and potentially terrifying to people in the past—instantaneous communication with disembodied people all over the world, access to a vast, ever-growing resource of human knowledge right there in the palm of our hand, objects with 'intelligence' that can sense and talk to us (and each other). But rarely are these 'otherworldly' dimensions of technologies explored in more detail. There is an often-unspoken presumption that the march of progress will inevitably mean we all adopt new practices and incorporate new products and new ways of doing things into our lives—all cities will become smart cities; all homes will become smart homes. But these systems have become omnipresent without our necessarily understanding them.

They are not just black boxes, but invisible and intangible: entities in our homes and everyday lives which work through hidden flows of data, unknown agendas, imaginary clouds, mysterious sets of rules which we perhaps dismiss as 'algorithms' or even 'AI' without really understanding what that means. On some level, the superstitions and sense of wonder, and ways of relating to the unknown and the supernatural (deities, spirits, ghosts) which humanity has felt in every culture throughout history have not gone away. Instead, they have transferred and transmuted into new forms. The systems we produce and invite into our homes today are so vast, distributed, complex and intangible, that they defy a complete understanding. While specialized research work in explainable AI [1] is teasing out the dimensions and implications of this complexity at an academic level, it is investigations behind the scenes of everyday technology experiences, such as Crawford and Joler's *Anatomy of an AI System* [30] that reveal the hidden and intangible tangle of "each small moment of convenience". Whether it is "answering a question, turning on a light, or playing a song [it] requires a vast planetary network, fueled by the extraction of non-renewable materials, labor, and data." The beautifully rendered system map lays bare the staggering complexity of even the most simple interaction in the smart home.

The otherworldly, and its histories, are entwined with everyday technologies. The idea of other times (or places, or people, or presences) intruding into, or being present in our time is, on one level, what much technology has brought us, from camera to telephone to the endless Zoom calls: ways to get access to memories and minds, our own and others'; ways to talk to or see people and places we couldn't otherwise, from across the world or across time, an incomplete yet boundless archive. As Fisher [40] noted, "in conditions of digital recall, loss is itself lost". It might not be how we routinely think about technologies which have become prosaic and mundane, but a slight shift in frame can cause us to think somewhat differently about the enmeshed systems we exist and live within. The action-at-a-distance notions in time and space, whether an IoT heating system being switched on remotely, or even the idea of code itself—written instructions to a physical object—are actually quite profound,

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https://doi.org/10.1145/3532106.3533547

Byrne et al. Spooky Technology. The ethereal and otherworldly as a resource for design. Conference on Designing Interactive Systems, 2022. https://doi.org/10.1145/3532106.3533547



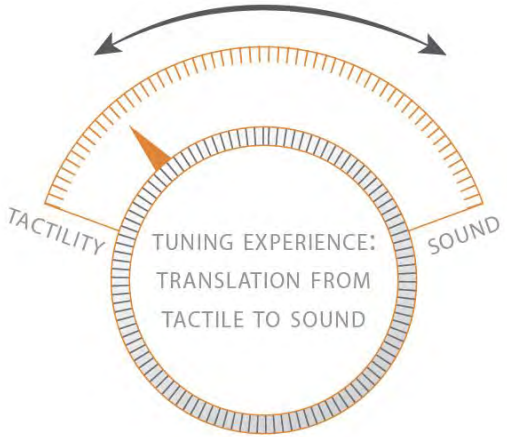






According to the designer, for expats, missing home is a mix of melancholic longing for something far away and pleasant sense of connected-ness. He interprets the tuning of the Geist Radio accordingly: "*The tuning will implicate hope (in search of a channel) and disappointment (when the de-sired channel is missed/ cannot be caught). These iterations of acts and affects will happen each time one searches for the next radio station, till a pleas-ant sense of conncetedness is elicted when a satisfying chan-nel is caught".* The designer defined this overall tuning experience of the Geist Radio as 'sad-isfaction'.

sad-isfaction
The quality of being content with melancholia







Karana et al. The Tuning of Materials: A Designer's Journey. Conference on Designing Interactive Systems, 2016. https://doi.org/10.1145/2901790.2901909

more sources for inspiration

- ACM conference on Tangible, Embedded Interfaces (TEI)
  - Scroll to “previous pictorial examples” https://tei.acm.org/2027/call-for-pictorials.html
- ACM conference on Designing Interactive Systems (DIS)
  - Scroll to “examples of pictorials” https://dis.acm.org/2027/pictorials/

important disclaimer

- The pictorials presented here are to give you examples on how to approach your own pictorial for CW2
- These are examples from research that took months to develop - we don’t expect your work to be at the same level in terms of design ideas, sketches, prototypes or presentation!
- The structure and design of pictorials presented here, does not have to match your pictorial - work from the CW2 brief

how to approach your pictorial

- Follow the structure provided in the assignment brief

- Introduction
- Design ideas
  - Ideation (describe 5 design ideas)
  - Sketches (present 2 sketches)
- Prototype
- References

how to approach your pictorial

- Emphasize images over text (see pictorial examples)
- Layout is up to you, but you may use the pictorial templates from the Designing Interactive Systems (DIS) conference as a starting point
  - **DIS Word template**
    - https://dis.acm.org/2027/wp-content/uploads/2026/11/DIS2027-Pictorials-Word-template_Folder.zip
  - **DIS Powerpoint template**
    - https://dis.acm.org/2027/wp-content/uploads/2026/11/DIS2027-Pictorials-PowerPoint-template_Folder.zip
  - Modify these as you see fit!
  - Ignore the instructions included in the template - they are for the conference, not for your assignment; follow the assignment brief

from HCI report & pictorial to a UX portfolios

What is a UX Portfolio?

- Exhibition of a UX designer's work that
  - Introduces one's skills in designing UX and
  - Showcases a selection of projects that highlight these skills.
- An UX portfolio demonstrates the process — not just the end result
  - How was the problem identified and solved?
  - What were the methods used and the processes undergone?
- A powerful tool that may be used to land a job
  - From an employer or from a client



Photo by Andrea Piacquadio from Pexels

References:
https://careerfoundry.com/en/tutorials/ux-design-for-beginners/tips-for-your-first-great-ux-portfolio/
https://www.interaction-design.org/literature/article/what-is-a-ux-portfolio-and-what-should-it-contain



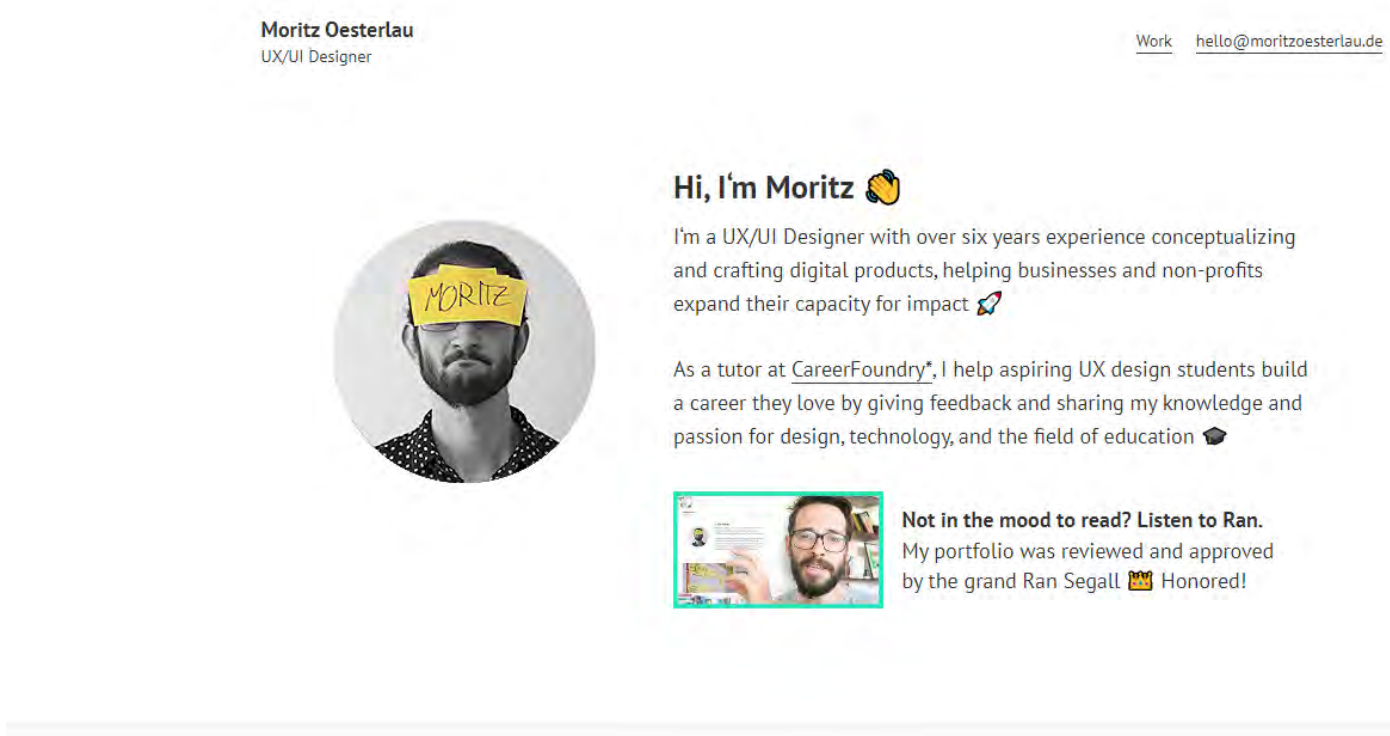
*'...to ensure they can **demonstrate the projects they have worked on**, the **problems they were trying to solve**, their **design process** and provide **design artefacts** (pictures, sketches, wireframes, high fidelity mock-ups) showing **how they applied that process to solve the problem**. Also, it is good to **see learnings at the end** highlighting how they might have done things differently next time.'*

- Andy McBride, QUT's Principal UX Designer
On the purpose of UX Portfolio

Photo by Kaboompics .com from Pexels

Portfolio of **Moritz Oesterlau**

https://www.moritzoesterlau.de/index.html



Through your portfolio

- You demonstrate that you fully understand the entire design process
- Present your expertise and experience in an easy-to-follow narrative
- Tell the story of the project (case study) using both text and images
- Showcase an entire UX process



turning assignments into a UX case study

Step 1: outline your case study

- **Type of project** – real-world project, a project for an education program, or a project you created
- **Organisation and/or product overview** – provide a short summary of the company/organisation/partner you were working with and/or the product you were working on/researching/designing
- **Skills and area of focus** – what skills or focus does this case study provide evidence of?
- **Project problem or purpose** – what was the purpose, what problem were you trying to solve, what were you trying to learn?
- **Roles, responsibilities and team** – what was your role, what were the other roles in the team, external organisation or partners involved? You can highlight the collaborative work you've done here
- **Timeline, scope, constraints** – provide some context around what you had to work with
- **Process** – this the main part of your portfolio where you detail what you did (you will go into more detail on this in step 2)
- **Outcomes, results, lessons learned** – what happened, what did you learn, did the product launch, what would you do differently?

Outline inspired by https://www.sarahdoody.com/

turning assignments into a UX case study

Step 2: write the project details (process)

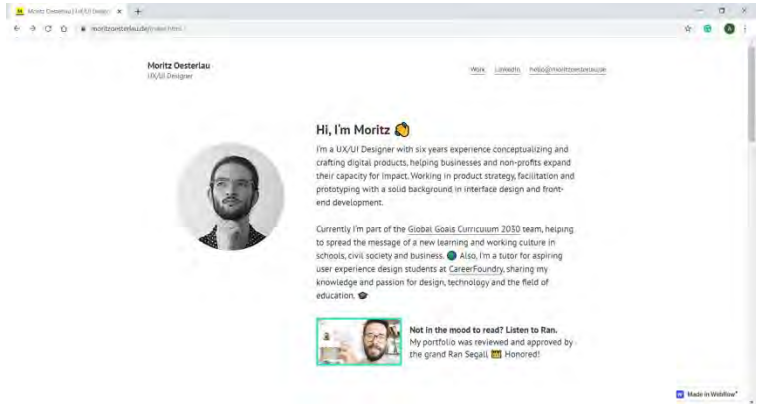
- Methods
  - What did you do? – what research methods did you use?
  - Why did you do it? – why did you decide on that research method?
  - How did you do it? – software, tools, process, etc
- Findings
  - What was the result?
  - Give an overview of your key insights
- Design specifications
  - Persona, journey map, rich picture, etc
  - Update these based on assessment feedback
- Updated design brief that highlights key problems, objectives, target audience and scope

turning assignments into a UX case study

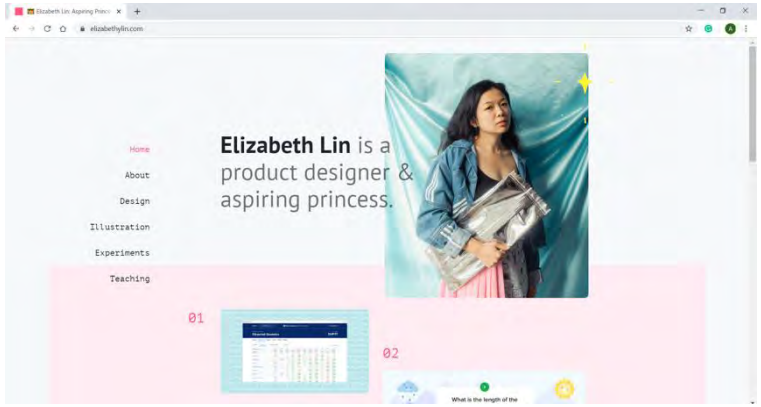
Step 2: write the project details (process)

- Ideate
  - List the design ideas and describe them in 2-3 sentences
- Sketch
  - Add your sketches of your design ideas and the paragraph that described them
- Prototype
  - Add images of your prototype and describe them
  - State that this was then presented to the client
  - Add any feedback you received from the client
- Summary

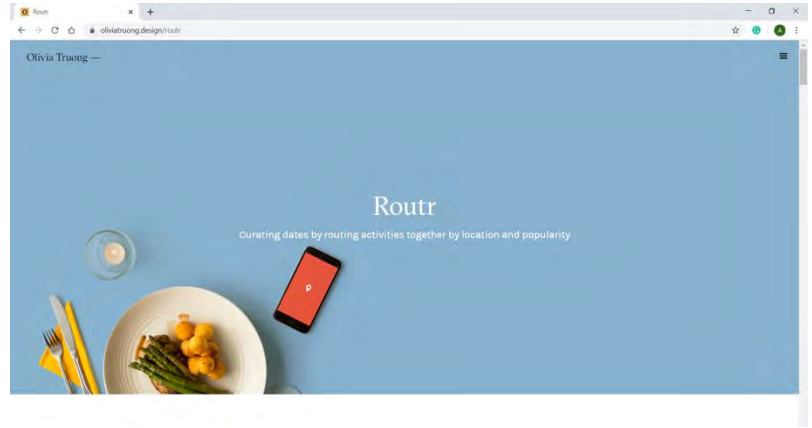
Some wonderful UX Portfolios for inspiration



*https://www.moritzoesterlau.de



*https://www.elizabethylin.com/



*https://www.oliviatruong.design/routr



https://johnyvino.com/

Next steps

- Week 10 tutorial
  - CW2 clinic
- Week 10 lecture
  - Dark patterns in HCI
  - The role of (critical) theory in HCI

Any questions?