User interview with Paul

☰ Meeting Tags	User Interviews
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Research Questions

- Is the presented prototype easy to understand of what you can do to control our device?

- Does the terminology make sense?

- Is everything that we provide sufficient enough to start building things on top of it?

- Which style should the application follow? (after presenting mood boards and colour schemes)

Interview Script
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Introduction

- Doing an user interview, helps us to find out what and how we want to design things early in the creation of a new product

- We ask questions, not directly about you or to test you, but rather to gain insights for our design process

- If you don't know how to answer a question let us know, we're here to help you guide through the process, if you don't want to answer a question that's also fine, just let us know

Warm Up

- Tell us about yourself

- What do you do as your job?
  - Go into more detail to ask about the context and connection to IDUN
- What is the greatest pain at your current job? OR with what the person has mentioned in context and connection to IDUN?
  - Go more into detail and find out the WHY
- What are you currently building? Can you describe the idea and especially technical challenge behind of it?

- Have you heard of brain-machine interfaces – what is a brain-machine interface?
  - Can you describe what a brain-machine interface is and how it works?
  - Have you ever worked with or thought of working with a brain-machine interface?
  - Do you have an idea to create something with a brain-machine interface based on your understanding? Is it maybe something that would integrate into something that you're working on at the moment?

Context

At IDUN, we are building a brain-machine interface that can read your brain's electrical signals in real-time. We are not the first to do this, others have been doing it for many decades. The difference between our product and others on the market is the form factor. Our brain-machine interface is the size and shape of a normal in-ear headphone such as Apple Airpods. Compared to e.g. a state of the art system in 2022 our device has similar signal qualities in a form-factor which has the potential to be mainstream and the setup speed that is not comparable to any other brain-machine interface as of today (show some charts).

Our goal is not to develop the headphones themselves (building the brand, marketing, packaging design, etc.), but to integrate our technology into existing headphones. And why? Because we want the brain to be another API for developers who create applications. For example, as of today, you can pull GPS data from a mobile phone or computer in the form of an API that users can plug into, so you can, for example, create something with the users' geographic location, for maps or games like Pokemon Go, automatic time tracking software, sharing location with emergency contacts, etc. The possibilities are endless, as

history has already shown us. What we want now is another API for developers to access the brain.

- **To give you some examples of what's possible and will soon be possible in the near future:**
    - The users general focus in a range from 1–10
    - The users tiredness in a range from 1–10
    - How long, well and in which stages the user slept
    - Where the user is looking at (top right, bottom left, centre up, centre down etc.)
    - If the user is squeezing their eyes together or not or blinking and how long is blinking
    - If the user is hearing sounds in certain frequencies or what for profiles the user is able to hear
    - If the user is eating something, talking or chewing something hard of soft
    - If the user is hungry, tired, asleep, bored etc.
- More things will be possible soon. Before we continue we want to hear how you feel when you hear what's possible with our device?
- Do you already have an idea of what kind of app you could build with such an API?
- We will give you two examples of what is possible to build with our device:
    - A music app that recommends music based on your mood: if you're tired it will show you two auto-generated playlists; one that makes you more awake and one that helps you fall asleep. Same with being focus, bored etc. You can replace the music playlist with basically any recommendation engine you could think of. (show example slides)
    - Another more complex idea: A user is wearing a AR/VR device and you track where the user is looking at in the 3D world and based on the focal point of the users attention you increase the volume of the source and decrease surrounding sounds (also known as the cocktail party effect). (show example slides)
- What are your thoughts when you heard these two ideas?
    - Ask more questions so that the user elaborates

- How would you build the first example?
  - What for technologies would you use and how would you combine them?
  - Can you describe the architecture?
- How would you build the second example?
  - What technologies would you use and how would you combine them?
  - Can you describe the architecture?
- How would you ensure that the users' brain data is safe and secure?
- How would you protect the users privacy?

Responses

assistive technology in production? or research environment?

wORKING IN assisted tech for 25 or 7 years, cognitive, physical assistive tech from devices to smart environent, worke diwth NHS, for poeple to ocntrol their einvieonements, then education, specialist education coverall aspects of living and learning envioements for asisstive tech

Had many assessment centers in UK midlands, moved to medical legal claims, wide ranging individuals with complex needs.

One of the individuals sparked his BCI interest, people with castonpic injuries, susbstantial disability recommended eye tech for controlling their envionrment, one gentle man richatd, eye gaze tech do not work for him, so eye tracking doesn't work well, looked for better access, tried EMG switching, due to the injury it's inconsistent, then moved to BCI, NeuroSky, to play with drone, had encousing results but with Richard the issue is that bhe brings together all the challenges, the existing tech is not useful for him but BCI maybe useful, he can not hold his head up, uses a head restraint, so traditional BCI doesnät work, tried OpenBCI, but it's not tolerable.

Can't apply a standard BCI electrode setup to his head. So in-ear BCI tech was very interesting to hear about. For many people exisitng tech isnot accessible, looking if neew tech can have a meaniful impact on the lives of this community, if we can address Richards needs then it will also work for other people in the community.

The medical legal space is interesting in that the NHS includes speciality services, heäs had multiple assessments, but there's very little that can be done for him via

the NHS, just normal gaze tech, looking for new solutions, They are on the periphery, but Richard is indepdtly financed, so cost of the tecnologyis not an issue, most important thing is finding the right solution.

Richard represents a culmination of injuries.

Massive communication decifit, many have epilepsy, whhen he has a sisure, itäs not so apparent, the movement is not very defined, so weäre looking fo   evidence of the epidode, the 1000 yard stare, thereäs no one biomaker, but they're affectivlen Not There anymore, and there are many people with injuries from birth where it's not clear if they are attentive and ready to interact and learn. If we can determine a mild seizure it helps to improve the intereactoin. For example think of a light bulb, when itäs on they are ready to learn and interact, how can this be used throughout their lives to improve the interaction ability. We need to konw, is he there and ready to interact or not.

Can a baseline be established to know what an attendenat level of activity looks like, gives a cue to the teacher that they are ready to interact and to learn. Theses are very complex user groupls, in the past heäs seen unintended consequences, how can we get the technology in the hands of professionals to look at the data and see if its affective or not.

Never got to the point where they can put a BCI on a child and address all of the spin-off issues like stress levels, need somethingn that is miminallz invase, gahter data and see the affectiveness.

Where is Paul in the picture?

He wears many hats,

1. as a practioneer in the medical legal space. tech requriements, teaching space, capture a baseline from which progress can be made. If the product were readay he sould access the funding and get it in the classroom, and it would be come part of their legal settlement.

2. works with national charities, specifically for special education, in this case he would bring IDUN to that usergroup, brings to the community that would use the tech, from the end user perspective.

What if we have the new device, tech, etc.?

How would Paul proceeed?

From end user perspective, it's about stitiching togehter unique products for a solution, for example 7 dof robot that fixes on a wheel chair to provide arm and

hand funtion to person.

They sournce the tech from Canada, and install it on a wheeel chair, so all of this integration withthe control of the wheel chair, so there's a pieplin in place to integrate

About 50k to install the robot, so cost is not a huge issue

Rihana life works on tech integration with the people that need them

integrations of existing interfaces, not only for assistive stuff, but everything else

There is community in place to help bring tech into people's lives

supervisor tech and monitoring technology

From NodeRed, we could send data into the system from IDUN

We could ideally run through a distributer in UK, integrate with their Smart Box that brings assisstive tech to communities. They would use IDUN as an added periphrial, integraiton. - BrainFingers is an EMG system that picks up movement for example. But there's really just a couple of people who would benefit from this in the UK.

highly individualised could be a challenge for an open API/SDK

Can the environoment build solutions, like a window closing automatically, an enabling technology instead of ha

KNX for building technologies, Node Red, can we stitich together sensors and actuations together thorugh the cloud? Create a more immersive solution for each individual. These individuals will not necessariy interact with an artifact, so if you put an ipad there they won's use it, not part of their normal interaction in the world. Need to passivly captuer their motions and thiking to use it to as data to inform how the environment needs to change - like hightened levels of stress, how can it automatically change building phyis like light and temperature

Carter Network, national assisted technology,

Need full package for use in educatoin, Dashboard UI, etc. Gold-standard for Insight Software from Inclusive Technology, good example of the package needed for dployment. Gahters data processes it, and provides the insights to the teacher to inform the learning process. Hardare, analytics, and presetned data.

Children with special needs is global issue. Pro KNX - amart speaker that is edge based, like an alexa but without neededing the cloud. Can be better for reliability.

pilot project, how to asses if they would work: we're working lots of charities, number of organizations, R&D funding development

he asked us about if we're working with universities, knows a lot of people in research sleep space, there is no end product that he could take to richard, number of issues need to be resolved:

- not only the technology but also the dashboard to teach professionals

- the training about the product

his view on privacy and storing the data on the cloud: GDPR as a means to not do things do store on the cloud, language activity model: usage of words of the individuals, also stored on the cloud, get as much data as possible and then keep, rich data is a new goal especially in the early days of a novel user group

really diffucult to measure progress for people like richard, very very powerful if we could, how do i know if this works? opinions are anecdotal

Baseline is importnat, but also progress longituinally is ipmorant to map and identify the progess the pople are making, evidence base is very poor, how do weknow this works? It's very anecdotal. Catch - center for assessitie technology na dhelath care, so communities of reasehcer sexist to investigate hese technologies.

Envionrmental control and assisted learning technologies.

asked us where we are in the process of product development: proofing ourselves or in production

are we able to monitor state of consciousness currently with our device

Do we know Cognixion, they are looked at the occipical lobe to see what people are focuing on based on stimuli, but is that good enough to establish if a person is focusing or not and ready to learn? Whatis the correleation?

they were working a woman and it eas verz difficult till they realized that she like horses, and theat stimuli changed everything. Goes in the emotional response direction.

Inital assessment process, well travled route for is the person in pain, what will dsitract them? but its observational, what have you seen that indicates that something has changed, very subjective, can we provide more actionable data

This community has no voice

learning component to the system (ml), an individualized system through the cloud

a closer look at cognixion and why exactly they use AR?

paul working with people that have no way to even communicate with her, big initial research aspect before actually creating applications – again focus of the web app and what we offer there, API only secondary important there

ux of end-user such as Richard: observational, not insights from the brain and is currently very subjective

this community is under-served and Paul really cares about it, locked into situation (living hell) let them out, drill deep – this community has no voice, something as simple as changing the TV switch

small things can have way more impact than we might think: quantity of the software possibilities and the API

Special education is in the 1000's, Pauls area is in the do

insight is a web based application: shows how such a technology might look like (do they have an API?)

Autism also possible? Capturing emotional state ramp up?

non-verbal communication in autism e.g., complex emotional reaction, see if something is wrong without an external information, emotional state is way more important

his currency is knowing what happens in the industry, he is the middlemen for selling these devices to richards – interested in seeing this