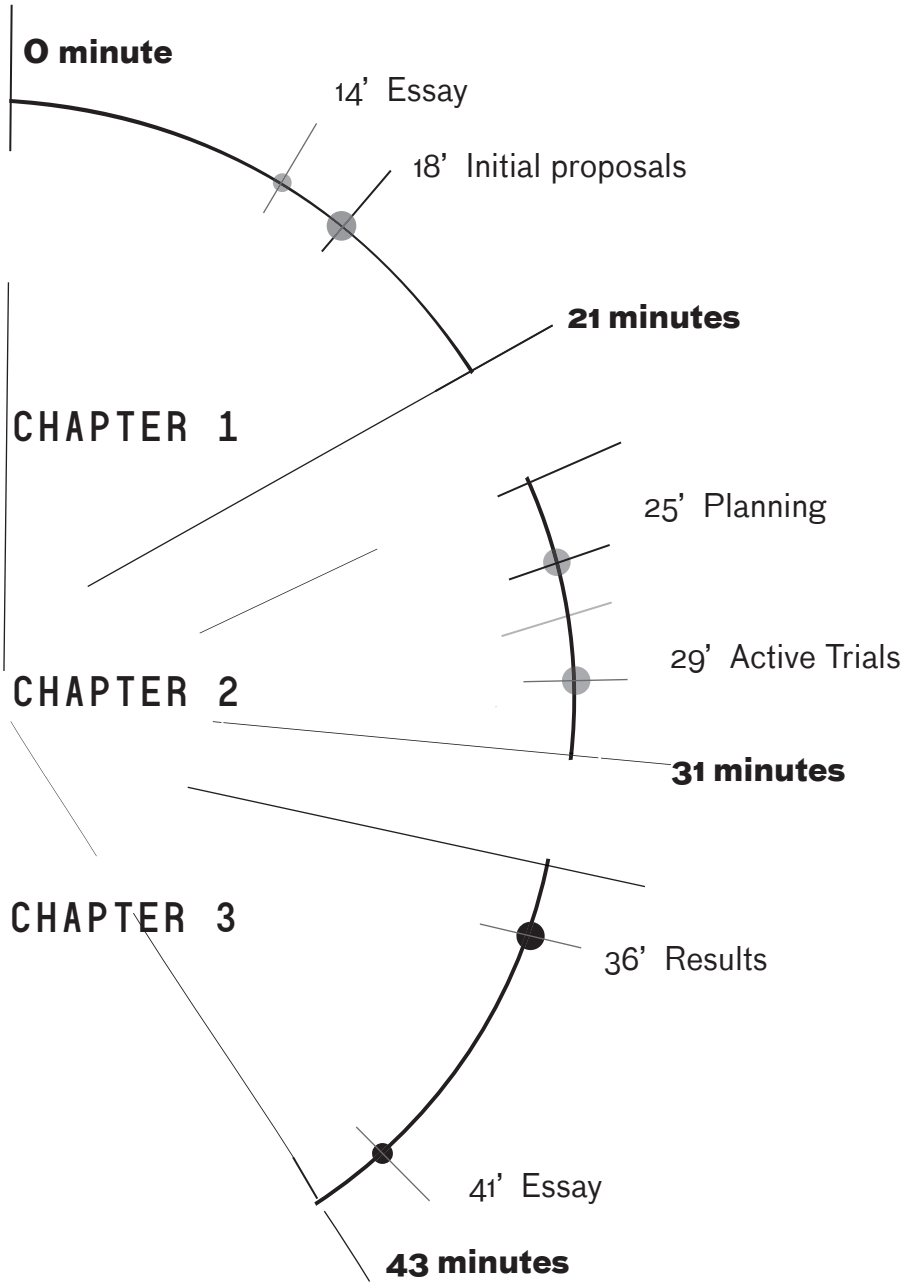
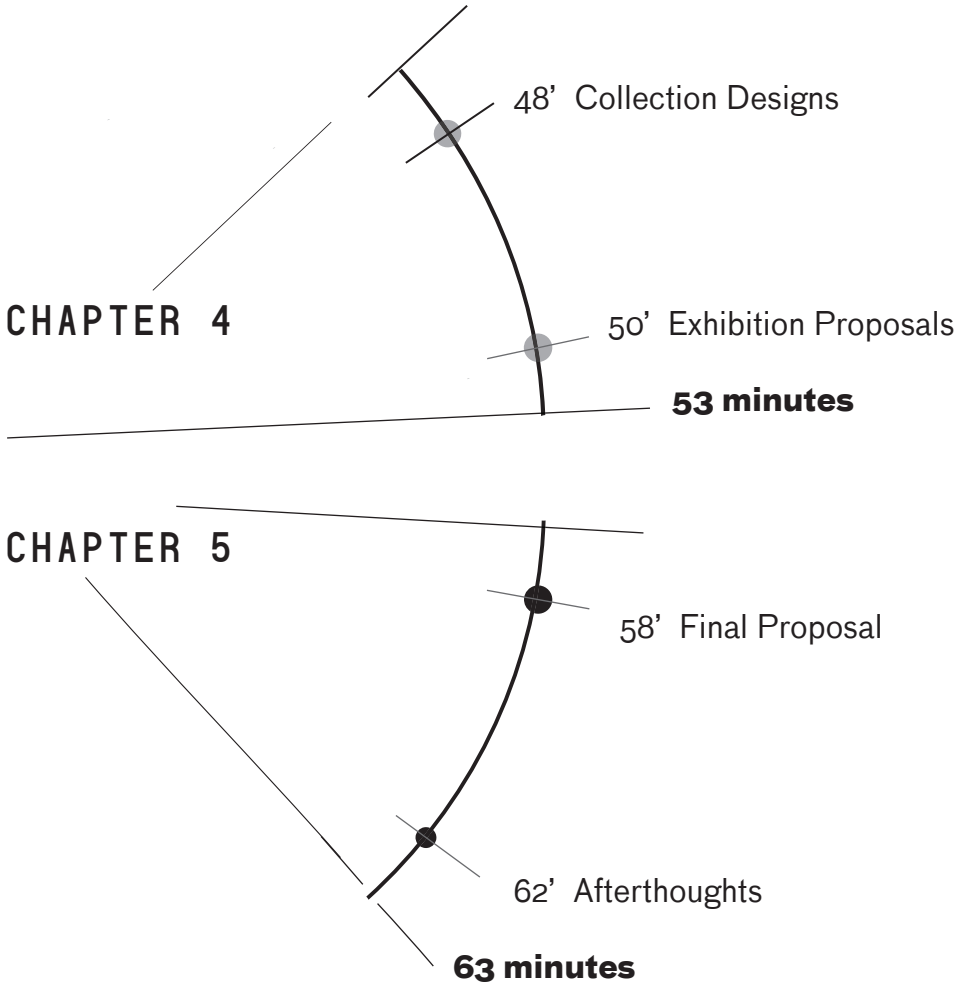
Rhythmanalysis

CONTENTS IN MINUTES




48’ Collection Designs
CHAPTER 4
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63 minutes

Foreword
Roger McKinley

Research for each of us means different things. For FACT it's really about impact and setting the framework to create real and long lasting change. To create a place where, in the words of Information Architect Peter Morville "What we find changes who we become". The *Rhythmanalysis* project was a research project with the ambitious aim of discovering whether or not we actually have, or can have, a discernable rhythm in our daily lives and if, within it, there is a consistency to the point that psychologists call *flow* - a place of well being, immersion and creativity that is an optimal condition for making the best work we can. Furthermore if we were to discern a rhythm to this *flow*, this sweet spot of the mind/body experience of work, can we create something that will help us manage, share and utilise this peculiar condition to enable a greater pleasure *and* efficiency in work?

The question remains intact and unresolved - the project was too constrained by time to reach any definitive conclusions. What we did discover however was that the right technology now exists to make large scale sampling of the *right* kind of data possible. We also hopefully have put together a possible observational technique or process, a first iteration methodology that may be helpful in informing a larger and longer term body of research in the field.

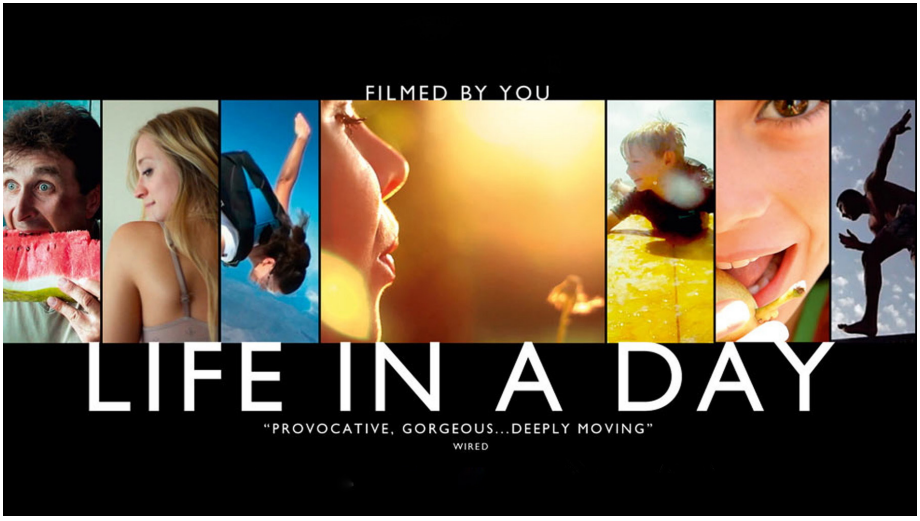
This publication is a conclusion to the research project in which we have attempted to gather together some of our experiences, views, iterations and analysis. In this sense it is more a notebook or scrapbook of the project as it unfolded rather than a robust methodology. Within the team was a designer, an artist, a number of key academics from architecture and psychology and an expert in physiological data analysis all of whom contributed immensely to the project. I say this to give an indication of the transdisciplinary nature of our approach. We didn't want to simply create a set of data to draw conclusions from - we wanted to make the data, and the process of capturing and presenting it, innovative and creative.

By way of a description of the methodology we looked at in the development of the project, we started from one described by Daniel Kahneman in his international bestseller *Thinking, Fast and Slow* to determine the level of "experienced well being" as "experience sampling".[1] The **experience sampling method** was originally a research methodology developed by psychologists Larson and Csikszentmihaly where they ask participants to stop at certain times and make notes of their experience in real time. Given the nature of the work we were looking at (hairdressing and games testing) this was not practical so we looked at Kahneman's work with fellow Israel psychologist Amos Tversky (who together pioneered most of the work on heuristics in human decision-making) who took this research and created a second sampling method called the Day Reconstruction Method (DRM) that would create a space where the participants could revisit their previous day, breaking down their experiences into episodes, like scenes in a film, and using the experience sampling method to reconstruct their subjective experiences. The technology provided by CamNTech enabled us to combine the two sampling methods, DRM and Experience Sampling, efficiently by asking a series of simple subjective and objective questions (listed in the appendix) through the PRO-Diary wristwatch whilst the participants were engaged in their daily activities and a simple diary of their activities that they could fill it at their leisure at the end of the day.

But it was not enough for us to simply report on the findings, the project was passing through too many other "registers" or lens in the team to be having a single unifying conclusion, including the lens of designers and artists. We've tried to reflect this in the approach we have taken to the design of this publication too, so rather than the standard pagination we have estimated how long we think it will take to read and absorb the content. Of course this will vary depending on how interested you are in the subject area, the context in which you are reading, the speed in which you can absorb content, your age, how distracted you become whilst reading it and so on. In our calculations if you are a modular person we estimate that you will take 63 minutes in total to consume this publication.

Jill Bennett in her recent book *Practical Aesthetics* talked about the experience of the art object or event and described how:[2]

> "The methods we deploy in the analysis of interdisciplinary objects and ideas



Life in a Day, 2011
Courtesy of Scott Free Productions

> must track the way in which these are transformed as they pass through different registers. The object in this sense is not merely the subject of layered interpretations but is, in essence, the infolding and unfolding of ideas and perceptions."

In other words the way in which an art object is perceived changes not only over time but in the context of where and how it is received and through what medium. These are some of the "registers" she describes.

Though Bennett was describing the experience of the art object, the same discourse can be applied to publications and bodies in action at work and in life. The quality of the experience of moments in time is not sequential or linear like film, but arcing and cross-referentially always jumping between the "ideas and perceptions" of the individual. This of course makes analysis of the quality of experience very difficult, and all we can hope to demonstrate with the evidence that we have gathered is an inference of positive, neutral or negative experience based on the information the processes produced and the rhythms that we can define. We didn't really find a flow moment either within or across the two groups, perhaps because it's a tiny sample, on only one day.

Still, as Ridley Scott indicated in his 2011 film *Life in a Day* - collated from 80,000 clips posted to You Tube through an open call for collaboration on the project and recorded in the exact same 24 hour period - a lot can happen in one day. With the strapline "Filmed by You" (which of course it really isn't as the craft of an accomplished filmmaker has steered the film into a coherent and compelling narrative) this self-reflectivity, the personalisation of the everyday into a coherent story of the human condition with the aim of helping us to see ourselves in the bigger picture is compelling. Now, even beyond the grave our social presence can now be felt through LivesOn, (subtitled 'Your Social Afterlife') - a project that is designed to analyse a person's Twitter account, for future tweeting after one has passed away, whose strapline is "Once your heart stops beating, you'll keep tweeting".[3]

In my view it is not possible to conclude to any real sense of "self" in the above examples. You will not be "you" in these scenarios. In Ridley's you are "you" only in relationship to the grand narrative crafted by the filmmaker, in LivesOn you will be an algorithmic version of yourself, limited to the possible combinations of annotated

and analysed actions you do. This act of deep self-reflection, this need to capture, monitor and measure the self in the everyday can be seen in the burgeoning Quantified Self Movement, a group of individuals whose mission is to share their intimate data on a regular basis, and a group who illustrate an approach that this project embraces.

Ultimately the life you live and the way you manage the complex relationships you have to work, rest and play is deeply elusive and it's probably impossible to prescribe a way to improve decision-making which fits even a minority of people. Most of us **get by** and we do so on a personal heuristic model of behaviour, finding satisfactory solutions that don't use too much mental effort. Not because we are predisposed to laziness, though there is some evidence to support this hypothesis, but because we are already mentally and physically consumed with enough to do that we need to make judgement calls efficiently, even if they are not always right or balanced. Rules of thumb, educated guessing, intuitive judgements, stereotyping, and common sense are part of our everyday lexicon of our decision-making tools, and they need to be.

The most we can offer in this project is some indication of the experiences of a small sample set of two groups of working lives that are close to the experience of some others, learn from the mistakes we made and use this small edition as a utility from which to grow something bigger. The transdisciplinary research team that we gathered together points to a new model and approach to investigation that we believe the CX Programme as a whole embraces - that the next level of endeavour in the understanding of what makes us tick, in work, play and our everyday is so much greater than the sum of its parts.

...and Thank You ...

I would like to extend my sincerest gratitude to Professor Richard Koeck from Centre for Architecture and the Visual Arts at the University of Liverpool who, with myself developed the original proposal and came up with the all important name which brought to all of us the work of Lefebvre. He kindly provides some astute reflections and further reading for anyone interested in this area in his article included here. Alastair Eilbeck from digital marketing and technology consultants Amaze provided

an astute and lateral design aesthetic in problem solving how we might visualise research. We are indebted to Veronica Ranner from the Royal College of Art for developing some terrific design proposals, (a number of which illustrate this publication) towards making manifest the work in a fun and engaging way. Veronica and Richard also provided a detailed and extensive bibliography and lengthy dissertation on the work in this field that for space reasons it was impossible to include here. This will be made available separately through the CX website. Veronica's work on the design iterations was particularly valuable in translating the project into a visual language that the participating partners Sony Computer Entertainment and Minsky's Hairdressers could engage with. We are immensely grateful to both these external companies who went above and beyond expectations in the time and patience they displayed on helping this project to come together, and I want to specifically thank Daniel Giles and Kristie Parnell from Sony Computer Entertainment and Peter Edwards Director of Minsky's Hairdressers - and by default to all of their participating staff - for their professionalism, openness and valuable time. I wish to extend thanks to CamNtech who generously provided the equipment for free with which we monitor the participants activity.

We are also grateful to Kiel Gilleade and Professor Stephen Fairclough from Liverpool John Moores University's School of Natural Sciences and Psychology for their continued support for the project both as consultants and in helping to navigate the data analysis - and of course for their respective contributions to this publication. Thanks go to Bronac Ferran and Jeremy Myerson from the Royal College of Art for their enduring support for the project and for giving us the opportunity to do it in the first place. Finally many, many thanks to Clara Casian for stretching time and space to collate and distill all the activity into this record. Clara also played the crucial role of managing the participation of the volunteer staff - something she is now getting a deserved reputation for doing incredibly well!

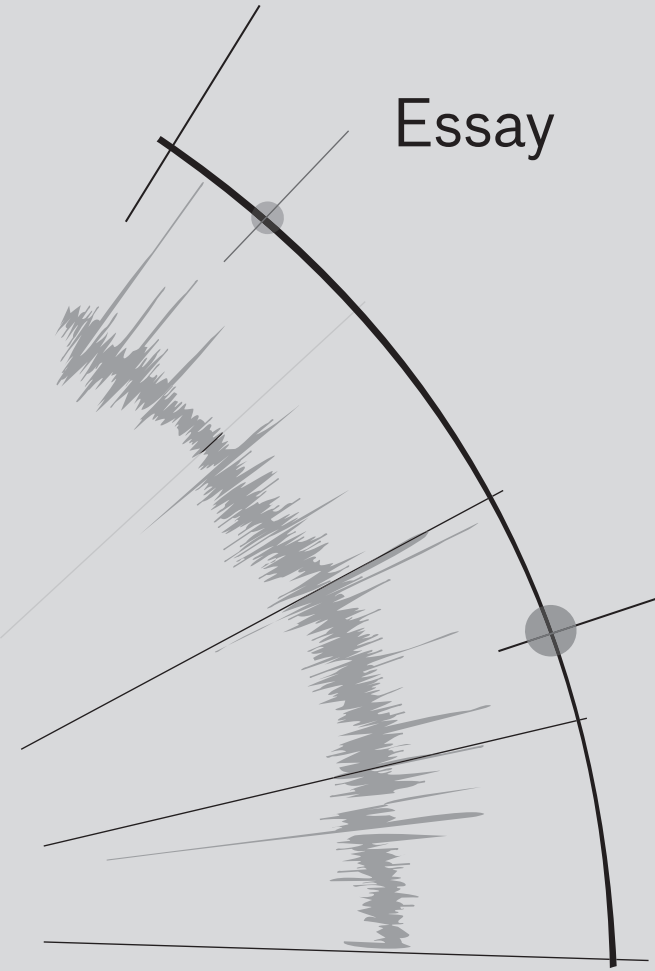
Roger McKinley is the Research and Innovation Manager at FACT, Foundation for Art and Creative Technology, Liverpool and Lead Partner on the Rhythmanalysis project.

1 D. Kahneman, *Thinking Fast and Slow* (Farrar, Straus and Giroux , 2012).
2 J. Bennett, *Practical Aesthetics: Events, Affects and Art after 9/11* (I.B.Tauris & Co Ltd, 2012)
3 www.liveson.org/connect.php


10’

Chapter 1

21’


Essay
Initial proposals

Design Iteration for final exhibition © Veronica Ranner

Where is our Time and Place at Work?

Richard Koeck

It is worth remembering that the sudden increase in urban population and the resulting growth of cities in the late 19th century were the results of people trying to find a place for work. Migration from the countryside to the town started a process that goes well beyond the creation of space. Cities were, at that time, as much industrial landscapes as they were places to live in, shaped by the scientific management of labour, necessities-related mass production of goods, and the rationalised organisation of everyday life.

Architects and planners saw the urban centres of cities, such as Paris, London and Berlin, as dynamic bodies with distinctive parts; zoned environments that provided the spatial context to work, recreation, and dwelling. Le Corbusier's *The City of Tomorrow* (1929) refers to the city as an "organ" that is compact, rapid, lively and concentrated.[1] Lewis Mumford,[2] and later Sigfried Giedion,[3] highlight that cities provide the spatial setting for social functions that have grown organically over time. In *Space Time Architecture* (1941) Giedion sees the city as the expression of the diversity of social relationships that have become fused into a single "organism".

Such language highlights the idea that we live inside an urban "body" that is filled with a series of functional parts, and which follow some sort of actions over a period of time. The project *Rhythmanalysis* aims to examine the dual role of the body within this urban body; probing our physiological reactions to, and within, individualised and vastly diverse temporal work-life patterns of everyday life. This raises the question where is our time and place at work? Do we know when we work, where we work, and how our body reacts to our environment and activity?

With regard to full-time, employed workers in the UK, the Office of National Statistics provides an interesting perspective. Almost no other nation in Europe has such long working hours for full-time employed workers as the UK. The statistics

also claim that the majority of people are either *satisfied or very satisfied* with their working hours. So far so good, one might say, but do these statistics reflect the actual level of satisfaction experienced at work and beyond office hours? How could this be measured? And where lie the boundaries (in space and time) between work, recreation, and rest in our digital and connected urban existence?

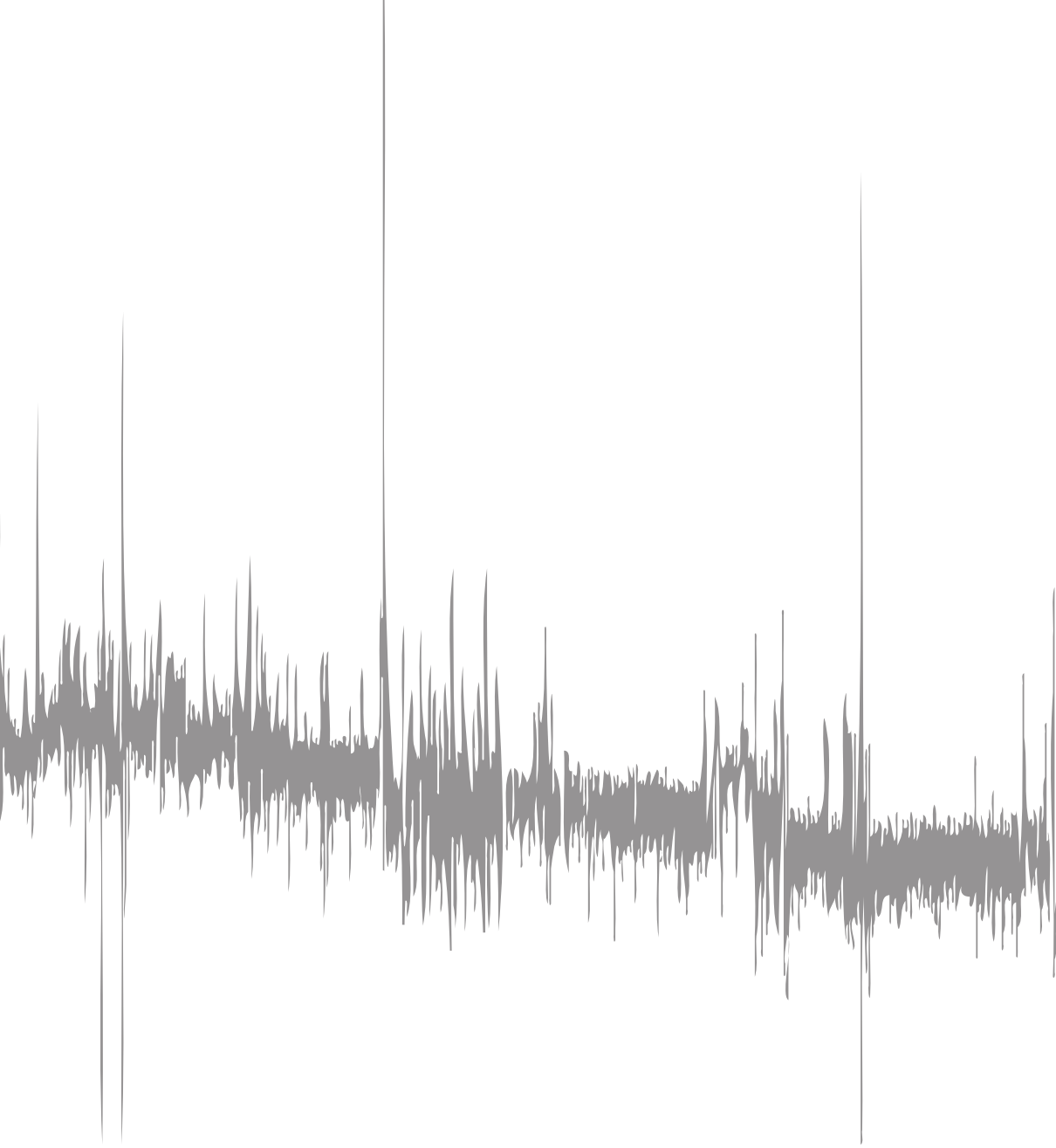
Jonathan Gershuny's 2011 study, *Time-Use Surveys and the Measurement of National Well-Being*, offers a more nuanced insight into our work-life balance. He highlights, for instance, that the shifting time balance away from work towards leisure, which started in the mid-19th century, seems to have halted or even to have been reversed. Furthermore, he concludes that our well-being is promoted, amongst other things, by the way we make use of our time.

> "Time is experienced and recalled as durations, or elapsed time, spent in various activities and with various sorts of feelings." [4]

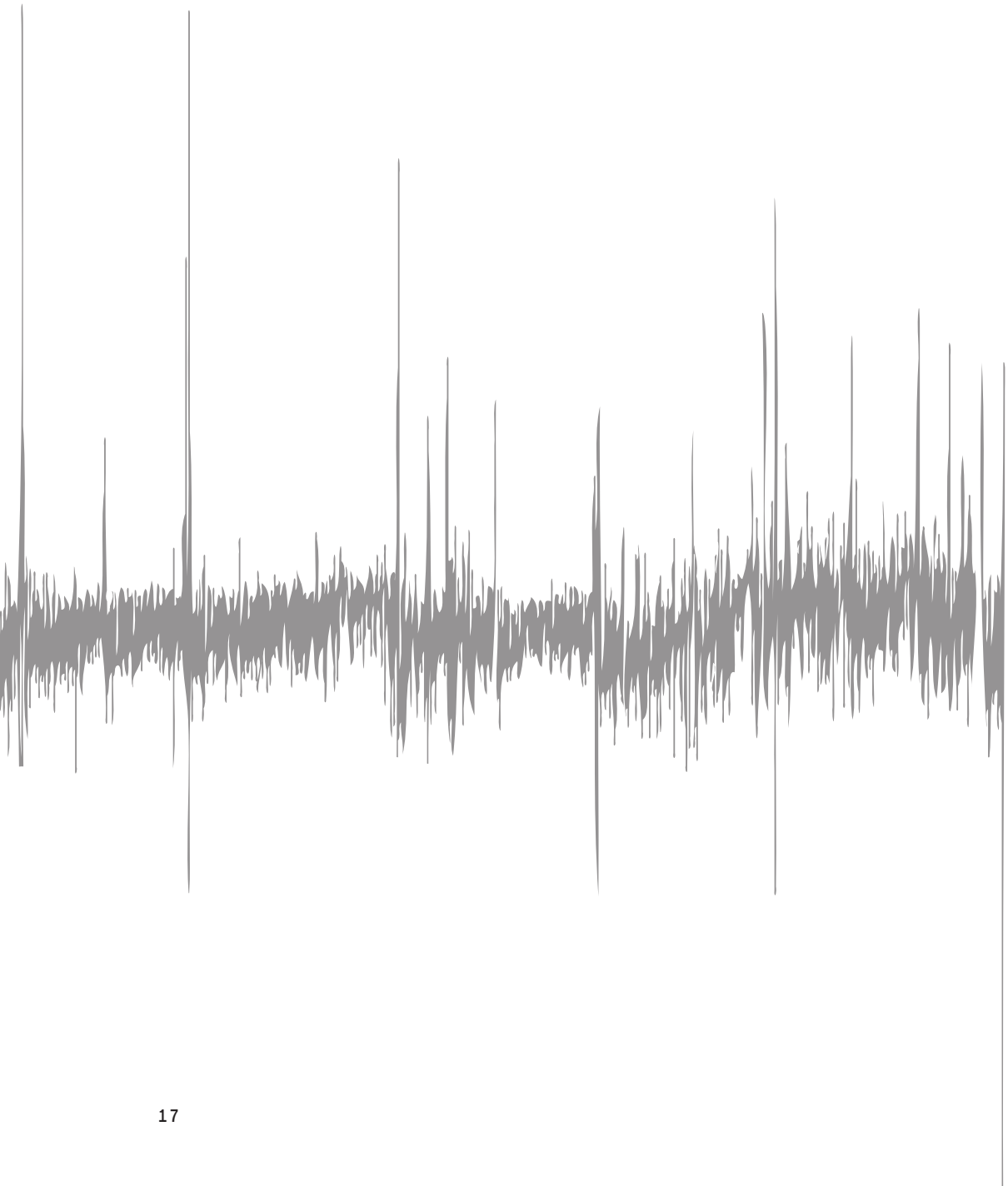
Rhythmanalysis took this information as point of departure to engage with diverse groups of workers that are representative of the city's local economy, including hairdressers from the local shop *Minsky's* and computer game testers from *Sony Computer Entertainment*. By monitoring their activities, and emotional and physiological responses over 24hr periods, *Rhythmanalysis* provides a non-representational yet intriguing comparison between these groups of workers, and challenges our expectation of the boundaries between work, recreation and sleep, as well as perceived levels of well-being.

Richard Koeck is the Professor and Chair in the School of Architecture, Director of the 'Centre of Architecture and the Visual Arts' (CAVA), and Lead Partner on the Rhythmanalysis project.

1 Le Corbusier, *The City of Tomorrow and Its Planning,* originally published as Urbanism in 1924 (London: The Architectural Press, 1987).
2 Lewis Mumford, *What is a City?* in 'Architectural Record', 1937
3 S. Giedion, Space, *Time and Architecture: The Growth of a New Tradition* (Cambridge MA: Harvard University Press, 1941)
4 J. Gershuny, *Time-Use Surveys and the Measurement of National Well-Being* UK Office of National Statistics (Oxford, 2011), p. 3-4



Example of heart rate reading at 23:00 hour



18' - 21' Initial Proposals
Collection of think-pieces

"There is a time for fishing and there is a time for drying the net"
-Chinese proverb-

The main objective of the project was to allow a dialogue across different organisations and research ways of enhancing awareness of one's work-life balance through self-monitoring and visualisation of body data.

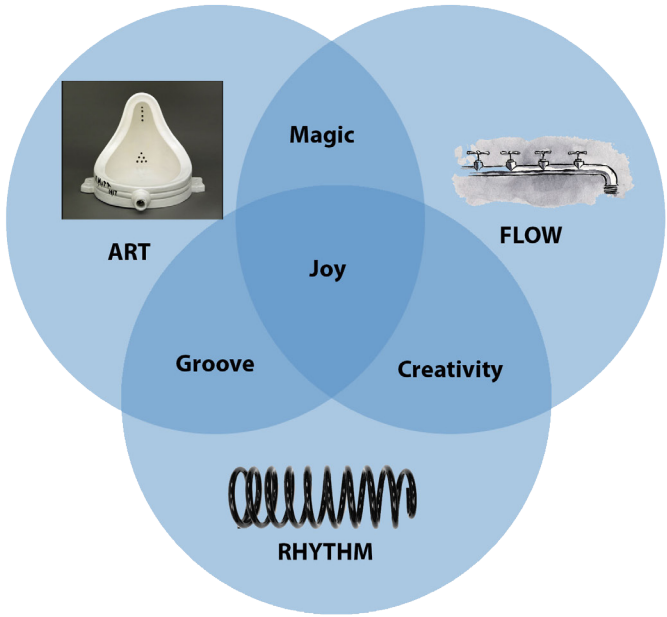
> *"Development of a tool that sits across multiple platforms (social media, digital workspaces, mobile devices) that monitors work-life balance and creates personalised rhythms that could be shareable across similar fields."*

> *"The pursuit of Happy Work: Can we create a Tool that can Increase, Augment and Enhance a Positive Work-Life Balance?"*

Real-time data, a look back at research methodologies of measuring performance in scientific and experimental ways and systems of measuring productivity were the main referential points when discussing the direction for research design.

> *"- The 19th/20th century notion of measuring performance through time lost perhaps it is justification in current times (Clock cards; Taylorism)*
> *- Time is still the absolute measure of performance; although we argued it is not, we acknowledged a perceived benefit from the "clock card" system, as people might feel a clearer distinction between working and leisure).*
> *- How to measure productivity instead?"*

We looked at the best ways for measuring productivity such as real-time monitoring systems that do not delay the response time in between feedback and performance outside standard models of work engagement.



Design diagram for the *Rhythmanalysis* Tool

"reporting on a regular basis into a spreadsheet represents an inefficient model because of the "lag" between work done and reporting. Data input three months retrospectively, which prompts the problem of no real feedback on performance. The fear of being labelled "inefficient" causes people to fake their own work sheets. This then results in quiet acceptance of unbalanced work-leisure time)"

We discussed and researched technologies and creative methods that display the monitoring data in ways accessible to a non-expert audience. The designed tool should support real-time data integrated as a quality of the system itself,

"visual, responsive, fluidly aggregating interface? Fully individual calibration?"

and aim for a system that reveals efficient flow patterns within the individual.

" - it should induce and support the experience of "flow" (iterations and variations of a measurably well-known, but slightly demanding activity - a balance of challenge and skill)
- a system which reports to people that they have been "in the zone"/in a state of "flow"
- capable of measuring whether or not you are in the "zone"/ "flow"
- how is the tool controlled? passively through "biosensing" through an autopilot system? actively by its user?"

Performance would be measured internally or externally across various working environments.

"data dashboard which monitors external performance indicators and social media activity - there might be scope to use the platform for a system that looks at "me"."

"spatial dimension of measuring performance: different people can get into the "zone" at different places (e.g. library or cafe). This strongly refers to the Activity Theory - Contextual Research of Human Computer - Interaction"

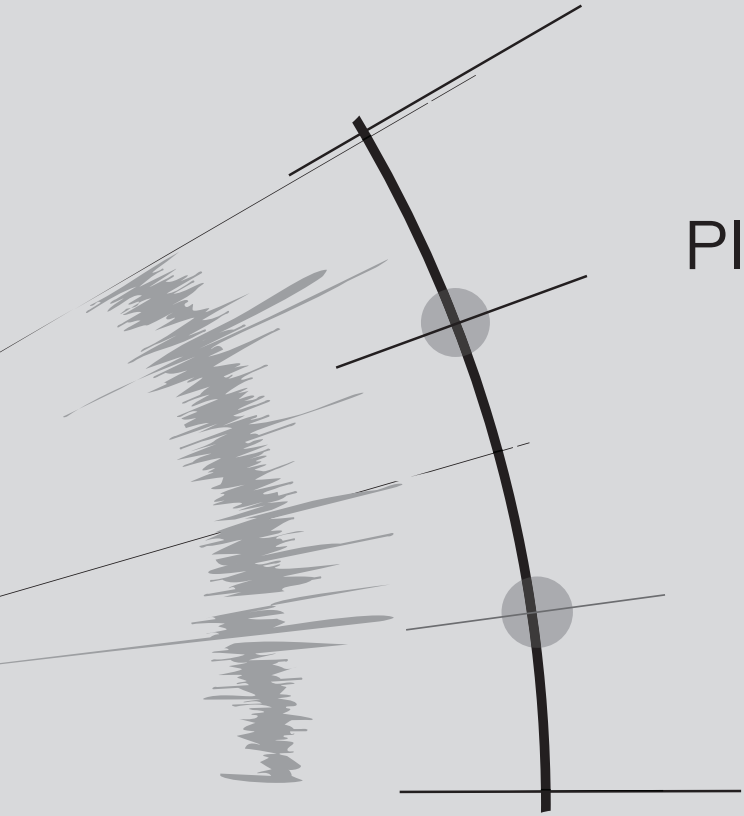
"contextual relationship - dependent spaces: anonymous spaces such as libraries and cafes versus office where everyone knows you"

Design ideas for the *Rhythmanalysis* tool that displays and monitors body data


22’

Chapter 2

31’



Planning

Active Trials

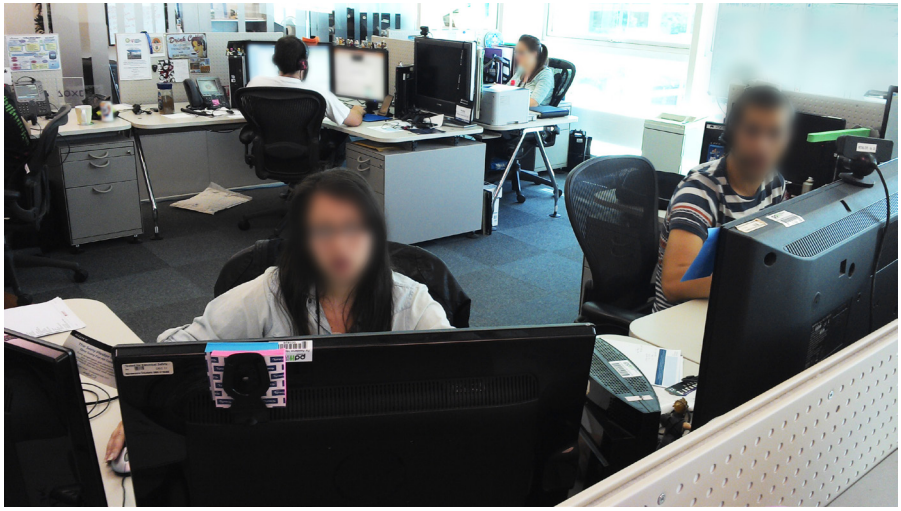
25’-28’ Planning

Workers

A group of five individuals from three different working environments were invited to participate in a five day trial to be carried out synchronously across the three sites. The designated sites are key Liverpool employers and represent three different contemporary working environments across three key industries: factory based, craft based and digital industries.

Within the factory based work environment, Tangerine Factory Shop on Edge Lane had initially agreed to participate in the trials but had to retract from the experiment to avoid any risk. The experiments would require participants to wear sensors in direct contact with the skin and this would not be possible as the factory workers are required to wear protective clothing to ensure food safety so would not be able to use the data entry system. On top of this, factory floor and food hygiene regulations meant that any extraneous articles had to be removed - including our equipment. This was highly unfortunate as their involvement would have been invaluable to the research of the project - high productivity expectance, a sense of rhythm developed through mechanical body motion, the impact on work satisfaction of mechanisation were all key elements to these workers’ experience.

A significant employer in the city and within the digital industry, Sony Computer Entertainment in Wavertree Technology Park, agreed to take part in the trials, to represent the digital industry sector. Their involvement helped draw understanding on a particular and very contemporary kind of workforce in a secretive, high pressure and very competitive environment.



Sony Computer Entertainment, Wavertree - Working Environment

To represent craft based workers, Minsky's Hairdressing Salon on Bold Street are a family-run company in an industry that is probably one of the world's oldest. Since records began 6 years ago hairdressers (and beauticians) have consistently topped or been near the top of the City and Guilds "Career Happiness Index" (only narrowly missing the top spot last year by florists). Staff satisfaction is high and rising - for example 80% would recommend the job to a friend.

Technology

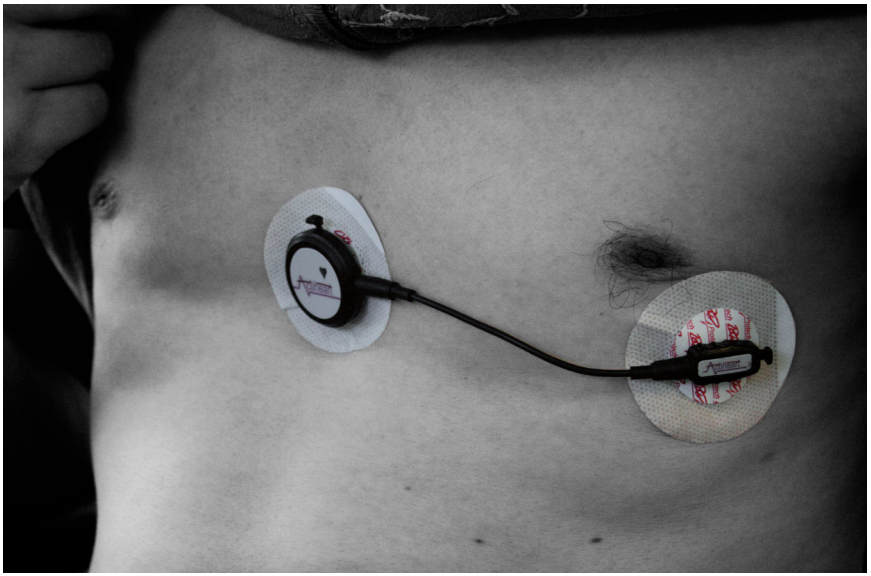
The *Rhythmanalysis* trials used a combination of wearable technology from Cambridge-based biotechnology company CamNtech to measure heart rate and motion and to deliver scheduled questions that gather information on the individuals qualitative experience of both life and work and their relationship to both.

PRO-Diary

The PRO-Diary is a compact wrist-worn electronic diary with integrated activity monitor designed to collect subjective data and objective data simultaneously. The PRO-Diary was initially designed as a sleep diagnostic tool, so was ideal for monitoring the 24 hour cycle of the workers. The device prompts wearers with questions over a scheduled period.

Actiheart

The Actiheart is a compact, chest-worn monitoring device that records heart rate, Inter-Beat-Interval (IBI), and physical activity in one combined, light-weight waterproof unit. It is designed for capturing HRV data and for calculating and measuring Activity Energy Expenditure.



CamNtech Actiheart monitor prior to testing

29’ - 31’ Active Trials

The trials were intended as an iterative, user-designed experiment to be both of interest to the employers as well as valuable to the project research interests.

The sensors used in the trials were unobtrusive and involved a slight, non-invasive element of interaction. There was no functionality for recording anything other than heart rate and motion to protect both the privacy of the participants and the sometime sensitive nature of their jobs. No information about the participants or the specifics of their work was gathered and an NDA was put in place to protect all sensitive commercial and employment issues.

The testing procedure used two biosensing devices: Actiheart and PRO-Diary which were required to be worn by the participant for the duration of 24 hours.

The PRO-Diary prompted subjective and provocative type questions at scheduled times. Questions were designed using the PRO-Diary software and then loaded via USB. Some examples of the prompted questions include provocations such as:

1. I wish I have more time with my friends.
2. My work has purpose.
3. I wish to have the courage to live a life true to myself, not the life others expect of me.

And qualitative work/life questions based on the highly regarded NASA TLX (Task Load Index) Workload Questionnaire:

1. I am under a lot of time pressure at the moment.
2. I am achieving my goals today.
3. I am being mentally challenged.

The testing procedure also required the participant fill in a paper diary with all written physical activities performed throughout the day and a paper questionnaire assessing work-life balance and daily rhythm. The paper diary, the questionnaires along with the biosensing devices helped gather valuable information on the physical and emotional performance of the participants.

The testing methodology and the qualitative experience questions were devised with the assistance of Liverpool John Moores University, School of Natural Sciences and Psychology.

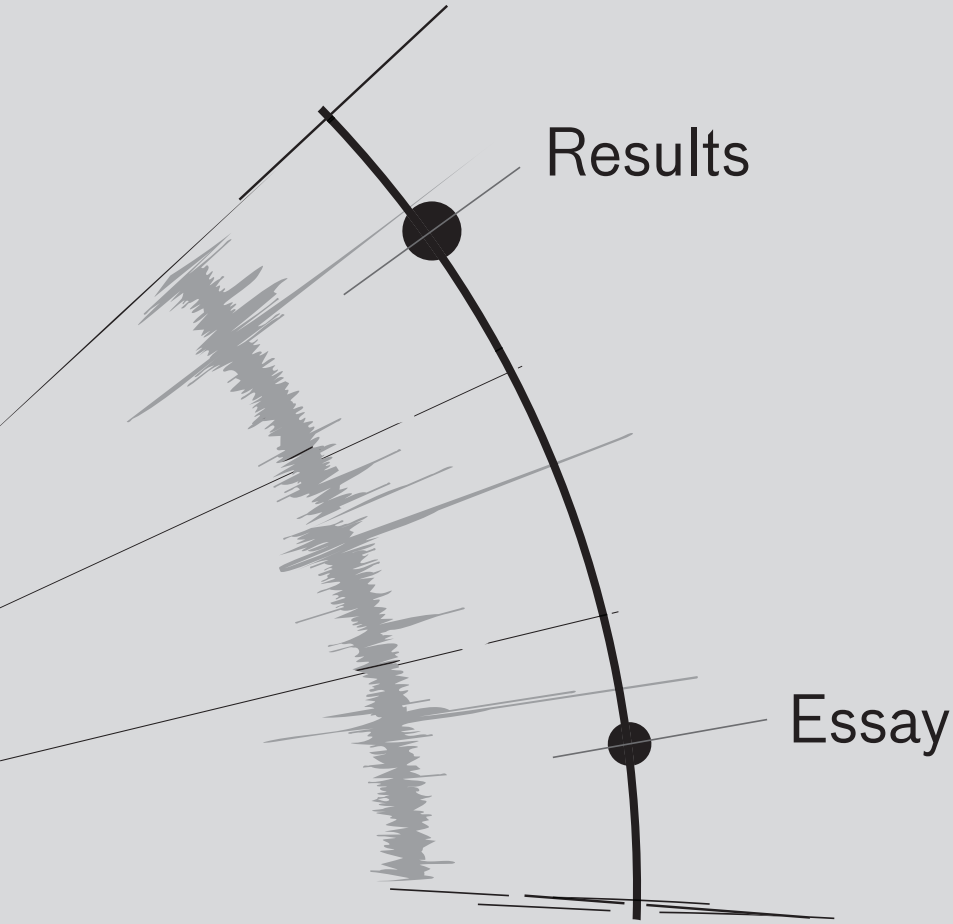
CamNtech PRO-Diary Watch worn by trial participant during testing

CamNtech Actiheart monitor worn by trial participant during testing


32’

Chapter 3

43’


Results
Essay

Start – Stop Time	Activity Performed
11.AM -11.30	SETTING UP OF HEART MONITOR
11.45	SHAMPOO CLIENT TAKE OFF COLOUR
12-1 ~~2.30~~	PAPERWORK
1 – 3.30	APPLY COLOUR (FOILS) DEVELOP AND CUT + BLO DRY
3.30 - 4.00	OFFICE WORK
4.00 - 5.30	HAIRDRESSING
5.30 - 6.15	WALKING TO CAR THEN 45 MINUTE DRIVE
6.15 -7.10	CUP OF TEA AND CHILLOUT
7.10 - 8.25	CYCLING
8.25 -9.25	DINNER + CUP OF TEA
9.25 - 9.55	DRIVE HOME
10.00	G+T WATCH NEWS

Paper Diary - used by the participant to catalogue activities during the testing

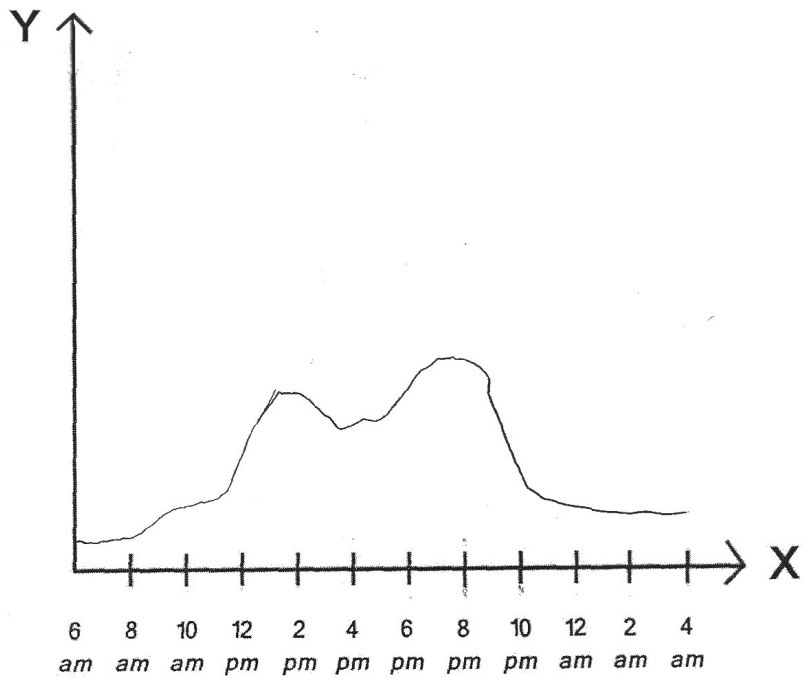
36’- 40’ Results

By asking what is the best way of monitoring the daily cycle effectively, the gathered data proved instrumental in testing, prototyping and researching tools that would improve self-awareness on work-life balance.

The results produced a comparable set of data, representative of two distinct working environments in Liverpool - Sony Computer Entertainment game testers and Minsky’s hairdressers. The PRO-Diary and Actiheart collected heart rate, activity levels and emotive levels. The paper based questionnaires offered subjective interpretations of one’s understanding of work-life balance and daily rhythm. The user-feedback questionnaire presented insight on the impact of self-monitoring and its implications on daily performance. The paper diary catalogued all physical tasks (conditions of the work or leisure environment) carried out throughout the day of the testing.

All types of data were visualised to provide a framework to help the team extract and compare material as needed. The subjective type questions prompted every hour (through the PRO-Diary watch) were used to establish a baseline on flows in daily work lives, to then be contrasted against heart rate, activity levels, diary notes. On the other hand, open format systems such as the paper diary and work-life balance questionnaires were used for retrospective comparison analysis with the real-time monitoring data.

By searching for commonalities and “oddities”, the team then used all the participants sets of data to create a platform for interpretation that will feed into the design iterations for the final visualisation/optimisation tool. All data



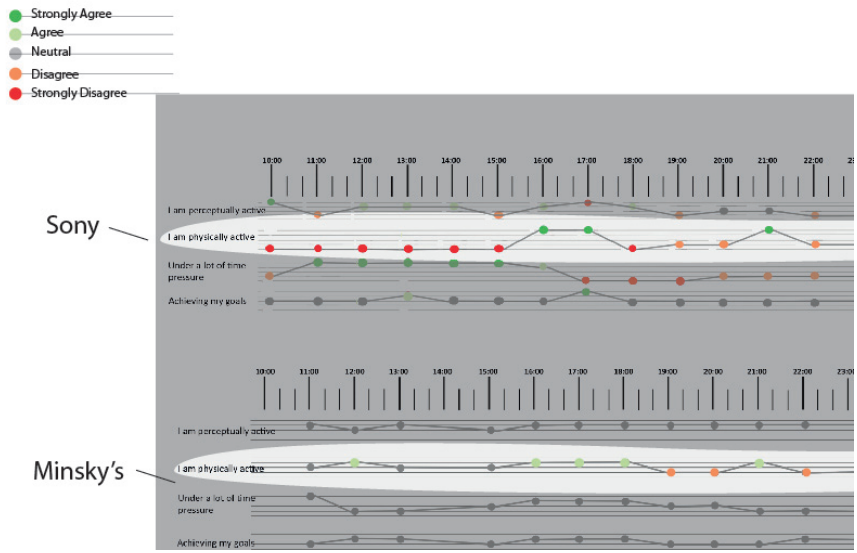
Daily Rhythm graph produced by participants based on what they think their rhythm is

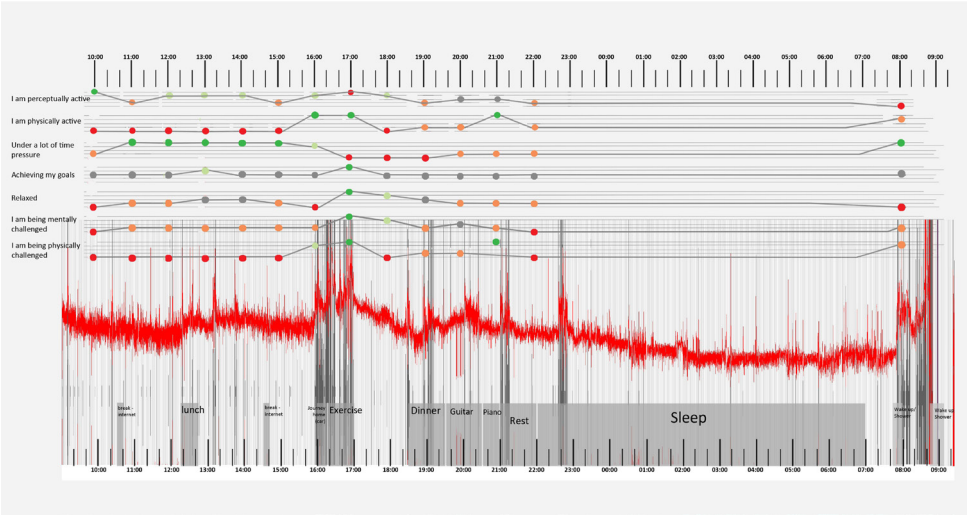
was laid out in accessible and creative ways through visual notation systems that would give a clear reading of the collected information, pick up any unusual case scenarios and understand the rhythm of the workers in relation to their work places.

Using these visual systems, the *Rhythmanalysis* team was able to get a chronology of events of multiple participants, map highs and lows, identify routines, zones and look at any significant readings that help interpret the rhythm of a worker. The resulting data started giving clues on individual biorhythms in the context of two very distinct work environments.

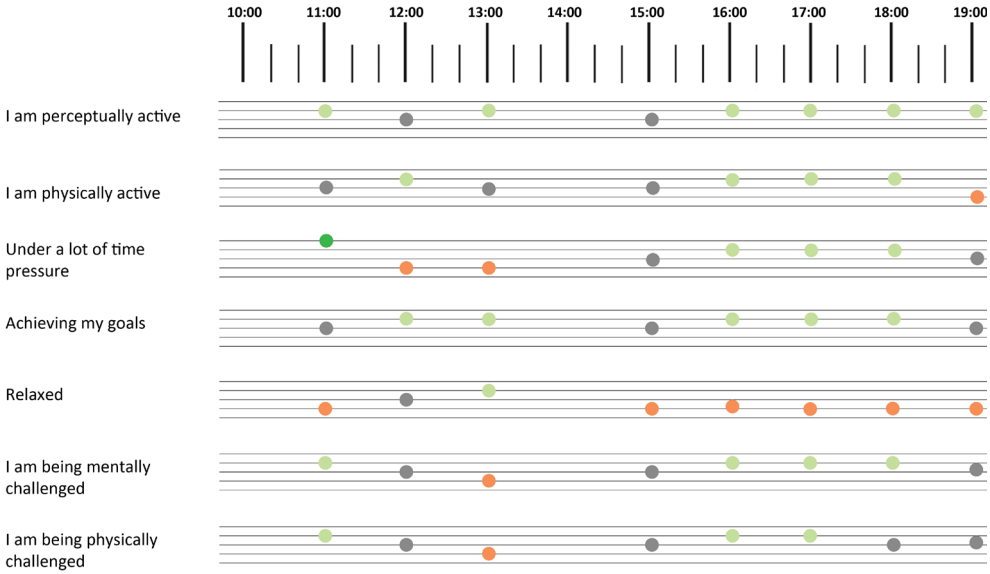
Case scenario Static Vs Active

Physical Activity comparison in between Sony and Minsky's working spaces:





Example of design mock-up using collated data from different sources



Example of design mock-up of PRO-Diary question prompt answers

Essay 41’- 43’

Kiel Gilleade

Signals from the brain and body provide a wealth of information about our physical and mental states. With advances in wearable sensor technologies these signals are increasingly becoming cheaper and easier to capture outside a laboratory. These signals can be used for a variety of purposes including the tracking of a patient’s medical condition or an athlete’s physical performance during a sporting event. They can also be used to drive computers systems, creating, for example video games which manipulate the level of difficulty according to the player’s level of engagement.

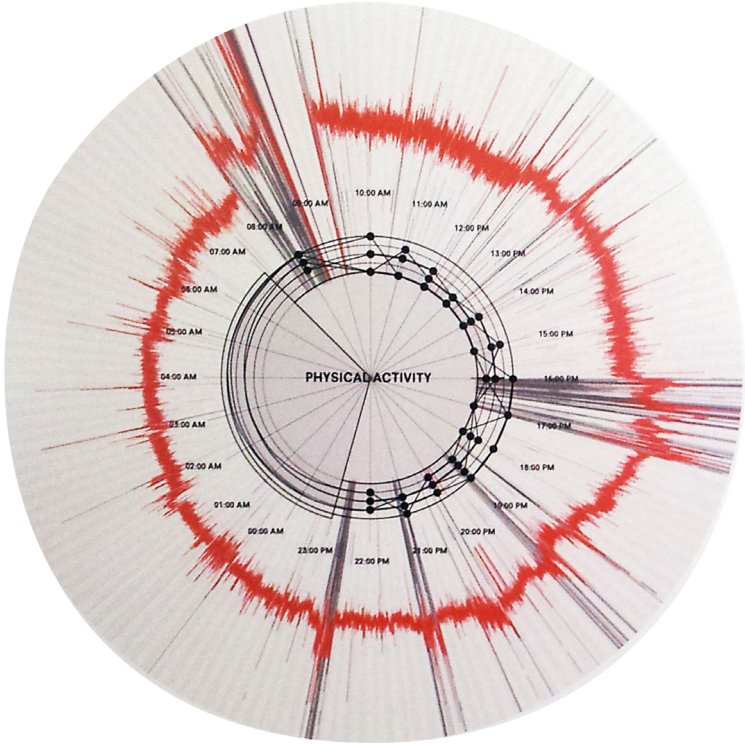
One of my interests as a researcher in Physiological Computing, where computer systems use physiological signals as an input control, is in the understanding and sharing of physiological experiences. Our physiology is a powerful tool for self-introspection and long-term data collection grants us a better understanding of our daily rhythms which in turn can be used to manipulate them for the better. In 2011, I worked on a project called The Body Blogger, whereby I monitored my heartbeat rate 24 hours a day 7 days a week for an entire year. As this data was collected it was shared on the Internet in real-time allowing the general public access to the physiological changes my heart was undergoing as I was experiencing them. This project had two goals: the first goal was to investigate the daily rhythms of my own physiology and how they were influenced by the different events I encountered throughout my day; and the second goal was to develop means of conveying these rhythms to other people so they could understand what I was experiencing.

My work on the *Rhythmanalysis* project provided me with a different perspective on my approach to self-tracking. Unlike my previous project which focused on exploring a singular person’s data set, *Rhythmanalysis* was interested in

simultaneously monitoring two unique groups of people over the course of a week, not only just to inform a singular participant about their own physiological experiences but also to compare and contrast their experiences with another person working in an entirely different environment. What made this project especially exciting was the participant selection. Employees from two uniquely different Liverpool based workplaces were invited to participate in this project: game testers from Sony Computer Entertainment and hairdressers from Minsky's.

With each workplace operating in a completely different way, the data collected revealed interesting insights into the psychological and physiological rhythms of these two groups as well as revealing new challenges in the application of self-tracking technologies. For example, mobile phones are an excellent tool for deploying sensor technology, however owing to the security requirements involved in game testing mobile phones were not an option and so the project had to find different technologies which it could deploy. As self-quantification through sensors becomes more popular, we are likely to run into more issues where technology will need to conform to the cultural environments in which they are to be deployed. While previously cost and ease of use were an impediment to wide scale use of sensors outside a laboratory it will be interesting to see how these technologies adapt to the constraints of different work and social cultures...

Kiel Gilleade is a computer scientist with a background in the development of physiological interactive systems including computer games, interactive artworks and life tracking.

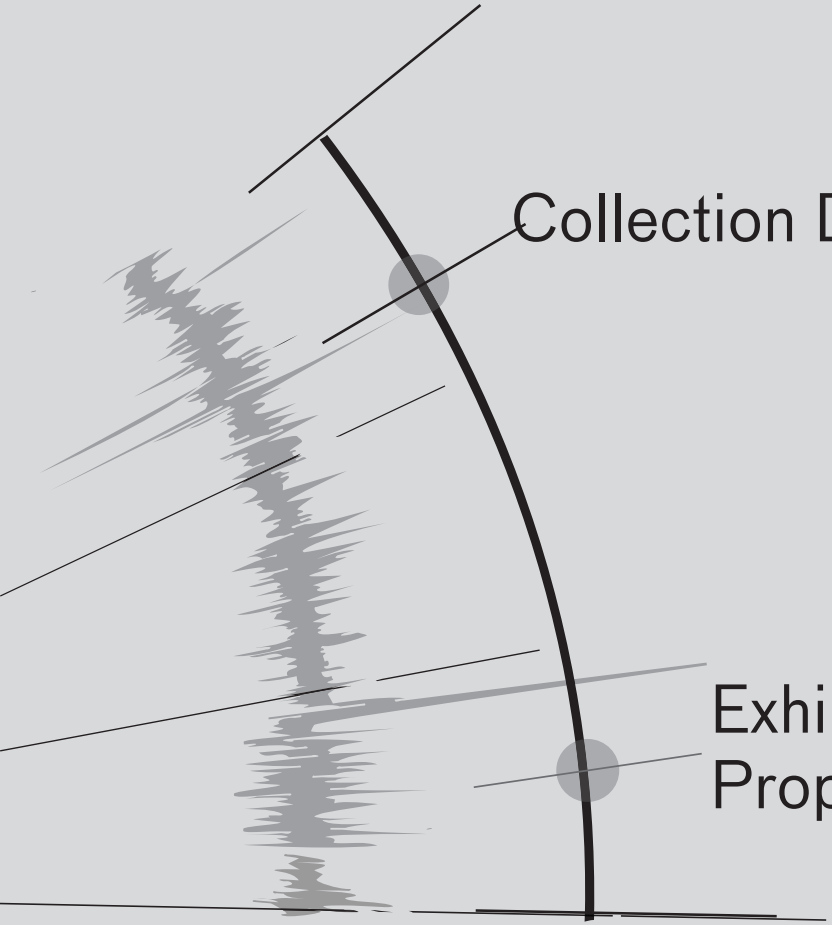


Example of design mock-up using collated data from different sources

44’

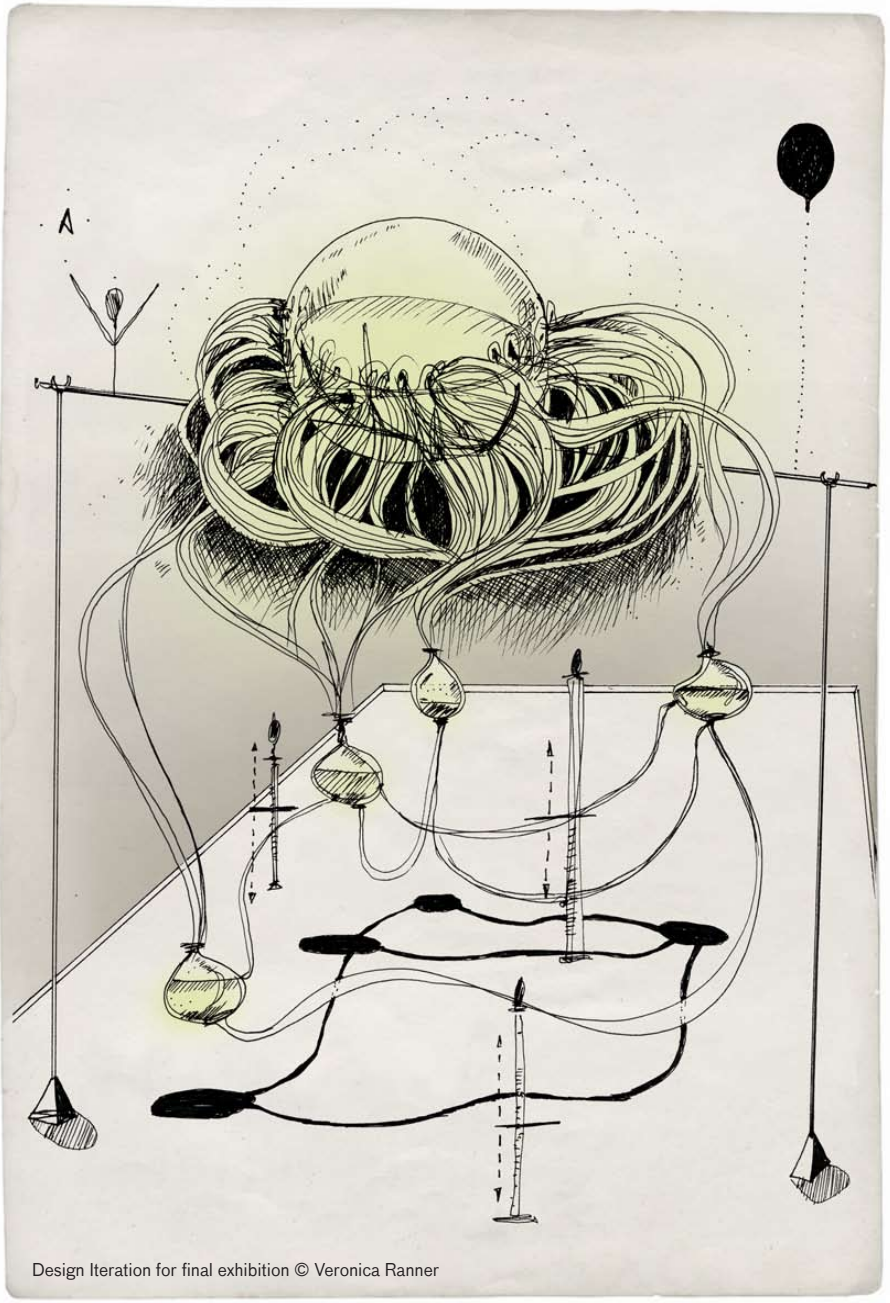
Chapter 4

53’



Collection Designs

Exhibition
Proposals



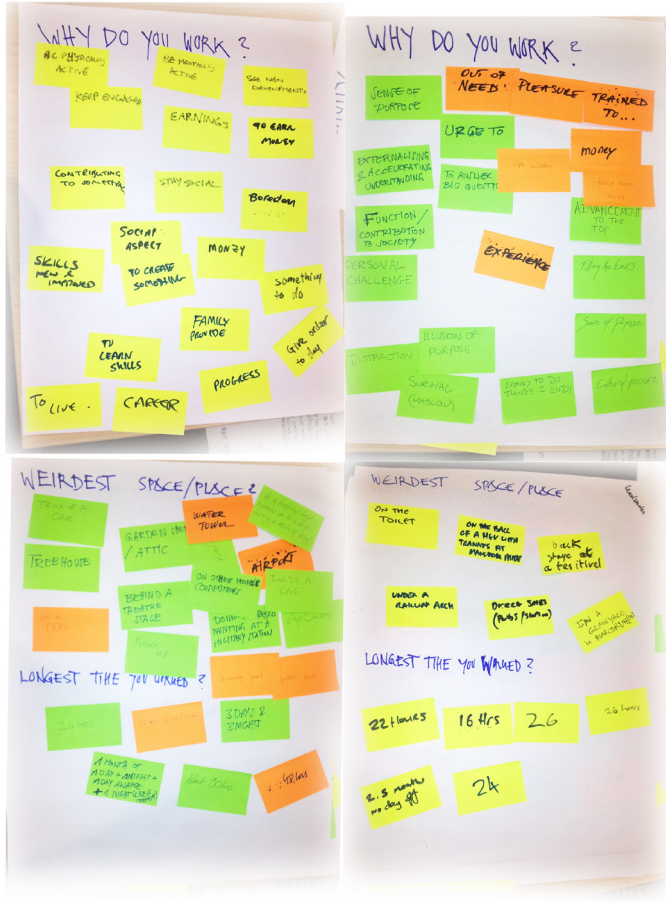
Design Iteration for final exhibition © Veronica Ranner

Collection Designs 48’ - 49’

Following the active trials, the *Rhythmanalysis* team organised a number of workshops that looked at ways of communicating and showcasing the project research to the trial participants and to the wider public. The workshops also offered an opportunity to share feedback and exchange ideas on how to incorporate the trial findings for pursuing an iterative design approach for a physical manifestation in the gallery space.

Therefore the *Rhythmanalysis* project took an action led research approach by enabling various insights to be part of the development process. The thoughts, ideas and think-pieces gathered throughout these workshops have been invaluable to the core research of the project.

The first workshop following the field trials was organised at the University of Liverpool, on September 9th 2013 and it was specifically targeted at all trial participants. The event reviewed excerpts from the captured data, design mock-ups using heart rate and question prompts and discussed methods of adapting the trial and research findings to physical installation formats. The event also held an exercise session where the group discussed the value of tracking oneself across the physical and mental space and the affects of the working environment within the context of Minsky’s and Sony Computer Entertainment groups.



Collided notes from *Rhythmanalysis* Workshop

Exhibition Proposals 50’ - 53’

During the workshop exercise the group exchanged ideas for exhibition proposals looking at various interpretations using the concept of *flow* of the monitoring data, the awareness of the biological self as a quality that can be transferred to the public gallery space through sound and time.

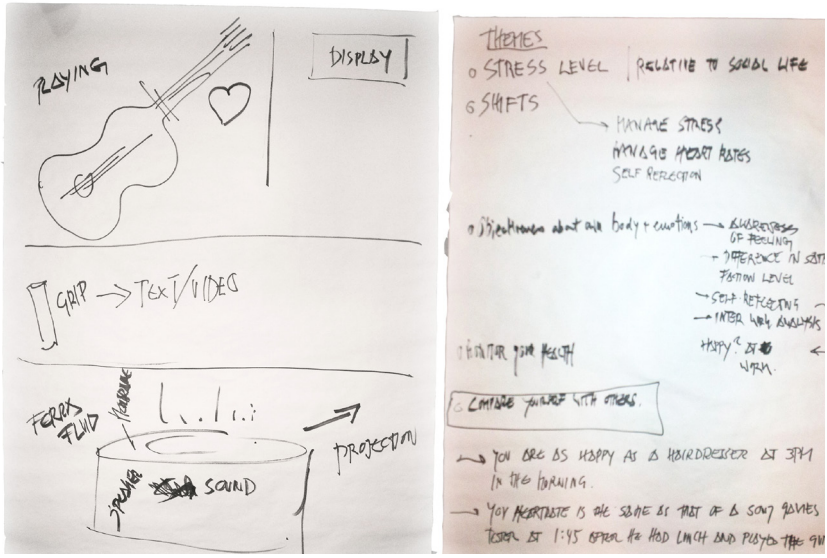
> *“Sound - Rhythm, create soundtracks that illustrate the heart rate beat”*

Further proposals were integrating the aspect of self-awareness, where heart rate data would be used as indicator of rhythm to be experienced through digital formats as a collective experience.

To deliver on the visualisation and tacit knowledge exchange part of the project we looked at the digital biological information from the biosensing devices as a design material through which we could show a relationship between data, its collection and the participants’ subjective experience. Externalising the data collection and playing with ideas that look at the exchange between the analog (physical) and the digital (data) was at the core of the project.

> *“heart rate - sense of heart rate through vibration pulse - translation back into the biological”*

Various ideas exploring the rapport between the biological, the digital and the analogue triggered proposals based around mechanical contraptions and circuits, and how we might make the data manifest through mechanical means that also demonstrated the “wet” physicality of the source of the data.



Collided notes from *Rhythmanalysis* Workshop

"I imagine a metal ball that is released to coincide with the time we recorded an event from our test group. It takes 20 seconds to go through a system and ends by hitting a bell, at which point a message will appear on large screens:

at 5:07 pm with 2 hours till the end of his 8 hour shift a Sony tester felt he was achieving his goals, heartrate of 70 bpm

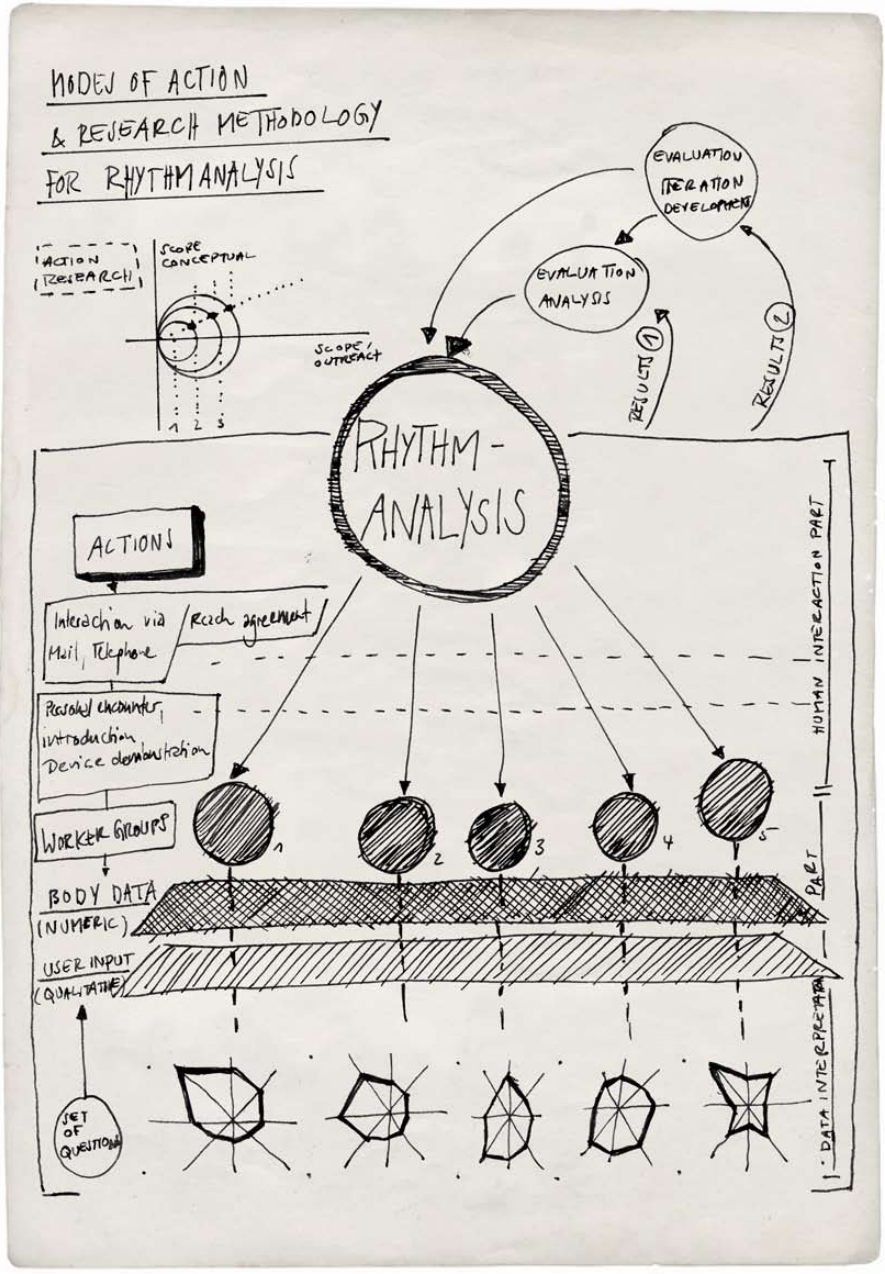
I love the anticipation that we seem to be hardwired when seeing something like this, its also a very rhythmical system and also reminds me a bit of the film Brazil."

The data experience is performative and collective. The rapport between real-time experience and data can be expanded, mutated. Time plays an important factor.

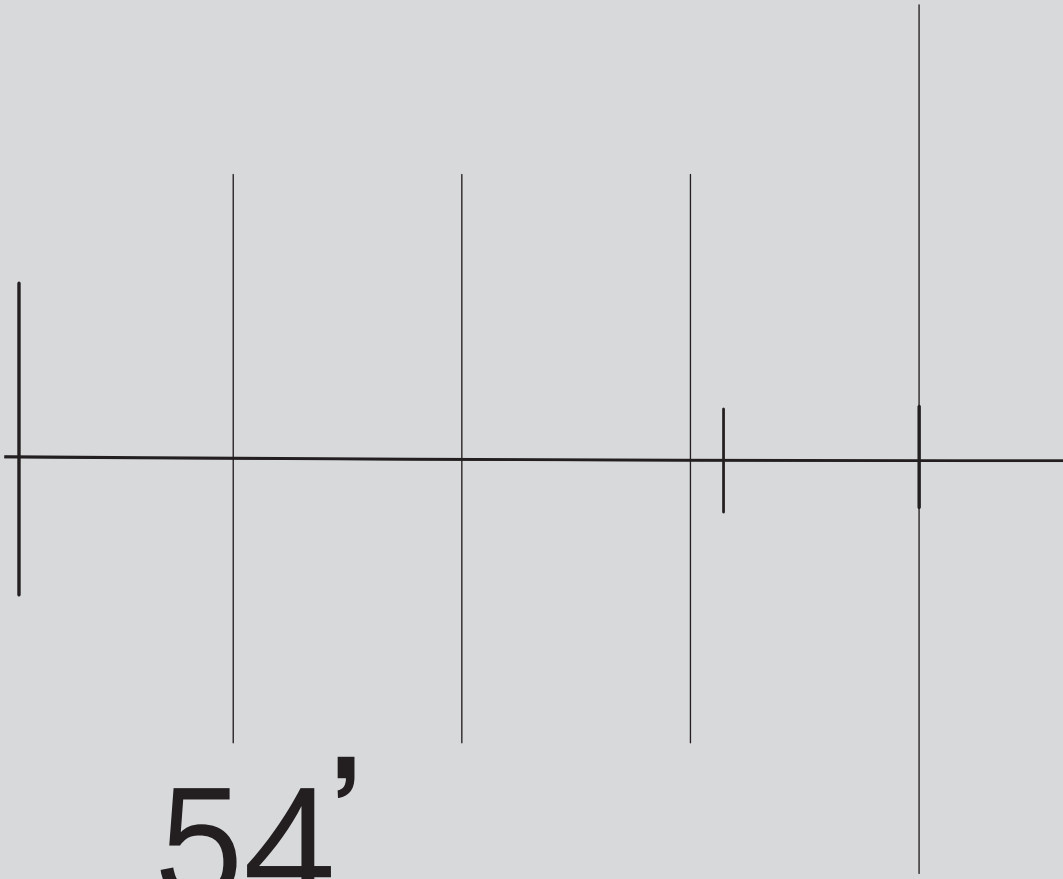
"I think that we should work on stretching or condensing our time. Time is subjective when being at work e.g. when being in a zone. Sound might offer good opportunities in the installation..."

"Should we add a soundtrack of the location? (the sound of the mechanics of ball rolling). There is also a small comparison with blood corpuscles running down veins"

"Perhaps we can compress the time into a shorter period - so the ball bearing represents the full day in a 24 second roll time.
Even at 24 seconds it will be a long run. Could the run track be modified using a little robotics and an arduino to "represent" the different people?"



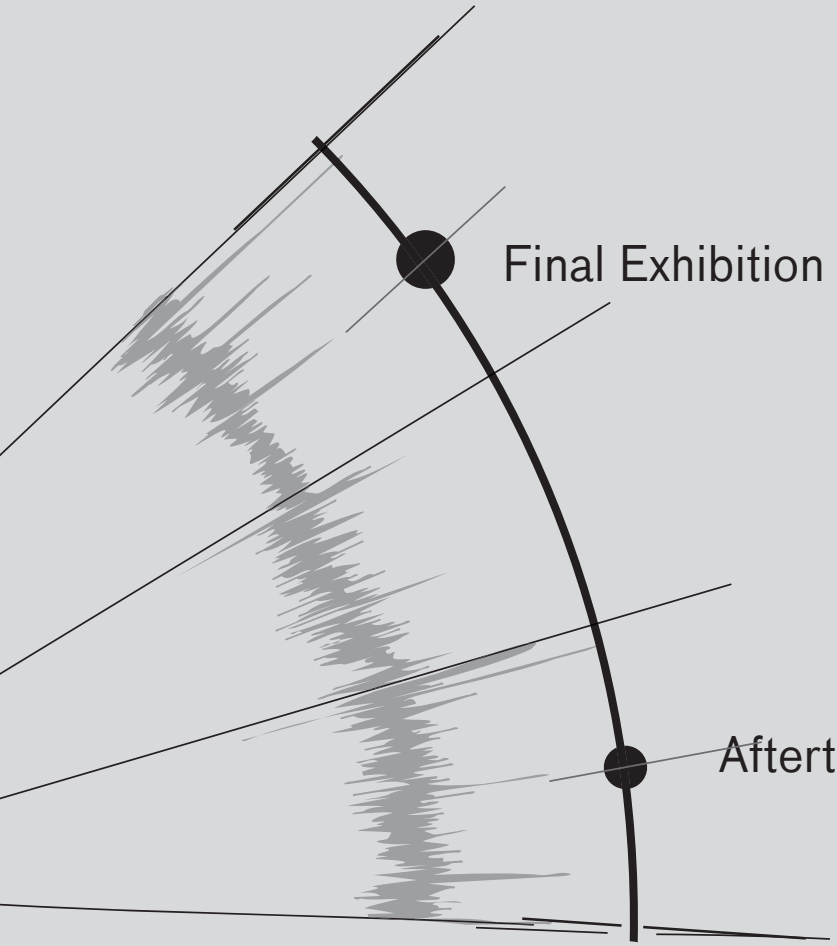
Design Iteration for final exhibition © Veronica Ranner



54’

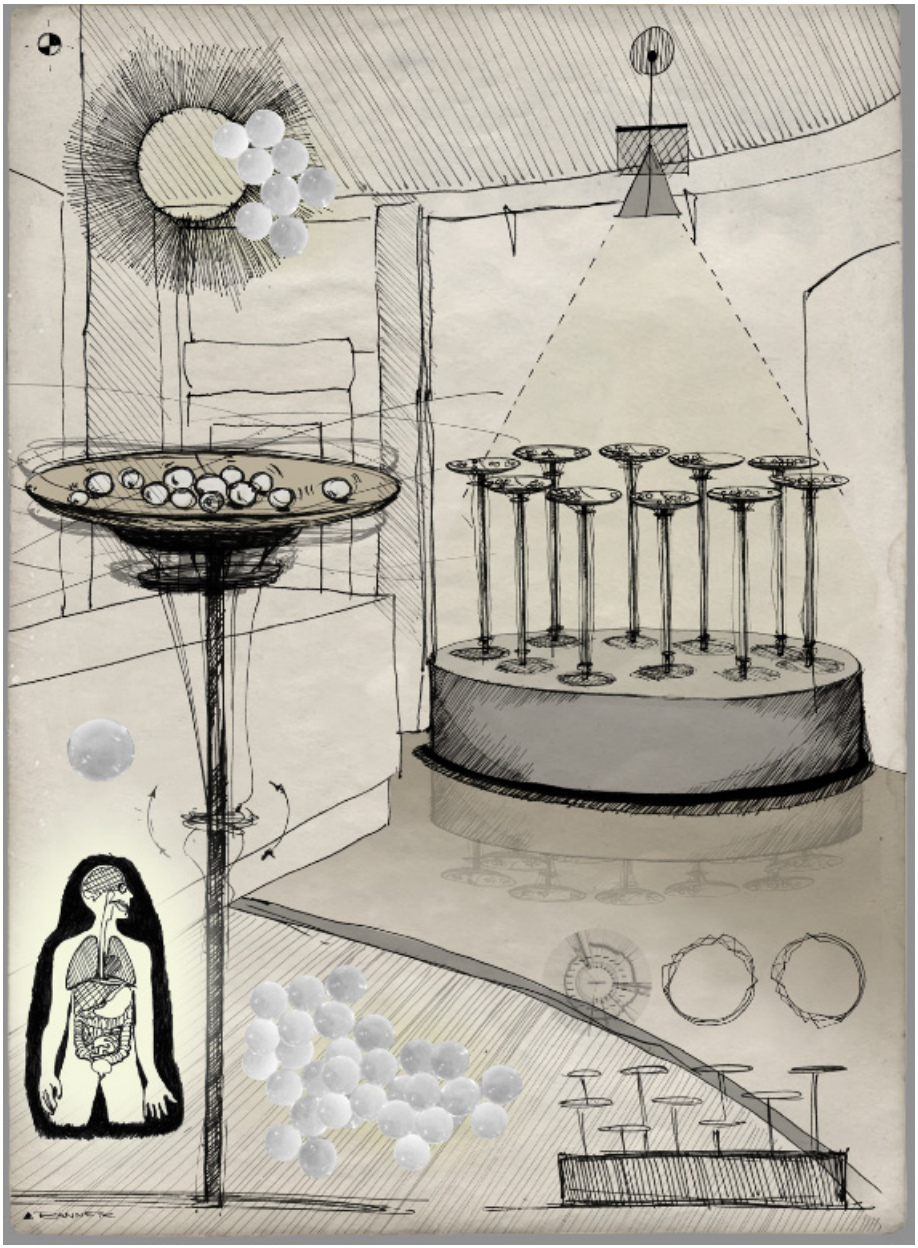
Chapter 5

63’



Final Exhibition Proposal

Afterthoughts

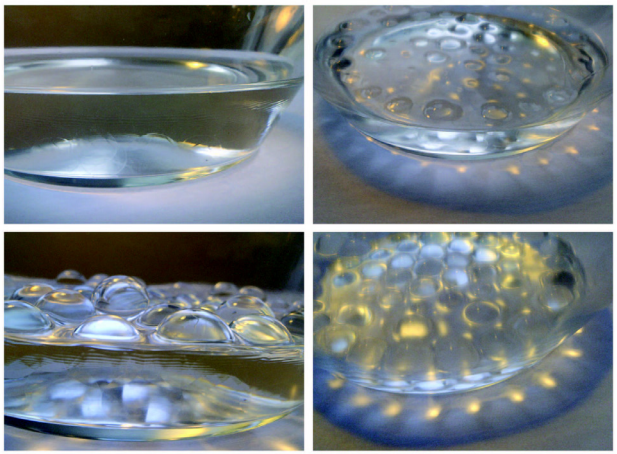


Design Iteration for final exhibition © Veronica Ranner

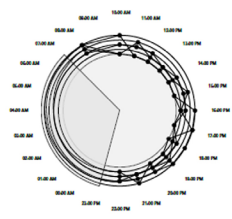
Final Exhibition Proposal 58’ - 61’

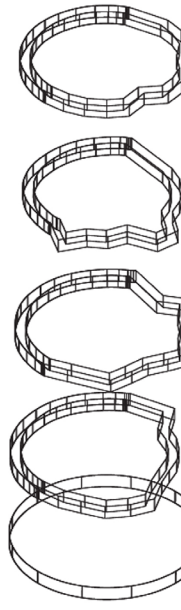
Veronica Ranner

The outcome of this study is planned as physical installation piece, based on the collected (body) data of the study participants. This installation is planned to run in two modes during the exhibition: one will represent the body data translated into movement when no visitor approaches the piece, the second mode allows for interaction with the piece by selecting a few of the most interesting data comparisons via tablet screen, which will then be demonstrated with the piece on demand.
The base of the installation will be a round plinth/ acrylic surface of up to 120 cm diameter, hosting ten plates, each representing one of the study participants. The plates are filled with transparent hydrogel balls made of a safe biopolymer. These soft balls are water based and pick up the slightest rhythm and amplify it by moving in a very interesting “wiggling” manner.



Clockwise from top left: Hydrogel balls immersed in water, reduced water levels, semi-lifted out of the water and defraction effect when exposed to light source.

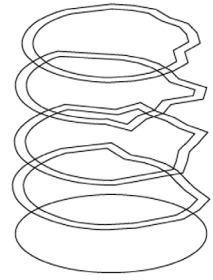




Acrylic discs are physical representations of perceived workload answer questionnaire.

Acrylic discs made of acrylic rings stacked onto each other

> Represent perceived workload per 24 hours
> Form a “bowl” in which the hydrogel bals will be moved



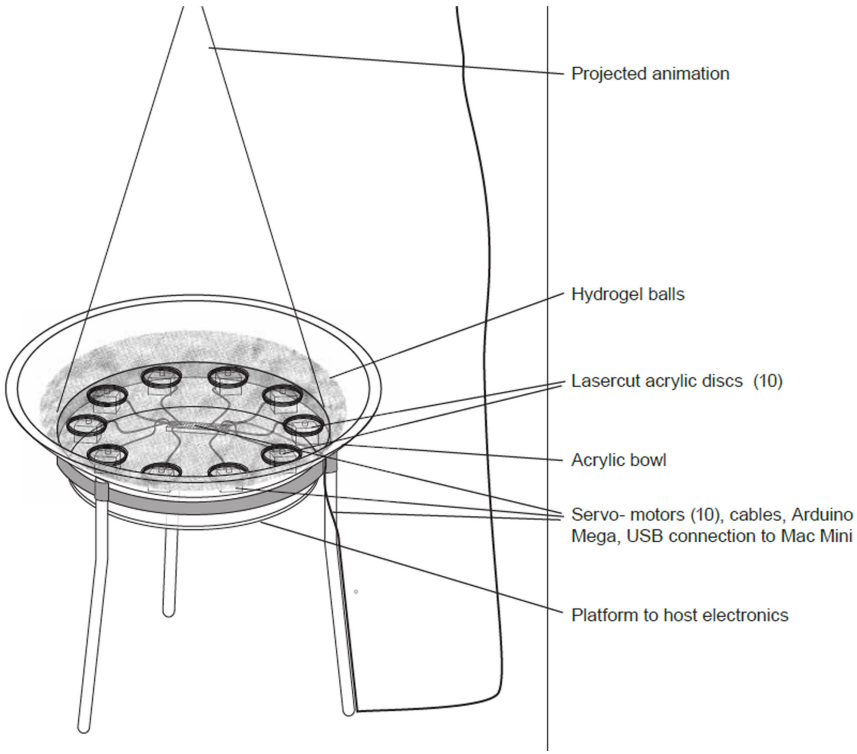
The plates are currently thought to have each an Arduino-driven mechanism on their bottom that changes height according to input data. The code will trigger the mechanical system, which will be covered with biopolymer balls to amplify visible movement of the mechanism below. Hydrogel balls have also the same light defraction as water, which make them disappear in liquid. This effect will be utilised in the installation by lifting the balls out of the water according to the mechanically activated rhythm below.

The installed plates will be either accompanied by a projection from above, prompting additional 2D visuals and information to the data sets onto the piece, or filmed from above and streamed on a large screen to be overlaid with such 2D graphs.

As mentioned before, two different modes of visitor experience are currently planned: one autonomous and one interactive run of the installation. The autonomous run visualises in a loop the average rhythms of 24hours within a short time frame, such as every 5-10 minutes.

The interactive run interrupts the autonomous one on demand and allows the visitor to select a few of the most interesting data constellations via a touch screen. This selection will prompt the according rhythmic representation, by also receiving more detailed information on activity, comparison and timeframe via graphical representation. Such graphical representations will be visible on the touch screen in front of the installation as well as via projection to be seen for pedestrians through the windows of FACT.

We collected four continuous data sets, which are currently prepared for the two different modes of representation - one timeline based, the other sequential for situational comparison. With such meaning making process we hope to not only present a representation and analysis of the raw data, but also to consider contextual factors as well as the performative potential of data in the public space of the exhibition space.



System design for final exhibition © Veronica Ranner

Afterthoughts 62’ - 63’

Professor Stephen Fairclough

Psychophysiological studies are generally confined to the laboratory but the availability of mobile sensor apparatus permits the study of physiological processes in the field. These studies of ambulatory psychophysiology provide insight into everyday activities and have been extensively used to study stress in occupational environments. The influence of high job demand is generally found to increase physiological markers of stress, such as heart rate and blood pressure, whilst high levels of autonomy and social support function as buffers that protect the health of the individual. This is the hidden world of work revealed by a physiological data record as employees engage with job after job or rush from meeting to meeting.

Data from occupational studies are generally analysed by experts and appear as figures and tables in scientific journals. The experts don’t simply represent these data but also provide an interpretation of significant trends. *Rhythmanalysis* represented an opportunity to provide an alternative perspective on ambulatory psychophysiology. The data patterns observed from heart rate during working life are raw material for the creation of a three-dimensional object. The act of interpretation enters a realm of aesthetics that is far removed from the data tables and bar charts used in scientific discourse. The repurposing of physiological data as object is central to this project. Like Lucas Maassen’s Brainwave Sofa, the resulting object is personal, functional and decorative.

Stephen Fairclough is Professor of Psychophysiology at the School of Natural Sciences and Psychology, Liverpool John Moores University

Alastair Eilbeck

At the start of the project a central theme brought us all together. We all became keenly aware within our separate areas, (art, academia, creative industry and arts organisation) that over time our working and personal lives have merged. This was polarised most clearly when compared with the traditional 8 hours work, 8 hours play and 8 hours sleep model - mentioned frequently across the different projects within Time & Motion: Redefining Working Life.

Our thoughts quickly turned to how these changing working methods could be affecting our health and natural rhythms, then to how the tools required to measure and monitor these rhythms are increasingly to be found in cheap consumer products and apps. This led to the central core of our research in comparing the biological rhythms of workers in the digital industries to those in a more traditional workplace. What really struck me was how outdated the legislation behind our 40-hour week is becoming. Can we draw any comparisons between workers rights, successfully fought for during the industrial revolution and the changing working practices of the digital revolution?

The main difference is that it is no longer obvious when and where we are working and it is the individual rather than the state whom now makes this value judgment. “I must finish that report before I go to bed!”

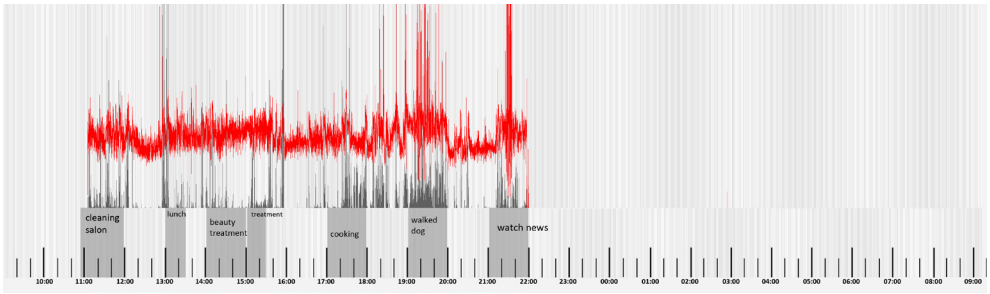
We are fortunate that the same technology behind our new rhythms and behavioural patterns can also be used to test their physiological affects. So for me the big questions that *Rhythmanalysis* raises is:

As technology allows us to profile and monitor our health, wellbeing and productivity in real-time and at an individual and corporate level, is new legislation necessary for the state to protect workers and provide for a non-linear and healthy work-life balance?

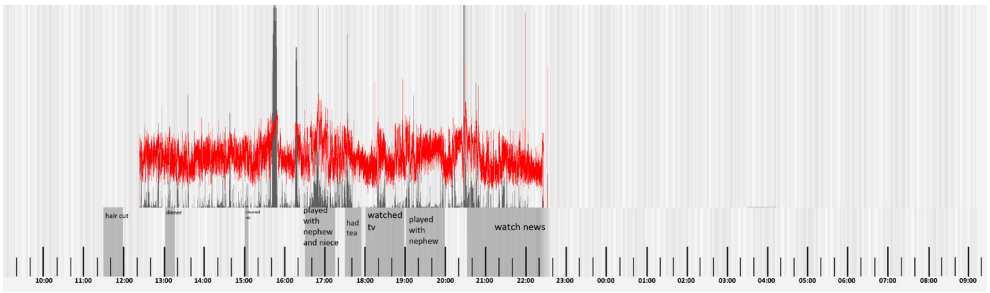
Alastair Eilbeck specialises in interactive design and works at digital media marketing company, Amaze. He is the Creative Industry Lead on the Rhythmanalysis project.

Appendix

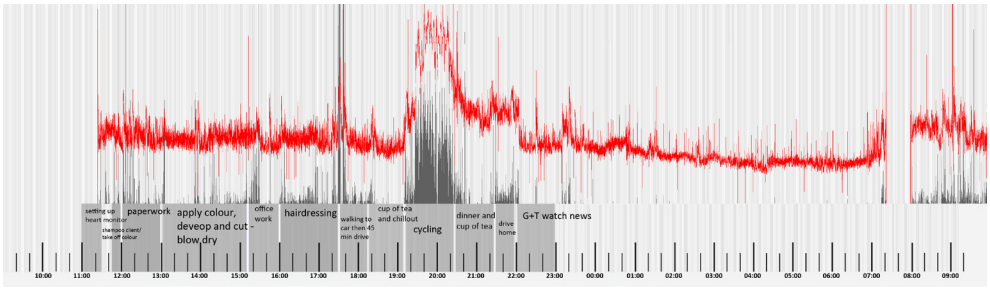
Heart rate and Paper Diary
Minsky's Hairdresser



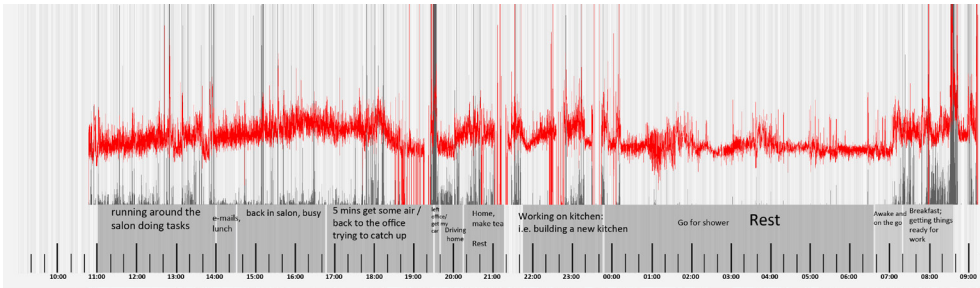
Participant 1, heart rate and diary 11:10 - 22:00



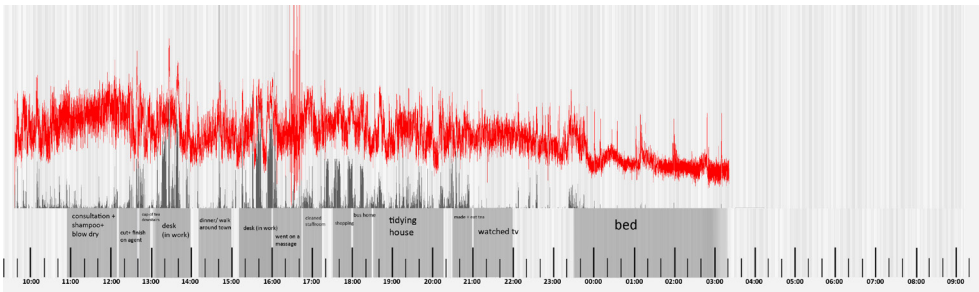
Participant 2, heart rate and diary 12:30 - 22:30



Participant 3, heart rate and diary 11:20 - 23:00

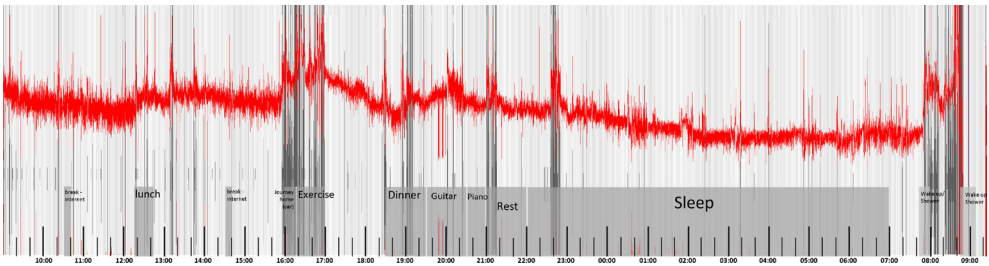


Participant 4, heart rate and diary 11:00 - 09:00

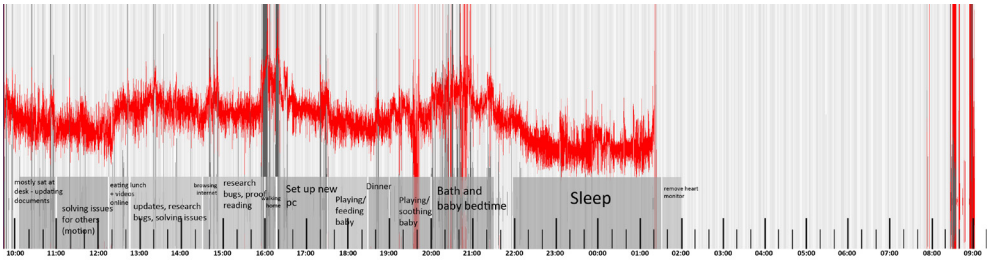


Participant 5, heart rate and diary 09:40 - 03:20

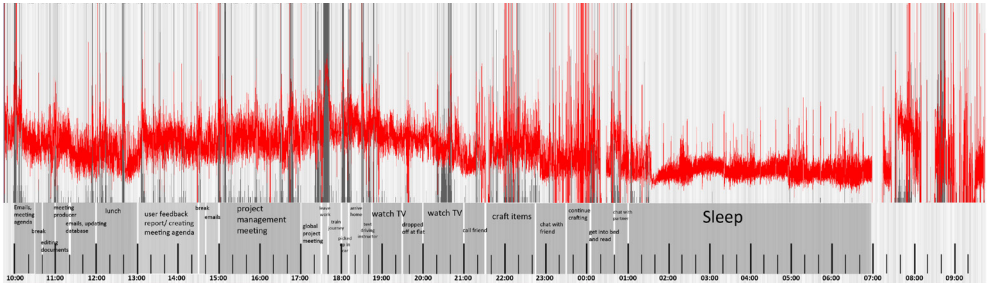
Heart rate and Paper Diary
Sony Computer Entertainment



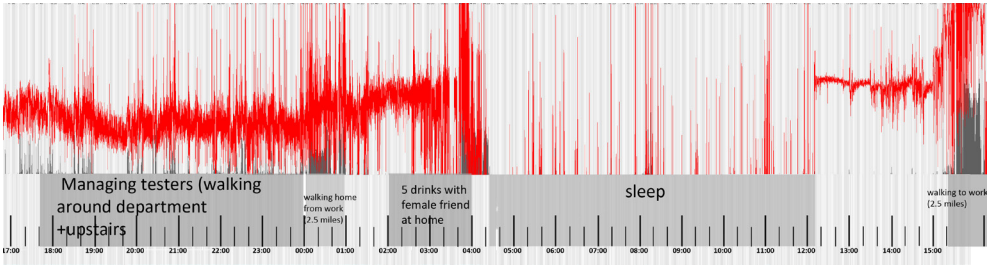
Participant 6, heart rate and diary 09:00 - 09:00



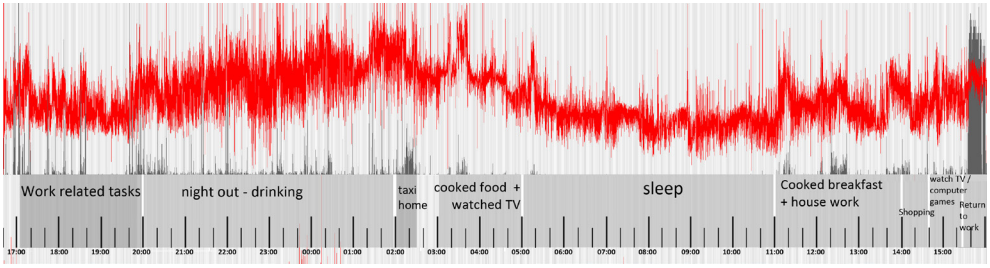
Participant 7, heart rate and diary 09:30 - 01:30



Participant 8, heart rate and diary 10:00 - 10:00



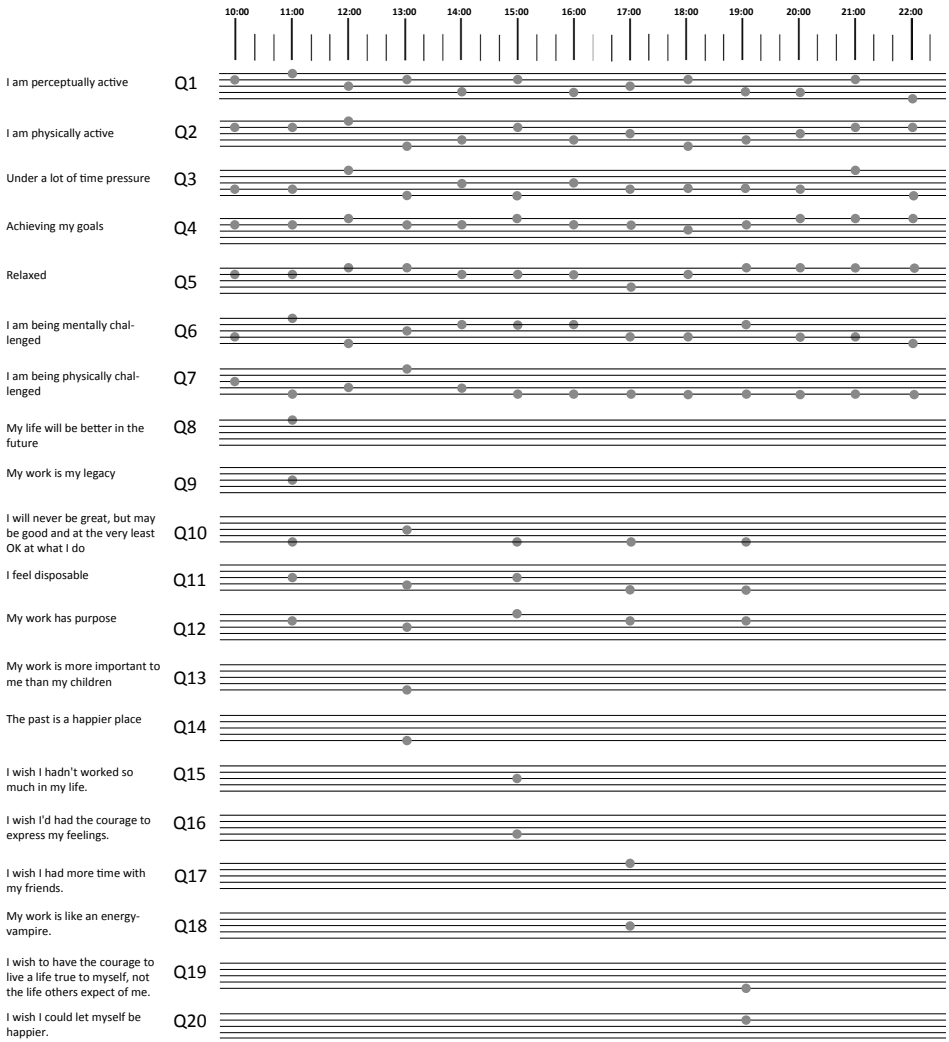
Participant 9, heart rate and diary 17:30 - 16:00



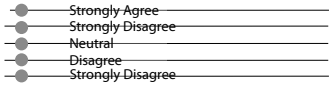
Participant 10, heart rate and diary 17:00 - 16:00

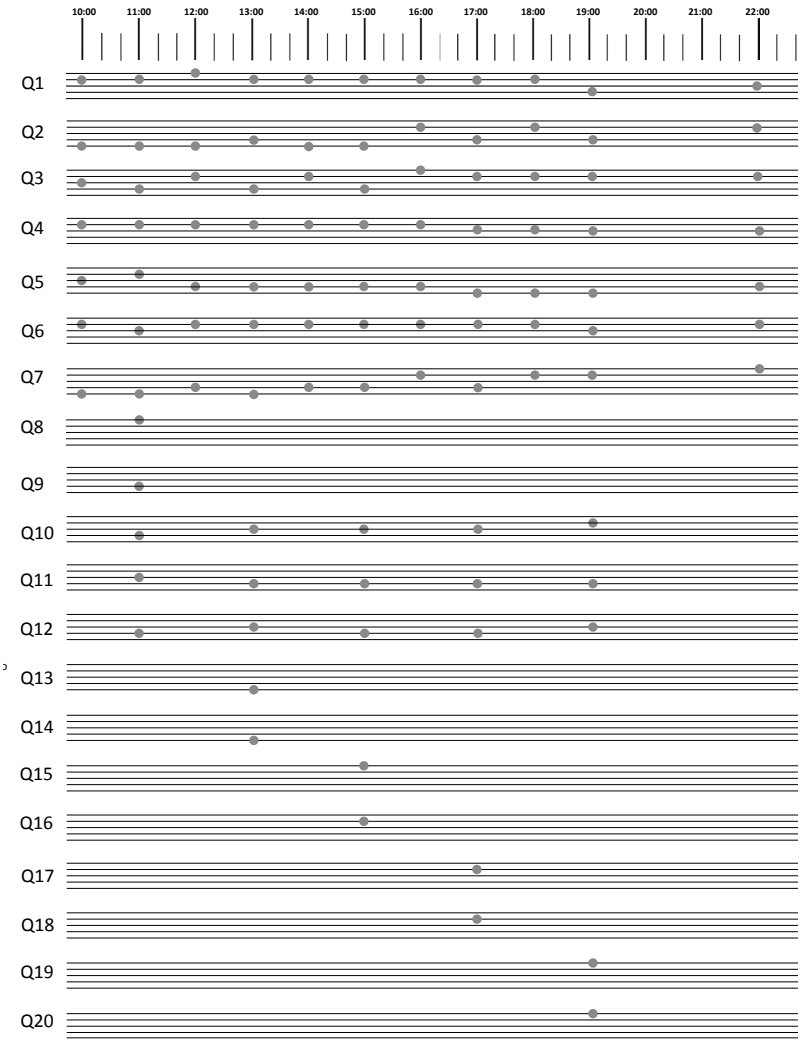
PRO-Diary answers Minsky's Worker

Strongly Agree
Strongly Disagree
Neutral
Disagree
Strongly Disagree



PRO-Diary answers Sony Worker





Rhythmanalysis team members
From left to right: Richard Koeck, Clara Casian, Veronica Ranner, Alastair Eilbeck, David Ogle, photographed by Roger McKinley

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