

# Cycling in the City

## Designing Digital Tools for New Cyclists

A report on exploratory approaches to scope the potential for social technology to increase the confidence of new cyclists and the discovery of new routes

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## **EXECUTIVE SUMMARY**

This report outlines two phases of a design study to explore the potential for digital technology to support local cycling knowledge for new cyclists within the city of Newcastle upon Tyne. Our purpose was to understand how new cyclists describe particular preferences for routes, their technology use and how they plan journeys to support confidence when choosing rides.

We found perceptions of route finding were part of a much wider ecology of activities involving formal and informal training and confidence building. All cyclists described the desire to find new routes, as driven by changes in circumstance, including ageing, health, family and retirement. The impetus to explore was important for people to continue to cycle but depended on geographical, embodied and technical knowledge to guide decision-making. The technology used to support such activity included a range of devices and platforms but focused on connecting and compiling information to build confidence in dealing with issues of safety, complexity and uncertainty. While some people also described their use of fitness tracking devices, others reported using technology to aid distraction and curate the sensory and social experiences associated with cycling. Technical and improvised work-arounds to connect, compile, make-sense of and accommodate the lack of specific localised knowledge of available routes were also reported.

We conclude with possible ways to further develop integrated mobile phone and web platforms, that capitalise on local grass-roots knowledge and sharing of places and routes while respecting the diversity with which new cyclists experience routes. We suggest connecting with existing platforms that support social rides and route discovery to encourage opportunities for curation around a broader set of search terms such as feelings of freedom, views and satisfaction associated with wellbeing rather than searches determined by efficiency, safety and fitness could support greater confidence for new cyclists.

## INTRODUCTION

People cycle for many reasons in the UK, including health, cost effectiveness, speed of travel and leisure and yet cycling is predominantly considered a secondary mode of transport (Tight et al. 2011; Pooley et al. 2013; Zander et al.2013). In comparison to many other countries in northern Europe, the UK has one of the smallest percentages of the population cycling regularly to work or as part of regular daily activity<sup>1</sup>. At a more local and regional scale, demographics, topographies and infrastructure can affect how much people cycle or whether they take up cycling at all. At a psychological, cultural and social level gender, age, circumstance, confidence, feelings of safety and perceptions of cycling as a 'sport' can further impact on people's desire to cycle, how often they cycle and the kinds of routes they choose (Heinen et al. 2010).

With the potential for cycling to both improve health and wellbeing, through exercise and sustainable transport, the British government have committed to doubling the number of cyclists on the roads by 2020. To achieve this 2 phases of investment were announced in 2011 and 2014 totalling £588 million across 8 English cities. As one of the beneficiaries, with a low percentage of commuters cycling to work<sup>2</sup>, Newcastle City Council received £16.3 million for cycling infrastructure, training and capacity building with financial support from the Department for Transport (DfT) and Public Health England (PHE) (Newcastle City Council 2016).

This investment across two departments demonstrated a recognition that increased and sustained cycling activity can't be achieved by improving the physical infrastructure alone. Health benefits, sociability and challenges of cycling at a grass-roots level needed to be further appreciated to create a cultural shift in building confidence for people interested in finding out about cycling and connecting with existing and new networks. Courses, group

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<sup>1</sup> <http://www.cyclinguk.org/resources/cycling-uk-cycling-statistics#How%20many%20people%20cycle%20and%20how%20often>

<sup>2</sup> <http://webarchive.nationalarchives.gov.uk/20160105160709/http://www.ons.gov.uk/ons/rel/census/2011-census-analysis/cycling-to-work/2011-census-analysis---cycling-to-work.html>

social rides and learning opportunities to build confidence have proliferated and are offered through a number of schemes such as *This Girl Can*, *Sustrans Beginners Bike Rides*, *Why Weight*, *Bike Right*, *City Tours* and *Sky and Breeze Social Rides*. These are supported by Newcastle City Council's 'Cycling in the City', Active Newcastle campaign and Sustrans.<sup>3</sup>

While there are many ways in which digital technology is currently supporting cyclists in their discovery of routes and health tracking, these tools can inadvertently emphasise, promote and privilege efficiency, through references to sport, competitiveness, healthy lifestyles, or fast, efficient and safe routes. Yet there is also a growing body of research that has pointed to other ways in which cyclists make sense of, use and appreciate their environment, wayfinding, sharing information, discovering and making up their own ad-hoc new routes that further contribute to feelings of wellbeing and health while cycling (Jones et al. 2016; Taylor 2016; Le Dantec et al. 2015, 2016).

This report outlines two phases of an exploratory design study to scope the potential for digital technology to support the creation and sharing of local cycling knowledge for new cyclists within the city of Newcastle upon Tyne. Our purpose was to understand how new cyclists described particular preferences for routes, their technology use and how they plan journeys to build confidence when riding.

Our hypothesis was that many new and experienced cyclists were already learning from one another and had an interest in continuing to do so. Cycling training schemes within the city of Newcastle were already building on this existing desire to learn from and with other cyclists, regardless of ability, age or access. Our question was a hopeful one in asking:

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<sup>3</sup> <http://www.thisgirlcan.co.uk/activities/cycling/>  
<http://cyclinginthecity.activenewcastle.co.uk>  
<http://activenewcastle.co.uk/health/why-weight/>  
<http://www.eventbrite.co.uk/o/sustrans-north-east-7457724181>  
<http://www.goskyride.com>  
<https://www.goskyride.com/Breeze/Index>  
<https://www.bikeright.co.uk/newcastle>  
<http://activenewcastle.co.uk/cycle-city-tours/>  
<http://www.sustrans.org.uk>

## **How can digital technology be configured to leverage local route knowledge to increase the confidence of new cyclists?**

The first phase ran between March - September 2015 and involved getting to know the many people who were planning and developing new cycling infrastructures and support systems across the city. We also developed and trialled an early stage prototype as means of discovering people's concerns and desires for those new to cycling.

The second phase ran between May 2016 - June 2016 and focused on how new routes were found by cyclists, their motivations for exploration and discovery and the existing role of technology in supporting such activity. This second phase widened our scope to understand perceptions of those who were also involved in increasing the confidence of new cyclists.

Our study showed how people's route finding was part of a much wider ecology of interconnected activities that incorporated technology and embodied sense-making of movement, aesthetics, sociability and place. This highlighted the value of relational perspectives, of those who were training and building confidence in others, both formally (through training courses, organised social rides and clubs) and informally (through family and friends). All cyclists, whether as trainers, new cyclists or experienced family members, described their desire to find new routes, albeit for many different reasons, ranging from changes in circumstance, including ageing, health, family and retirement. The impetus to explore new routes also depended on varying degrees of technical, geographical and embodied knowledge to help guide decision-making and confidence.

The technology used to support such activity ranged from mobile phones, desktop computers, wearables and tablets across a series of locations; on the move, at home and at work. Cyclists reported how their technology use focused on compiling information and media to further support decision-making and confidence in dealing with issues of safety, complexity and uncertainty. In addition, cyclists also reported the use of technology to track fitness, but also to help aid distraction and curate sensory and social experiences across space and time. Technical and improvised work-arounds to compile, make-sense of and

compensate for the lack of specific localised knowledge of available routes was also reported.

We conclude with suggested ways to develop integrated mobile phone and web platforms, that could capitalise on local grass-roots knowledge and sharing of places and routes while respecting the diversity with which cycling and new routes are experienced. We suggest that connecting with existing platforms that support social rides and route discovery would encourage opportunities for curation around a broader set of themes such as freedom, views and wellbeing rather than searches determined by efficiency, safety and fitness could support greater confidence for new cyclists.



## **BACKGROUND**

The range of commercially available products for cyclists is proliferating, and includes specific hardware for navigation such as those developed by Garmin, combined online and mobile tools for persuasive health (Wunsch et al. 2015), physical performance (Rooksby et al. 2014), safety and sustainable transport solutions (Rasouli & Timmermans 2015; Hirose & Kitamura 2015). Research has shown the propensity for such technology to support the collection and sharing of personal 'big data', reinforcing the idea of self-tracking for health (Lupton 2016). Yet mixed methods studies, combining both digital and non-digital approaches have highlighted the significance of social factors, self-efficacy and positive experiences in improving people's confidence and frequency of cycling (Wunsch et al. 2015).

Vines et al. (2015) call for a re-imagination of health- and activity technology to support the social sharing of experiences rather than a medical model of health, fitness and competitive physical activity. For instance, tracking applications going beyond measuring speed and distance might aid qualitative discussions around older people's mobility and journey-making to build awareness and engage them in activities that inform changes to transport infrastructure.

Le Dantec et al. (2015) in collecting data about cycling activity in the city of Atlanta, focused on the challenges and potential for crowdsourced data used in urban transport planning. Their sample of 'casual' cyclists was largely diverse, although predominantly focused on student areas of the city. The data collected provided rich information about how cyclists negotiate the city in 'everyday' ways, including purposes of trips, notes, locations, photos, issues or assets. Participants could also add personal data such as cycling ability, history, frequency as a further layer to help in the analysis of route data in order to create a 'taxonomy of urban cyclists' (p. 1720 see also Dill & McNeil 2014). While the structuring of participant data was organised to feed back to transportation planners in a transparent way, researchers found a need to interpret and curate data with planners to ensure content was communicated at a human scale.

Taylor (2016) argues that the collection of big data, particularly in documenting movement, might be most beneficially understood in terms of slicing through layers and anomalies of

meaning at particular moments in time. Taylor's study of his own cycling journey using a 'Boris Bike' (part of Transport for London's public bike rental scheme) and a number of bio-sensing and photographic capture technologies enquired into how data might matter and make a difference, particularly in designing urban techno-material infrastructure. In doing so, Taylor sought out the peripheral sites of the bike hire scheme and layers of historical and future regeneration connected with bio-changes sensed during the journey.

A localised approach is also employed by Oppermann et al. (2011) in a study of a touring 'cycling' performance *Rider Spoke* by artists group *Blast Theory*. As the performance toured three different cities, the study revealed how artists developed a novel approach to localised challenges, where users drove the co-evolution of content and the underlying location-service while exploring each new city. In response the artists iteratively developed filtering, survey, visualization and simulation tools to fine tune the experience to the local characteristics of each city, paying attention to both content and infrastructure issues to create powerful user experiences.

At a local scale, prior research within regional public health projects associated with the Newcastle Cycling in the City scheme (Pepper et al. 2015) and national projects such as CycleBoom (<http://www.cycleboom.org>) and Visions2030 (<http://www.visions2030.org.uk>) have shown the importance of understanding social and familial networks for cycling to expand concepts of health and wellbeing not just physiologically but more holistically and relationally. In addition, recent research has shown how most older adults in the UK learn to cycle in childhood, but can become reluctant, resilient or re-engaged in cycling in later life. Those who do re-engage often do so in ways that are rather limited in a spatial and temporal sense, for example by choosing to cycle only during quiet periods of the day and off-road paths (Jones et al. 2016) thereby highlighting a lack of confidence in infrastructure, environment and own ability to negotiate those.

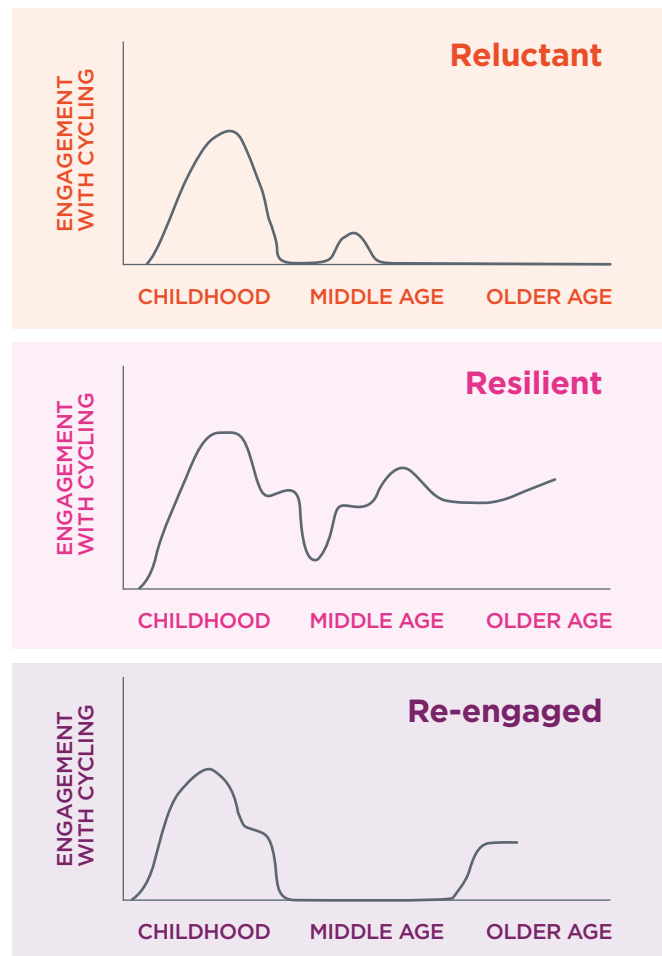


Illustration of cycling trajectories showing the difference between reluctant, resilient and re-engaged cyclists across the life course (Jones et al. 2016: 13)

There have been many schemes to encourage re-engagement with cycling for young women, BME communities and older adults within Newcastle upon Tyne, and for each of them websites promoting courses, social rides and training for those interested in healthier and more sustainable lifestyles are available. However, in other areas of digital community health, mobile applications such as FeedFinder (<http://feed-finder.co.uk>) have been successful in highlighting the value of disparate networked communities coming together over issues such as breast-feeding friendly places, to collectively rate and review venue acceptance and friendliness towards feeding (Balaam et al. 2016). Such an application has helped to move a public health agenda from the clinic to private businesses by empowering mothers to connect with each other through light-weight feedback. In doing so there has been an attempt to show the need for social acceptance of breast-feeding not just as an issue of health, but also one connected with socio-economics of the wellbeing of mothers (Simpson et al. 2016). Applications such as AppMovement (Garbett et al. 2016), an auto-

generating mobile phone application for commissioning community-based geo-tagged comments and feedback for local concerns and issues, that came out of FeedFinder, has also shown potential to be useful within other campaigning and advocacy communities such as disability and accessibility issues.

## **METHODOLOGY**

The approach of our study was an exploratory design anthropology which sought to collect a range of experiences through visual, auditory, and mapping data that could move towards future action and insights for technology design. Gunn, Otto and Smith (2013) describe design anthropology as a 'distinct way of knowing' (ibid. 10). Drawing from Tim Ingold they describe this as a 'practice of correspondence to the ever-changing circumstances and entanglements of people, objects and environments'. In describing how design anthropology is a combined critical and interventionist practice, they highlight how practitioners observe and experience, collecting materials and data with people in order to enact change.

In wanting to underline the importance of routes as wayfaring rather than transport (Ingold 2007: 75), we wanted to surface other qualities of cycling that are often missed when focusing on efficiency, location-based accuracy and health monitoring. Ingold makes a useful distinction here between wayfaring as travelling 'along', that is engaging with and being part of the environment. This he argues is distinct from notions of transport as travelling 'across' terrain, transitioning between a series of connecting points. For Ingold the 'wayfarer is constantly on the move. More strictly, he is his movement.' (Ibid: 75) embedded in the journey rather than focusing on departure and arrival points.

The mobilities turn in human geography and more widely in the social sciences, has also emphasised methods that better account for movement of people, goods and information within and through space. Since the ability to move is unequally distributed around the globe and within cities, access to and quality of mobility have become key factors in everyday economic, political and social life (Sheller & Urry 2006; Urry 2007). The assumption that human behaviour generally takes place in static and clearly defined spaces and times has gradually been replaced by a more flexible notion in which mobility is at the centre of human life, resulting in a vast number of studies arguing that the experience of different forms of movement is as equally important as going from A to B itself. Cresswell describes this as working with the 'fragile entanglement of physical movement, representations and practices' (Cresswell 2010: 159), associated with the specificity of

rhythms, pace, stasis, memory, time and place of people's experiences. At the same time he argues for a sensitivity towards surveillance and privacy, particularly with the design and use of technologies that seek to capture mobility that may manage and control infrastructure and perpetuate inequalities associated with class, age, gender, ethnicity and capacity (Cresswell 2010; 2011).

Despite the undeniable importance of mobility in today's life, its unchallenged status has been met by the notion of mundane or slow mobilities, which highlight that most travel still happens in the same way, according to continuous rhythms and repetitive spatialities and temporalities (Binnie et al. 2007). Resonating with research and policy agendas in the areas of sustainability and active transport, the notion of (slow) mobilities has put slower travel modes such as cycling back on the agenda. Different disciplines have uncovered the benefits of slower mobilities for social life and wellbeing, but what stands out is the growing engagement with technologies for mobility that emerge both in people's everyday practices and as an integral part of research methods.

In recent years, research in urban informatics has further highlighted the need to diversify who and how people's needs and aspirations are met in designing technology at scale. In developing digital systems for urban space and transport, Kukka, Foth and Dey (2015) report a potential flattening of identities that misses the diversity and potential of city-wide digital participation at scale. In doing so they describe an inadvertent imagining of a generic urban user that prioritises particular kinds of physical, gendered, and social mobility such as those practiced by young professional male adults. In order to counter such perspectives they argue for transdisciplinary approaches to develop technology, that can support designers in grappling with complexity while being mindful of peripheral users the diversity of needs and the value of slower mobilities.

## **Designing the Approach**

### *Phase 1: March – September 2015*

The first phase of our research focused on getting to know the diverse landscape of cycling activity that was taking place for new cyclists within Newcastle upon Tyne. This included attending meetings with Newcastle Cycling Forum and Cycling Data User Groups held at the

City Council which included representation from organisations such as Sustrans, local businesses such as cafes, shops, courier services, and cycling campaigners. We also attended meetings with cycle trainers and co-ordinators such as Liz Jackson; Cycle and Walking Officer, Newcastle City Council, Yvette Dungworth, Trainer for Bike Right, Jill Hetherington, Manager and Proprietor of The Cycle Hub, Ouseburn, where many organised bike rides were taking place. In addition, meetings with public health professionals involved in evaluating the health benefits of the cycling schemes including Craig Blundred, Public Health Consultant, Newcastle City Council, Vera Araujo- Soares and Gillian Pepper, Newcastle University Institute of Health and Society.

At the same time Wilbert den Hoed was working with older cyclists in Rotterdam, in the Netherlands to document their everyday mobility. Using the *Moves* app (<http://moves-app.com>) along with go-along audio and video documentation and interviews, Den Hoed explored with cyclists their (cycling) mobility practices across the life course and into older adulthood. This ongoing study is designed to capture the lived experience of ageing and mobility, along with its complex network of spatial, temporal, economic, social and technological relations (Murray 2015), in both a high and a low cycling context. Rotterdam is similar to Newcastle's wider urban area in its population size and urban sprawl, although Newcastle has considerable more hills than Rotterdam and cycling culture and infrastructure are less well established. Within the Netherlands however, Rotterdam is not known for being a 'cycling city' with a lower percentage of people cycling than the national average (Gemeente Rotterdam 2015). Since Newcastle City Council were working towards providing infrastructure similar to the Dutch urban and suburban cycling facilities, the study was well placed to highlight future inspiration regarding the ways in which people sought out and navigated enhanced infrastructure.

This was followed by a period of more practical design-led activity in Newcastle attending and speaking at Cycle City Active City Conference and participating in community consultations for the new cycling infrastructure schemes led by Newcastle City Council. We attended cycle rides with beginners' groups, while also reviewing existing commercially available cycling websites (Facebook, Strava, Sky Social Rides), mobile phone and web

applications (Endomondo, Cycle Streets, Strava, Map my Ride, Moves, Runtastic, National Cycle Network, Google Maps, RiderState, Cyclemeter, Fill That Hole).

We also designed a Newcastle Future Cycling campaign with Northumbria University Graphic Design students and developed a digital prototype 'Seniors Cycle', mobile phone application and website with computing science MSc student Kostas Papaterpos. We ran a day long workshop using the digital prototype 'Seniors Cycle' as a technology probe to inquire into desires and concerns of older adults (50+) who were learning to cycle or returning to cycling after a long period of absence. The workshop was audio-recorded, photographed, and transcribed with key themes identified through close-reading of the transcripts.





Northumbria University Graphic Design students envisioned a campaign raising awareness of cycling for non-cyclists.



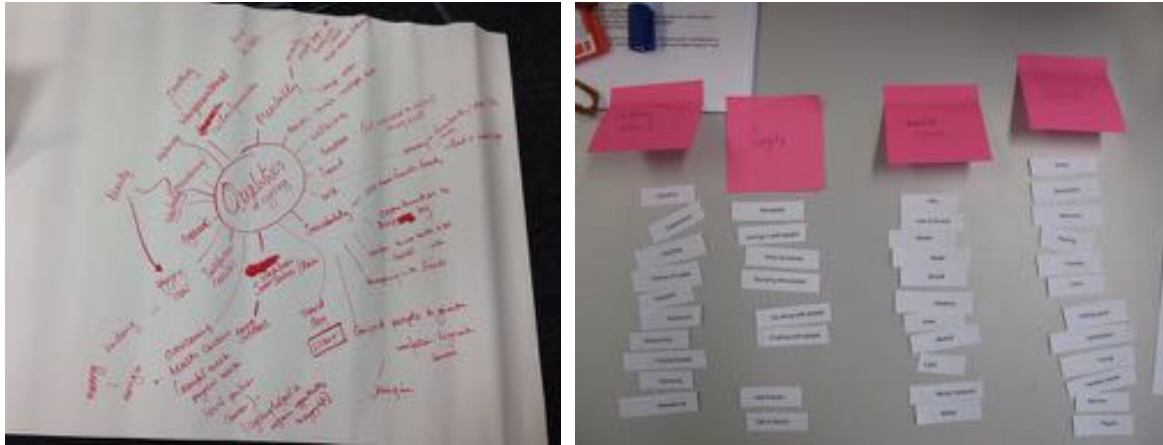
'Seniors Cycle' workshop at Bike Hub in the Ouseburn in August 2015. Participants were recruited through beginners' weekly cycle rides at the Hub. 10 cyclists took part and were given lunch and a £10 shopping voucher for their time. We used Estimote Beacons attached to bikes to trigger interaction with an Android mobile phone to launch the app and record a journey using GPS. We used this form of interaction with the mobile phone and Beacon to reduce continual GPS tracking of all activity, thereby ensuring some privacy and reducing consumption of battery power. The beacon was also used to reduce the need for participants to remember to switch on a particular app.

### *Phase 2: May – June 2016*

The purpose of this second phase was to tease out some of the ways relatively new cyclists, (those who had been cycling between 0-5 years), described their choice of routes and their use of technology. Our initial motivation was to plan for an 'AppMovement' campaign and to seed this with findings from Phase 2. Some of the layout and features of the application when generating a new app ask simple and specific geographic questions or word based prompts for rating places. Therefore, there was an interest in understanding the

terminology that new cyclists used to make sense of and discover new routes. As our earlier informal discussions and workshops with cyclists and organisations supporting new cyclists had shown, there was a diverse mix of people who used technology for different purposes as part of their cycling experiences. But technology was also used to find out about or keep in touch with others about regular social cycling activity. This second phase of the study therefore involved further go-along cycle rides with beginners and 'This Girl Can' group, mapping activities, and interviews with cyclists describing routes and paper-based home 'probe' packs charting the cycling experience.

We began by exploring findings from Wilbert den Hoed's (2016) Rotterdam case study. The purpose of drawing insights from this study was twofold. As previously outlined, Rotterdam has a similar demographic in population size and geography to Tyneside. Secondly in improving the physical infrastructure of the city, Newcastle City Council have drawn direct inspiration from the Netherlands, aiming to create a series of 'mini Hollands', in several inner city locations. In looking towards the experience of cyclists in Rotterdam we used this as a sensitising strategy to move towards a more future desirable vision for cyclists, rather than just highlighting challenges and problems with current infrastructure which is already widely recognised and documented. Moreover, a context-specific approach could evade the pitfalls of copy-and-paste and remove non-criticality of practices from elsewhere (O'Hare et al. 2016). This involved mapping a series of keywords that came forward from Den Hoed's early thematic analysis, which emphasised people's motivations for continuing cycling and their choice and description of particular routes. These keywords were then grouped into four categories: (1) preferences for cycling, (2) social interaction with people, (3) environment and (4) feelings evoked when cycling.



Mapping qualities of cycling; conversations on early thematic analysis from Den Hoed's (2016) Rotterdam case study

We used a bike as a mobile lab to both transport and show our research findings for three weeks between May 9<sup>th</sup> and 27<sup>th</sup>. We based ourselves during this time at the Cycle Hub in the Ouseburn at the Quayside between 10am -2pm each week day of the period except for 2 when we went on bike rides, and for 3 we needed to prepare materials for home-packs (total of 10 days / 40 hrs across 3wks). The drop-in lab was promoted through the Bike Hub, This Girl Can and Cycling in the City email and social media networks, although the majority of interest (35 out of 47) came from people who were curious and approached the researcher or were approached by the researcher at the venue. Instead of audio-recording we took notes during conversations at the Hub with an emphasis on quick notation and picking out key vocabulary.



Pop-up cycle lab at the Cycle Hub at the Quayside in the Ouseburn, Newcastle upon Tyne.

11 out of the 47 people either approached at the Hub or contacted via email and social media discussed their experiences of cycling in more depth and mapped their routes spending between 1-2hrs with the researcher. These experiences and insights were marked onto a cycling map<sup>4</sup> using a tracing paper overlay, marker pens and luggage tags. Further to this they were asked to mark up with stickers between 1-3 words they might use to describe important features of the journey including the environment, preferences, feelings, social experiences and technology related to some of the routes on 5 radar-chart diagrams which we described as 'Wheels of Qualities'. 26 of those approached were engaged in much shorter (10-30 minute) informal conversations, often as part of a social group. These shorter conversations were written up as part of the field-notes at the end of each day. 5 people engaged in these shorter conversations also took a home-pack (see further below) or were sent one in the post.



Cycle map produced by Tyne and Wear and Northumberland councils in association with local businesses and Sustrans. The map shows all major cycle paths in Newcastle and Gateshead at a scale of 1:20,000 and was used as the base layer for conversations with people at the pop-up lab at the Cycle Hub to discuss route preferences and discovery.

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<sup>4</sup> [http://www.tyneandwearltp.gov.uk/wp-content/themes/ltp/maps/newcastle/newcastle\\_south.pdf](http://www.tyneandwearltp.gov.uk/wp-content/themes/ltp/maps/newcastle/newcastle_south.pdf)



Maps with tags pointing out particular qualities of routes that were memorable to the cyclist. Cyclists talked while researcher took notes on tags. Cyclists also drew their routes with pen on the tracing paper overlaid on top of the map. These traces have since been transferred to visual maps, with comments typed up in the Findings section to identify particular voices.



Detail of comments about routes and locations. This comment here is from Sheila (see pg. 27) talking about the Cycle Hub.

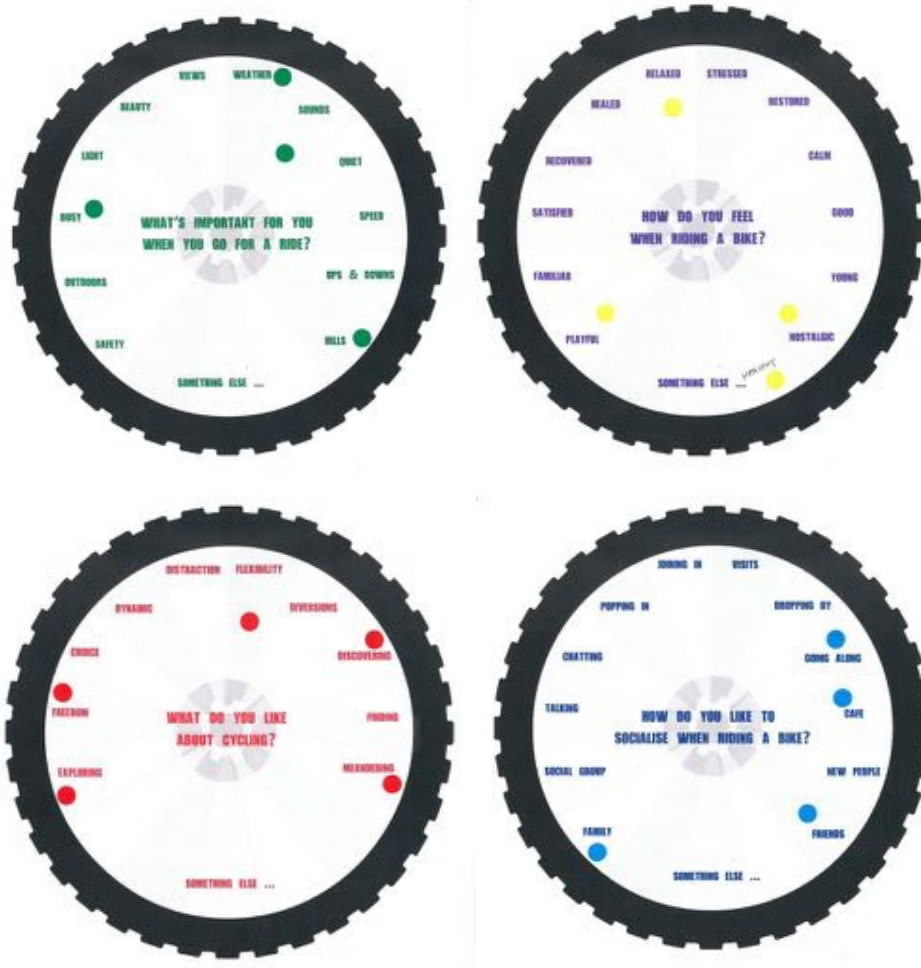




Home packs with 'Wheels of Qualities' for people to mark out what they felt was important for them in terms of environment, socialising, why they preferred cycling, and feelings associated with cycling. In addition participants were asked to mark out 'Routes of Joy' using some of the qualities they had previously identified on their wheels and identify technology used either while cycling or to find out about cycling. Participants were given a stamped addressed envelope to return to the pack to researcher, which was then followed up with a telephone call.

For those people who could not make it to the Hub during this time, due to work, study or lack of transport, but still wanted to take part, 15 home-packs were distributed. The home packs consisted of a smaller version of the 'Wheels of Qualities' and a 'Routes of Joy' page to encourage more notational, personalised and sketched forms of map making to show a particular route. 9 of the packs were completed and returned and followed up with 10 – 30-

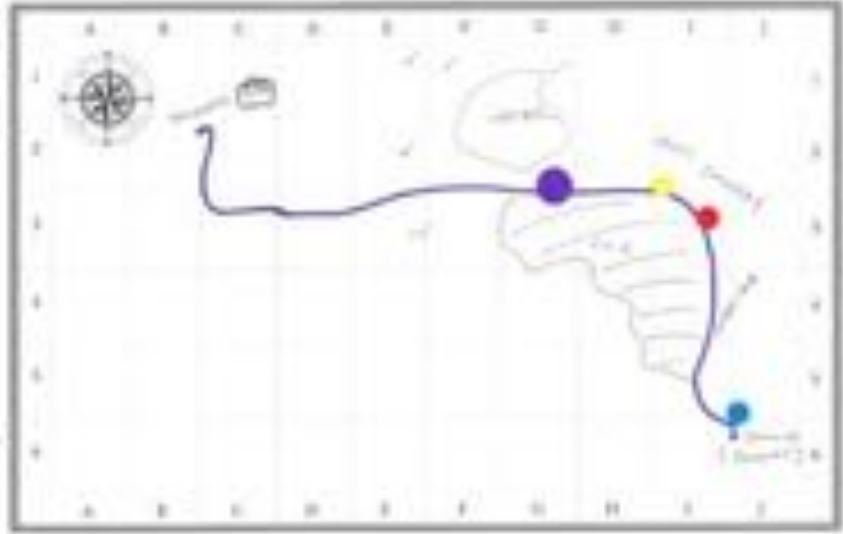
minute phone-calls, where the researcher took notes. In addition, one participant who had been sent a pack preferred to discuss their choices with the researcher face-to-face, where the researcher took notes during the discussion.



Examples of 'Wheels of Qualities' to explore terminology for environment, feelings, preferences and social experiences. These were used in the home packs sent to participants who could not attend the pop-up cycle lab at the Bike Hub.

**DRAW A MAP OF YOUR COMMUNITY ROUTE.**  
 DON'T WORRY ABOUT THE SIZE OR SCALE, BUT DO USE A GRID TO HELP YOU DRAW YOUR ROUTE.  
 USE THE DISTANCE AND BEARING ON THE MAP TO MARK OUT THE ROUTE AND MAKE IT AS CLEAR AS YOU CAN.  
 MAKE YOUR MAP AS CLEAR AS YOU CAN.

**KEY:**  
 [Symbol] Home  
 [Symbol] Work  
 [Symbol] School  
 [Symbol] Park  
 [Symbol] Shop  
 [Symbol] Church



Participants were also asked to mark up these qualities onto a 'Route of Joy', a blank map that they could draw onto and include their own 'Key' for points of interest.



Example of technology wheel used with stickers to guide reflection for home pack participants on their technology use.

## **Limitations of Methodology**

There were a number of limitations of the methodology which included the choice of location for events such as workshops and pop-up cycle lab, terminology, times and methods.

*Location:* Basing the research from the Hub reached a particular group of cyclists who were often very keen on cycling the coast to coast route, which had implications for geographical emphasis of which particular routes people described. As the Hub is at the Quayside, which requires significant downhill and uphill cycling, many people who visit there either arrive by car or are very proficient cyclists or tourists on a cycling holiday. In choosing to also attend one of the beginners' cycle sessions in Nuns Moor Park, this helped to broaden the geography further out towards an area that had little infrastructure but was also an area of the city that was due to receive additional funding for cycle lanes, which helped to further diversify the perspectives we captured.

*Terminology:* In initially promoting the drop-ins for new cyclists, the terminology was problematic in that people largely identified with learning to ride a bike, or going on social bike rides rather than becoming a cyclist or indeed being a new cyclist. The choice of term 'new cyclist' was to promote inclusion and identify those who were not as experienced as others, while this was at first considered a useful category, in practice this may have excluded many of the people we were trying to reach who did not necessarily identify with being a 'new cyclist'.

*Times:* The times of day when our researcher was available, 10-2pm on weekdays, largely limited who could attend to those who were either on holiday, retired, on sick leave, part-time work or unemployed. Evening and weekend sessions may have been far more appropriate in reaching a much more diverse range of experiences, but was limited due to researcher available time.

*Methods:* While some participants, especially with the home packs, enjoyed the creativity required of them for the 'Routes of Joy' and the 'Wheels of Qualities', some also expressed

that they struggled with how to approach the task as they expected a survey with specific questions. Furthermore in drawing from studies in the Netherlands to choose particular words for the 'Wheels of Qualities', we focused on more positive experiences, because problems with routes are well documented and clearly understood. The choice to only go along with two bike rides has further limited insights to focus on people's perceptions of what they believe to be important about their routes and what they're comfortable to report. The methods therefore do not provide rich insights into more specific and nuanced day-to-day practices, but focus on perceptions of routes and technology use.

*Technology:* We limited our focus to specifically understand the use of mobile phone, online and wearable technologies associated with cycling, rather than including technology associated with assistive cycling or infrastructure.

## FINDINGS

### Phase 1

As previously discussed, this first phase was to help researchers gain insights into future plans for Newcastle's cycling infrastructure and training schemes in supporting new cyclists with skills and confidence. For the purposes of this report, we outline three specific insights from this first phase that helped to inform the second phase of the study:

- **Using 'Big Data': Perceived challenges of understanding new cyclists' activity**
- **(Non)identification with existing apps**
- **Getting better; improving health and cycling ability**

#### *Using 'Big Data: Perceived challenges of understanding new cyclists' activity*

From early meetings and attendance at forums, there were tensions discussed around what people felt the role of data should be in giving a clear indication of how current cycling routes were used and how this could benefit the longer term health and wellbeing benefits for new cyclists who were just learning. With an emphasis on funding to increase the number of cyclists and double the number of cycling commuters on the road, it was quickly identified that this could only happen if new cyclists were trained appropriately, or those who cycled much more infrequently were encouraged to do so more regularly for their daily commute. This showed how there was a diverse groups of cyclists of whom little was known and it would be difficult to understand cyclists' activity across this diverse spectrum of experiences, just by collecting a singular set of quantitative data. For instance, there was a significant data set from 5 years of cycle counts, that is sensors around the city that documented the date, time, weather when a cyclist passed a specific location. This was and still is collected by Newcastle City Council and used regularly for transport planning. While these counts indicated how many times cyclists passed a particular location, it could not identify direction of travel, route or if that same cyclist passed once or 10 times a day. Strava had also just released a series of heat maps, which showed Strava users popular locations and routes over a 12-month period. As was highlighted in discussions, while these data-sets gave an indication of current and proficient cycle use, the meetings highlighted how forum members felt it was not necessarily useful in identifying the potential for what

was needed to encourage new cyclists to take up cycling and how this could be understood in the longer-term to inform decisions for built infrastructure.

There was also an interest from public health professionals to have access to a ground truth about new cyclists' activity that could be verified through technology in terms of how much time and exercise people actually gained from having access to bike rides and long-term bike hire. Other researchers had highlighted the challenges this created in keeping up to date with people who were collecting data about their cycling journeys. While a range of off-the-shelf sensors such as Fit Bit and or research sensors such as Axivity were discussed alongside mobile phone apps that could potentially track activity on a bike, there were challenges since it was recognised that most new cyclists did not always use these devices and may find them intrusive as they appealed to particular kinds of people already interested in fitness. Use of mobile phone apps were also considered problematic since it was reported that people would not always remember to switch on their apps to record journeys. If it was an application that ran in the background of a mobile phone, it would eventually drain the battery quickly. This made long-term data collection challenging and required verification with additional self-reporting or regular catch-ups from researchers, if the kind of data collected was not part of an existing well-established routine, which for new cyclists was difficult to determine.

#### *(Non)identification with existing apps*

In reviewing and trialling a number of available applications associated with cycling we quickly identified how the visual and textual language and qualities of many of these applications were targeted at experienced users, promoting competition, fitness often associated with particular values of beauty, or technical abilities in map reading and navigation. When trialling these apps we also felt that we were constantly prompted to do more activity, which had the opposite effect and actually de-motivated us.

When taking part in 2-hourly cycle rides with beginners' groups at the Cycle Hub, we asked if at all, what kinds of technology they used and if they used anything for cycling. The target groups for these sessions were older adults, young women, BME communities. The groups we met with, the majority of whom were made up of women aged 50+, highlighted they did

not identify with apps such as *Runtastic*, *Endomondo* and *Strava*, because they didn't feel they were adequately represented. One woman highlighted how 'these apps are not for me, no I'm not a skinny white woman, and I see that, these apps are full of it and I don't want to be like that, so I don't use them, they're just not for me.' Despite this most of the group used mobile phones and tablets to use applications such as Facebook to keep in touch with the cycling groups they were attending and other online sites that promoted social riding, rather than sites that promoted personal health.

### *Getting better; improving health and cycling ability*

In developing a technology probe 'Seniors Cycle' to work with a group of new cyclists, we drew from an alternative visual identity that promoted nostalgia and fun to track and share routes within a social network, drawn from the design work with Graphic Design students. The probe was used with a group of 10 cyclists on a 40-minute bike ride. 9 out of the 10 participants who came were women, aged between 54-67 and had returned to cycling between 1 week and 5 years ago. Their motivations in taking up cycling were largely to improve their health and lose weight reporting conditions such as anxiety, depression, lymphodemia, joint pain, diabetes and asthma. Half of the group had received a social prescription for cycling to tackle some of these health conditions within a more informal group environment.

In outlining their existing technology use, most were not regularly using technology connected with cycling activity at all, despite having smart phones and computers. Some however were using a range of tools to connect and share their cycling activity. One participant in particular was using a sophisticated range of devices combining use of an iPad, Jawbone, Garmin and iPhone to find social rides on websites and track her health activity. Many reported social use of their technology from looking at websites with partners and husbands to find social rides, to asking their children or siblings for help to download apps like Facebook onto their smartphones. Everyone who took part regularly used email and websites to keep in touch with the latest social rides in the local area connected to the Cycling in the City scheme, with only 3 of the group using smartphones on a regular basis for Google maps, Endomondo, Strava, Jawbone Up, Map my Ride and Go Sky Ride.



In trying the Seniors Cycle mobile phone application and website the group worked in pairs and went on a bike ride to record their route. They set-up identities on the app and gave each journey a name. On returning they uploaded their route to the Seniors Cycle website and shared with each other where they had travelled and were asked to reflect on the kinds of information they would want to share with others about a bike ride. This ranged from seasonal specific information like what certain routes were like in the winter, spring, or dark nights, to how safe routes might feel for single women cycling on their own. One of the group was training to be a mentor for other new cyclists and she felt it could provide a good way for her to post what routes she had done with images and comments from the group and highlighted the importance of finding a group of 'buddies' for people to organize their own routes. There was however concern about those not part of a network being able to see activity or where people had been. All participants highlighted they appreciated the simple interface and ease of use in the design of the probe, but felt they would continue to need help in using such an application.

Our initial intention was to expand the technical development for Seniors Cycle to extend the website and phone application to improve its design. However due to technical difficulties and staffing, we were unable to take the design forward in a way that was achievable within the timescales of the project. Instead we looked at alternative ways in which geo-tagged information about routes could be made available and accessible for new cyclists and the terminology they felt was important when searching for routes.

## **Phase 2**

Our analytical approach taken to understand the data collected in phase 2 was informed by design anthropology where we drew together broad themes about people's perceptions of their cycling activity with the aim of developing insights for the design of technology. This has involved organising the disparate elements of visual and textual data collected to draw attention to:

- **terminology used by cyclists to describe routes and preferences**
- **motivations to cycle and find routes**
- **how technology supports new cyclists to find routes**

Our 'Wheels of Qualities' were specifically designed to map out terminologies with a focus on environment, socialising, feelings and preferences for particular cycle routes. In drawing routes on maps during our pop-up labs, this also helped to draw attention to how cyclists further described their routes in relation to a geographically accurate map with specific cycle paths already identified. 'Routes of Joy' maps drawn as part of the home packs were more open and notational, highlighting what people described as memorable in relation to their 'Wheels of Qualities'. Field notes from bike rides with groups of people further helped to identify specific terminology people used to describe their routes and what was important for them. Conversations in the form of follow-up phone calls, interviews, and note-taking at the Cycle Hub as part of the pop-up lab gave further depth to people's personal motivations and stories and how technology further supported route discovery. In the following section, as an organisational device, we provide a selection of quotes from our Conversations, maps and quotes for each data set including, Wheels of Qualities, Specific Routes and Routes of Joy.

### *Conversations*

The conversations we initiated with people were often brief and fleeting either as part of longer cycle rides or as part of being at the Cycle Hub. These conversations presented here did not lead to further more in-depth conversations or mappings, but were useful in further expanding what it a 'new cyclist' was and how they had returned or started to cycle after a period of not cycling. What we include here is fragments of conversations, but for reporting we have chosen to pull together quotes that more specifically highlight different qualities and concerns not surfaced in the other forms of 'correspondence' with cyclists and highlight people's motivations for finding new routes associated with particular circumstances.

For instance, Gordon, an older gentleman who had come to the Cycle Hub with his friend for a cup of tea no longer cycled but was in discussion with the Hub about their electric bikes.

'I'm in my 80s now and getting up these hills (puffs and rolls eyes) pffffff, and I've put on some weight you know and I'm not as trim as I used to be (laughs) but I'd love to find places that I could just potter along, you know and not try too hard. I've been thinking about on

electric bike, just a bit of extra power. I've heard they're pretty good for the likes of folk like me who are getting on a bit.'

Gordon, 82

Geraldine however described how she was more tagging along a little bit with her husband who was much more interested in the cycling and had been for a long time. She enjoyed going for rides, but was starting to get tired of going on the same trips, but did not know where to look to find new ones.

'I started cycling with my husband about a year ago but we do the same routes like this coast one, which is great, I don't mind that but I'm getting a bit bored of the same places and would like to find other places but where to start?'

Geraldine, 56

For Lois was at the Cycle Hub with a group of young men as part of her job to encourage people to cycle. She'd made a decision to cycle more a few years ago, and had found cycling with others a great way to get started.

'I was really interested in getting on my bike again after several years of not going anywhere on it so I joined a club near where I live which was really satisfying. It was for all women, so this really helped boost confidence because I was worried about being too slow or not very good until I realised that everyone was worried about the same sorts of things – so that was great. Everyone I met had these amazing stories about why they'd come to cycling and how it had helped them cope with different things in their life and that in itself was uplifting. So I wanted to take that feeling with me into my day to day so started to cycle as much as I could to commute and at the weekends much more on my own as well as with the groups and friends and so started looking for routes as part of that. I also take teenagers at risk as part of my job now so they get to experience cycling once they've got over the helmet embarrassment!'

Lois 36

Phil who was at the Cycle Hub having his breakfast on his way to work described how he had decided to cycle when he changed jobs and there was no direct route on the bus. He didn't have a car and he did shift work so it gave him more flexibility.

'I come here (Cycle Hub) all the time on my way to work, gives me a bit of peace and quiet. But I started cycling when I changed jobs to work down near Wallsend and there was no way I could get to where I needed to go at certain times of the day, because it's shifts, so it was much easier for me to get a bike. Still learning though and I've had to get the gear, but it works for me.'

Phil 27

For Shelly cycling was more of her husband's thing really, but she came to the Cycle Hub in some of her free time because it reminded her of when the kids were young and they would all go off on cycling adventures together.

'Well I don't bother so much now, because the kids have grown up and we don't do big cycling holidays and trips all together, can't remember the last time we did one actually. They were pretty mad, we'd have all this stuff with us on the back of the bikes and we'd be prepared for anything, but the kids loved it, especially when they got better on the bikes, going up hills, going down hills. But it's nice to come to the Cycle Hub every few weeks as it reminds me of those adventures, and it's just nice to be around that again.'

Shelley 48

Salma who was taking part in the beginners sessions at the Bike Garden in Nuns Moor Park had borrowed a fold-up bike from her daughter, and had got into her cycling after that.

'I just come on these sessions to try to get better, but this bike is pretty old now, it doesn't have any gears or anything like that, but it doesn't matter, as long as I can have a bit of a potter and get out on it and Esra (bike leader) tells me what to do and helps with tyres and checking the bike, because I wouldn't really know what to do otherwise.'

Salma 62

Mark was taking part in beginners cycling sessions at the Bike Garden. He was with Zak and Jamie, who had learning difficulties and they had been coming once a week to get some bike training.

'I'm hoping that as we do this and we keep doing it, they will get better, but I'm not sure they'll be able to go out on their own on the bikes eventually as they both need to be told when to be safe. These rides are great for both of them because they both like to do slightly different things on the rides, like Zak just likes to go off and do his own thing and we can do that on the town moor, but Jamie prefers to stay with me and he likes having the company and the chat.'

Mark 47

Sam had been coming along to every beginners session since they had started over a year ago because each week he got to meet new people and learn about bikes.

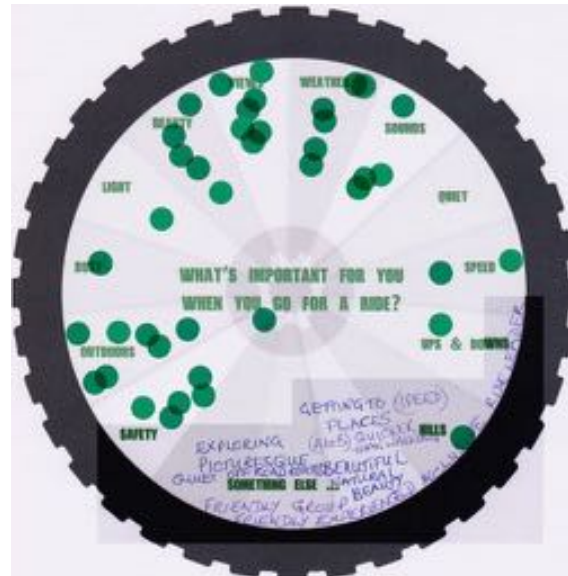
'I come every week cause it fits in with my work, and it means I can get out. We tend to do the same routes and every week it gets longer because there are more and more people coming cause it's become so popular, which has its good and bad points. So it's good because I can chat with people, but then it does take a long time to start, get signed in, get our bikes sorted, but then I can just go off for a while and cycle in the park before we go. It means I can help new people get started too if they've never been before.'

Sam 34

### *Wheels of Qualities*

Cyclists who discussed their experiences with our researcher or filled in a home pack identified 1-3 words they identified as being important in terms of environment, sociability, preferences for cycling and how they felt when cycling. The words were chosen by placing a coloured dot sticker onto a wheel. People could also write their own words if they felt we had missed something.

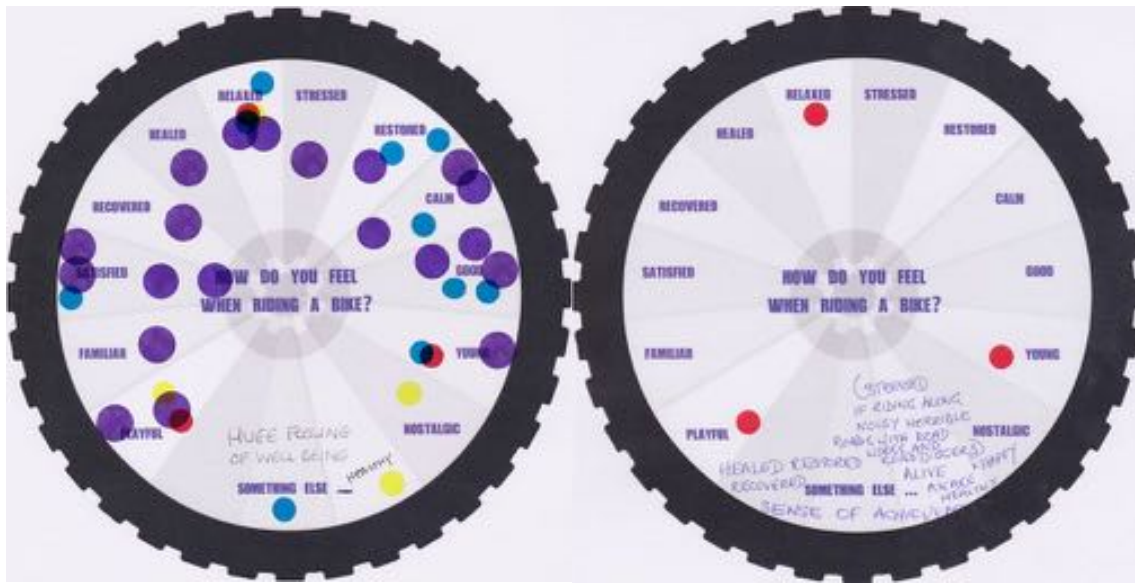
*Environmental importance:* People reported being outdoors (7) and views (7) as the most important aspect of environment with weather (6), safety (6) and beauty (5) being of slightly less importance. Sounds (4), speed (2), ups and downs (1), hills (1), busy (1), light (1) were reported as being of less importance. Cyclists also used words such as ‘explore’, ‘picturesque’, ‘off-road’, ‘natural’, ‘friendly’, ‘experienced’, and ‘inclusive’ with reference to ‘bike leaders’.



*Sociality:* People reported that being part of a social group (6) was preferred with both friends (5) and new people (5). Cafés (5) were also seen to be important and the act of going along with (4) chatting (3) and talking (3) as preferred. Cyclists also chose family (2) joining in (2), visits (2), dropping by (2), and popping in (1), also adding 'organised guided bike rides' as a further preference.



*Feelings when riding:* People reported feeling relaxed (6), good (5) and satisfied (5) when riding a bike, but also playful (4), calm (4), restored (3), young (3), familiar (1), healed (1), stressed (1), recovered (1), and nostalgic (1). Cyclists also included the following terms: 'huge feeling of wellbeing', 'healthy', 'sense of achievement', 'alive', 'awake', 'happy' 'stressed if riding along noisy horrible roads with road works and diggers'.





*Reasons for preferring cycling:* People reported freedom (7), exploring (7), distraction (6), discovering (6), flexibility (5), meandering (3), dynamic (2), and choice (1) as their reasons for preferring to cycle. They also added 'fitness', 'free gym', 'challenging', 'social', 'quicker than walking to places', 'exercise', 'fresh air', 'getting out', and 'speed'.



### *Specific Routes*

In outlining specific routes people chose to discuss during the pop-up lab at the Cycle Hub, we have brought together the routes drawn with quotes taken from notes. These have been placed next to the specific locations that people discussed. We have accompanied these annotated maps with further detail from the conversations with cyclists to flesh out some of the backgrounds of the people we talked with to contextualise their journey.

### *Retired Friends Pete and Morris*

Pete and Morris were regulars to the Cycle Hub and always looked for good places to eat cake on their bike rides. They owned their own dental practice together and retired 2 years ago.

'I retired and I was looking for something to do you know and my friend here he was always heading on trips and the likes and having a good time and I thought that sounds pretty good, I'll have some of that and so I just started tagging along – he's been my mentor and guide really – and now I can't get enough. I got all the gear and that was it – hooked. We find places to go when we're looking for something new – a bit of an adventure – where should we try today type of thing – usually following our stomachs to good cake shops and cafes.'

Pete

Morris highlighted how he found routes to go on through looking up places on the National Cycle Network website and then trying them out with Pete. Morris described himself as much more of an experienced cyclist than Pete, but that he enjoyed showing him the places he had found over the years and clearly Pete enjoyed sharing this experience with Morris.



### *Cycle Trainer Jim*

Jim was a very experienced cyclist and had been cycling for as long as he can remember and now trains others how to cycle safely. He takes people on rides from the Cycle Hub because he feels the paths are relatively good and safe. But he described how he had to think carefully when training others because so many of the cycle paths take you on the road which few people have experience of.

'I know quite a lot of routes 'round and about when I'm taking people on cycle training, but I do sometimes need to check new routes out for leisure. It's just very different when you're thinking about new cyclists and there's a group and everything – thinking about how safe and comfortable they're going to be. There are lots of routes that are pretty challenging for that reason – you take your life in your own hands – you know some of them (paths) just disappear, so you have to think carefully about how you deal with that or just avoid it altogether or find ways around it.'

Jim

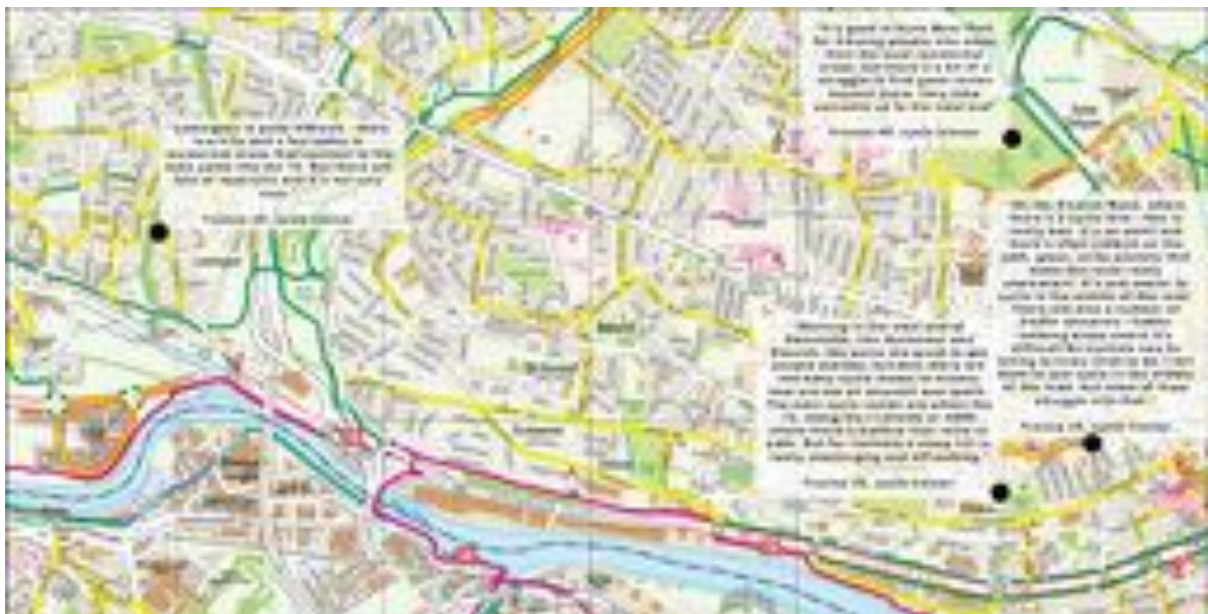
Despite Jim being an experienced cyclist he still regularly checked out routes digitally.

'I look at Google Maps as my first port of call to get a sense of where I need to go and then I export a GPX file to GPS visualiser to get the right co-ordinates and that sort of thing. But to be honest it still doesn't give you a sense of what a route might be like. It can tell you how

long it is, how fast you might be able to travel at, but there are some routes you just wouldn't want to go because it doesn't feel very safe or there's always a lot of glass on the road or paths or parts of the path just disappear.'

*Cycle Trainer Yvonne*

Similarly cycle trainer Yvonne had an acute awareness of some of the particular challenges facing new cyclists in particular when there were confronted with hills and awkward cycle lanes. Through the Cycling in the City scheme, she had to expand her usual network of well-known routes for those where there was little or no physical infrastructure. Where there was dedicated lanes, she highlighted these were often inadequate or not well-maintained, but this was hard to see just from a map.



### *Retired Friends Marta & Sonja*

Marta and Sonja had been coming to the Cycle Hub since it opened and cycling wasn't that much of a big deal back then. They travel once or sometimes twice a week down from Benton for a potter about and a chat as it's just long enough for what they call a cycling stroll and it means they can get further than they would by walking. They took up cycling after their children had grown up and left home so they could have a bit more time getting out and relaxing.



### *New Commuter Sheila*

Sheila regularly came to the Cycle Hub as part of training and the Cycling in the City scheme. She'd taken up cycling to help get some regular exercise and help keep her calm as she suffered with anxiety on a regular basis and had to take time off work.

'So I took part in some cycling training schemes and I loved it and luckily on some of the sessions we went right past where I work and I started thinking well that's something I

should probably look at doing. So I started looking for a simple way of getting from my house to work.'

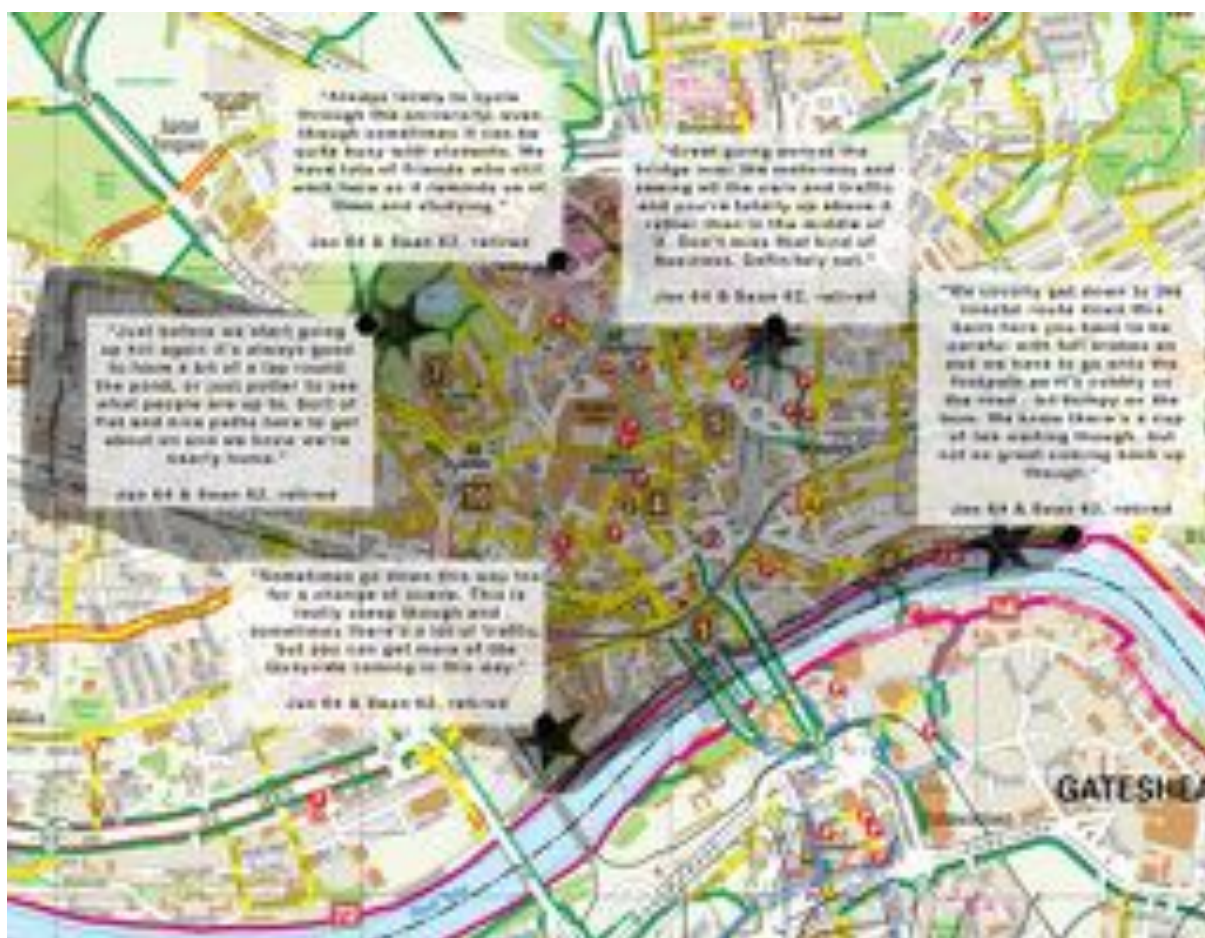
Sheila

Sheila also discussed how she found her route to get to work.

'When I realised how I could cycle to work, I looked on Google. I typed in a route on Google maps at home on a big computer screen, like my commute to work I typed in my home address and the school address and then looked at the different options cause it usually gives you a few to choose from right. And then I went out with my husband in the car and we tried them out in the car, just looking at what it was like. We drove the different routes so we could see what looked best. With my cycle to work, it took me several goes because when I drove it with my husband, it was after work and it was really quiet and that felt like 'yeah I can do this' even though I had never done it before and I really didn't know my way. But then when I was going to work it was busy, so it felt really different and I didn't feel that safe, so I had to try some of the other ones and then each time I went I found other ways, cheeky short cuts, that sort of thing. I have two main routes that I take now, depending on how I'm feeling and the weather you know, and I can vary it because I've done it a lot now.'

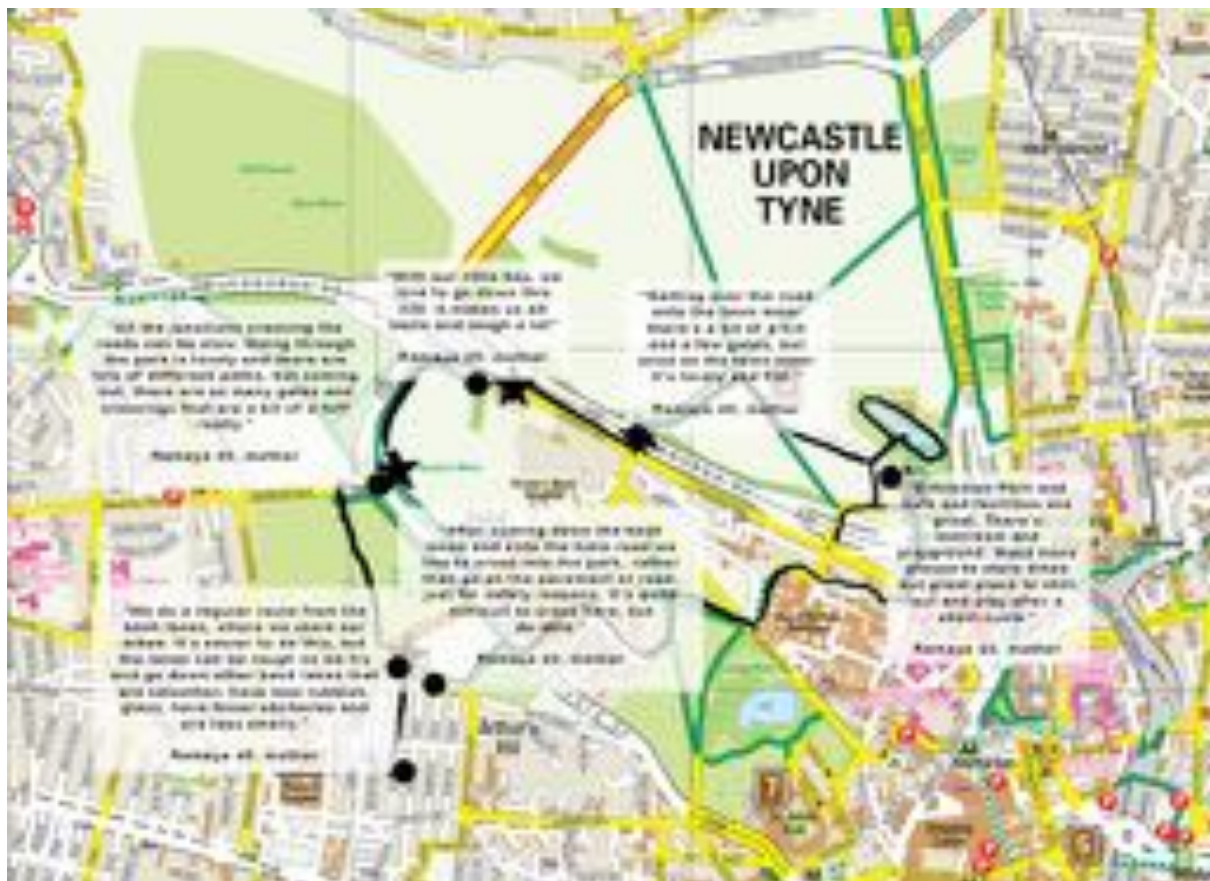
### Retired Couple Jan and Sean

Jan and Sean were a retired couple with a grown up family and grandchildren. They had bought their bikes when they first retired a couple of years ago and not have the confidence to go out on them where they lived. Jan had joined the beginners bike rides at the Bike Garden in Nuns Moor Park, but had soon found that the rides were quite limited in where they could go. With some of their friends they began to go on longer bike rides to build their confidence, but they didn't really like to do this on their own so always went out together, making sure they found good places to eat and drink and rest on the way.



## Mother Ramaya

Ramaya went to Nuns Moor Park a lot to train her young son how to bike ride. Now he was getting the hang of it they ventured out more onto the Town Moor so they could get access to some other playgrounds and cafes. She found this route by having a look online for cycle routes from the park and seeing others cycling across the Moor regularly.



'I try and cycle to work most days and me and husband, used to go on fairly longish rides, like a couple of hours sometimes involving a few hills. Our little boy would be on the back. But now he's older and he can ride a bike on his own and he enjoys it, so it's much easier to try and find places that he can go as well – that we can all do really. But it's made us look differently though at what makes a good place to cycle, because we've had to teach him what to do at traffic lights and that sort of thing, junctions, crossings and that makes us think twice about what is feasible, but also what's enjoyable. Are there enough fun bits, like going down hills or a café, relaxing bits to compensate for awkward gates or lots of twists and turns or dangerous bits where you have to think and take your time?'



### Returnee Cyclist Rebecca

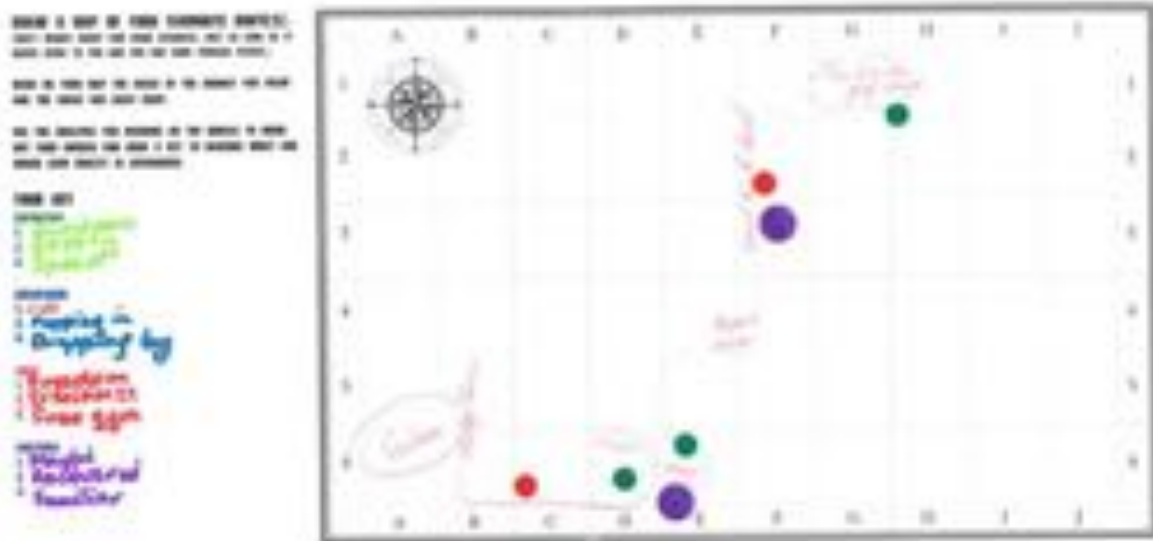
Rebecca hadn't been cycling for years and then saw some opportunities for beginner cyclists at the Bike Garden in Nunsmoor Park. She had always cycled as a student but had got out of the habit once she had a family. Now she was keen to get going again and had traded in her car for some money and was going to buy a second hand bike to see how she got on. The only routes she knew about were the ones she had gone on while on beginners' bike rides.



### *Routes of Joy*

Mapping specific routes as part of the pop-up lab during the day time limited who could contribute, so the home packs gave us an opportunity for a wider group of participants to detail their own journeys in their own time with a follow up phone call conversation. In the following section we show each route with accompanying snippets of conversations that help give further context to some of the drawn routes and personal keys illustrated here.

### *Oriana 31, researcher cycling 5 yrs*

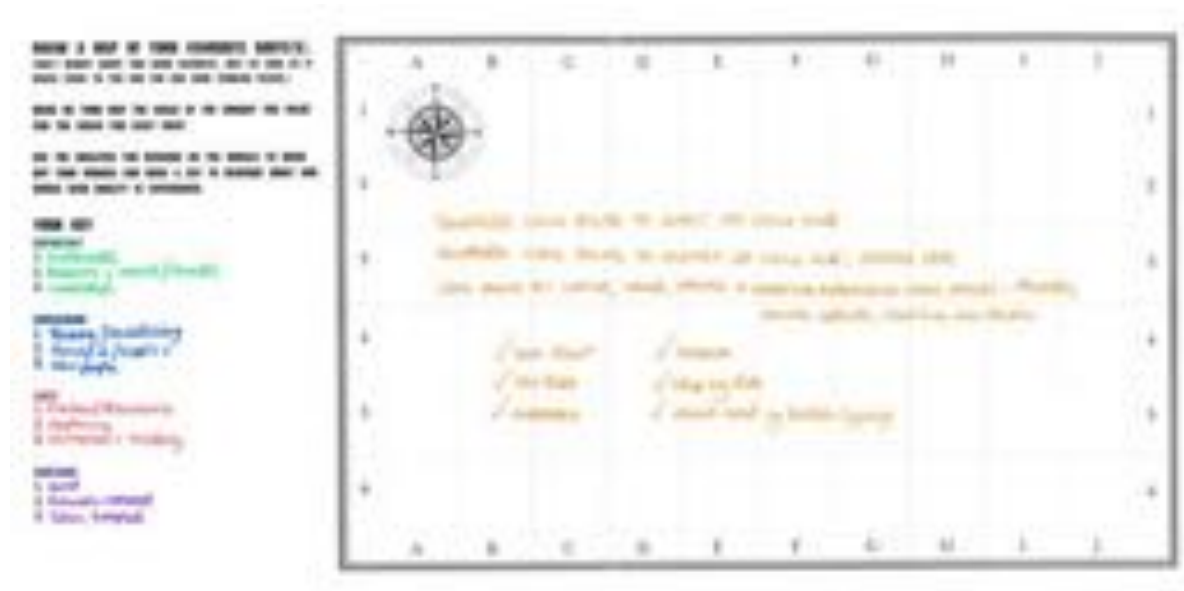


‘This sounds obvious but it’s important that I get outdoors, that’s the main reason I cycle rather than anything else, so I choose my routes to give me access to big spaces, like the Town Moor which is also safe and gives me a chance to pick up some speed. I tend not to socialise on my bike when I’m heading to work, usually in too much of a rush for that sort of thing, but in my free time I head to Parklands Golf Club via Regent Centre, where I drop in and visit friends. It’s a good cycle – a free gym and workout cycling across there, and it gives me a sense of freedom and things are changing, it’s dynamic and I have to think all the time, it allows me to have a bit of a play with speed, but also a bit of recovery time from work, especially as the route is so familiar to me now.’

‘I cycle home to work most but everywhere I can in the city really. I’ll sometimes chat with my housemate about some of the places she knows about and I’ll often check the weather

before going to work and sometimes use a map on my phone to find directions on the go, if I need to find somewhere new.'

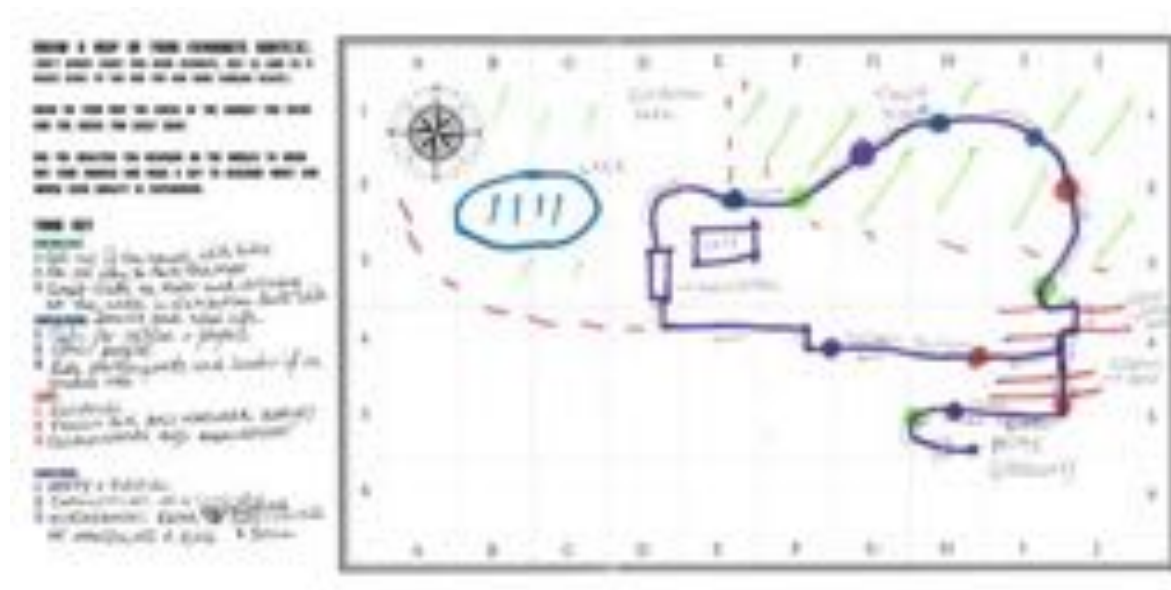
*Lauren 43, Educational Trainer, cycling since childhood, but more recently last 2 yrs.*



'The main routes I do are with organised sessions, like the Quayside to coast, or to the countryside. I usually like visiting cafes, like the Hub or Staithes café. I love being by the water, trees and nature and just being able to share my experiences with others, like friends, social groups like at the Hub and meeting new people. I really appreciate the beauty on these routes, yeah there are a few places that are a bit rough round the edges, but the views and sounds by the river are stunning, especially if you get the weather. There are lots of points on the way for talking to people and these routes give you a bit more of an opportunity to be flexible, to discover for yourself. I always feel restored after a cycle, like I've caught up with myself.'

'At home I use health apps like Strava on the computer and my tablet and check for cycling groups, at the Cycle Hub, if they've got any events happening, Bike Right and Sky Ride and Google maps for distances of some of the rides. At work I sometimes check my emails from the Hub and Sky Ride to see if there is anything interesting happening – in breaks of course!'

Maryam 55, unemployed mother cycling 2yrs

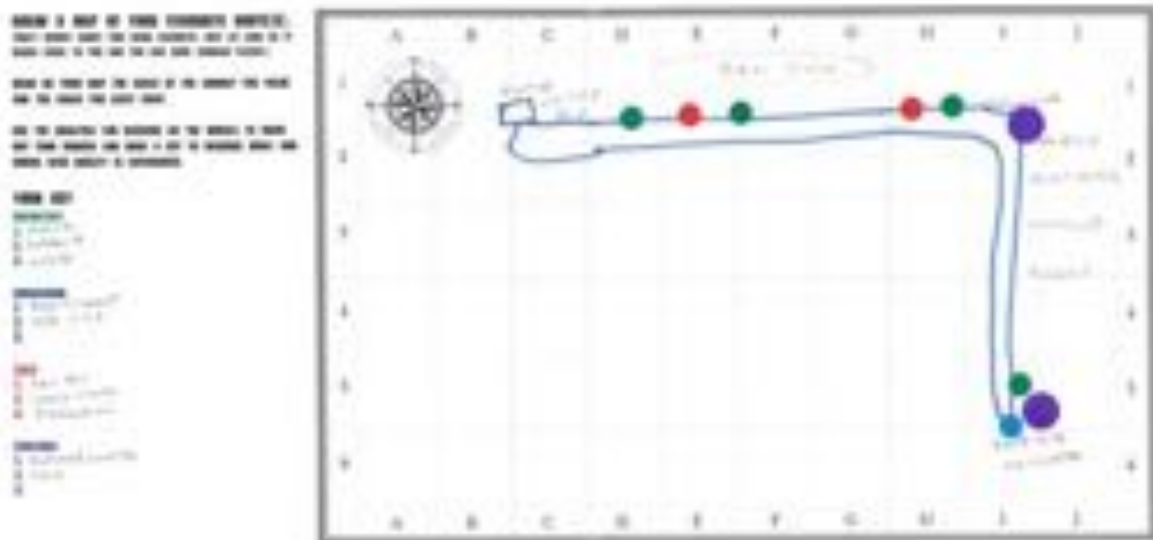


'I go on ones (rides) that are organised, they're really friendly and inclusive, so I look for that when I'm looking for routes. It's important for me to get out of the house with a bike and the best route for me is coming from Jesmond and onto the Town Moor, arriving at the Lake in Exhibition Park with ducks and wildlife. I love going to the café for coffee and a read of the papers, but you just meet so many other people there too, and there's loads of space for group rides just going along with one another having a chat, meeting new people. I like the fact it is much quicker than walking to places, it feels like proper exercise, fresh air and natural beauty, and I like to explore some of the picturesque off road routes when I go on a ride, and I look for these kinds of things when looking for routes. I also like the fact I'm learning how to co-ordinate my movement on different paths and gateways – this gives me a big sense of achievement – it doesn't sound much but for me that's a big deal. If I get it wrong, like riding along noisy horrible roads with road works and road diggers, that's not great. But on good routes I feel really happy, like I'm really awake and alive. It's not just about it all being easy or anything like that, I like a bit of a challenge, in a good way because this helps me overcome the fear of some of the busier routes and helps me develop confidence in handling a bike and improving my skill.'

'I've been going on guided bike rides with a friendly group (usually Sustrans), Breeze Rides, Active Newcastle. Sometimes I cycle independently to become autonomous and get around

I've taken lessons with 'Bike Right. I've been looking at websites at home to find out what organised rides and other related activities are available and suitable. I go on Facebook quite a bit to see what bike related activities are available and taking place and there's always photos and information to help give a sense of what is happening. I also ring up to talk to group leaders like Sustrans, Breeze, Get Active (Council), websites.'

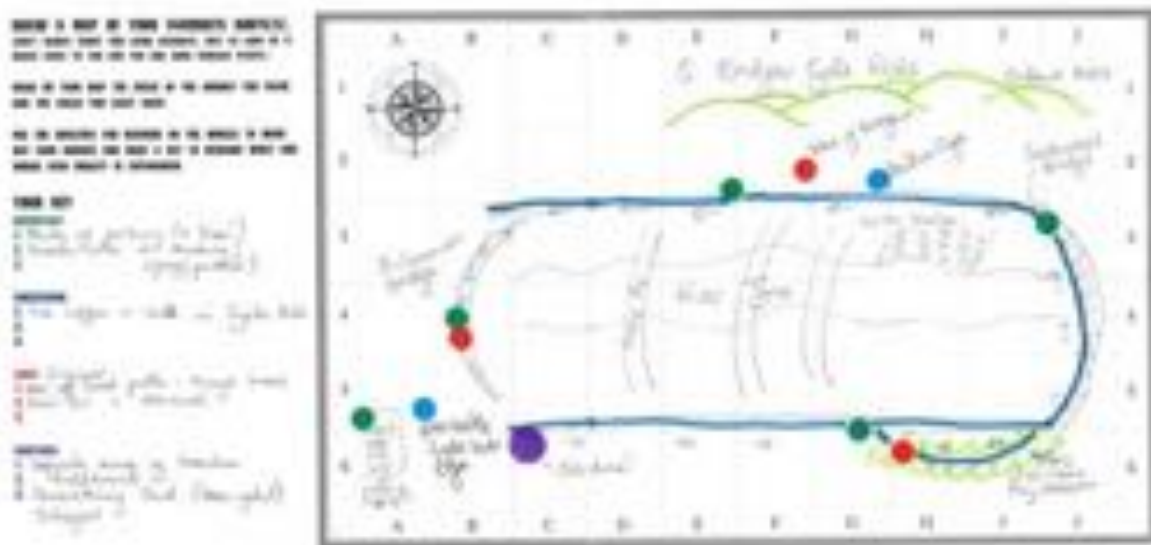
*Gail 47, Marketing Manager cycling 1 ½ yrs*



'I cycle with my friends and family regularly between Whitley Bay and the Cycle Hub, taking all the special bits in between, the sea front, Tynemouth, Fish Quay, Royal Quays, Wallsend, Byker and then arriving at the Hub. There are so many special views and the sea air, all along this path, is such a distraction, it's so relaxing and calm and it's important for me to spend time catching up with friends and family on routes where we can chat.'

'I go on social rides with friends and family and organised groups usually including coffee and a cake stop. I'll usually check on my computer at home for Sky Rides on the website to see what's available. When I'm on the move I'll be using my mobile phone to check weather and while I'm at work I often check emails as I will get a weekly update from Cycling in the City. I use my Fitbit and Fitness Pal to help understand how much regular exercise I'm doing.'

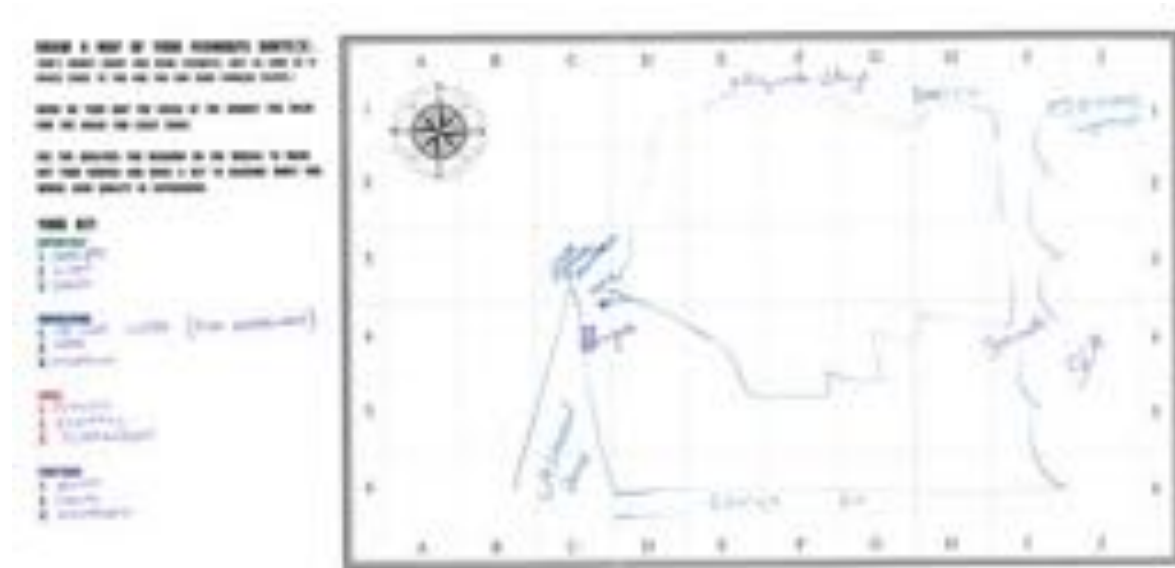
*Joy 61, retired cycling 50+ years*



‘What’s important for me is that there is plenty of parking for the bike and my camper van which is free, somewhere on the route so I can stop, and possibly go for a bit of a wander or just look at a view, like views of bridges, like the Millenium Bridge or Scotswood Bridge or like there’s a section just off Scotswood bridge which has trees and wild roses and may blossom at certain times of year. It’s important for me to do rides with my partner or to be part of a group, like a guided ride and I’ll also look for somewhere where I can have a nice coffee and cake and the route I usually do has 2 great places to go, Newcastle Cycle Hub and Staithe Café on the other side of the river, where I can stop and chat with friends or other people out and about. What I like to do is find routes where I can discover like a new off-road path through the trees and I love the fresh air and exercise I get from it. It gives me a definite sense of freedom, fulfilment and satisfaction. Cycling also often helps me remember my dad, who is dead now, he was a really keen cyclist.’

‘I tend to like social rides with groups and I cycle on weekend breaks in my camper van and enjoy cycling to work as most of it is off road (from Wallsend). I’ll check for a weather report on my phone, using like BBC weather to see what I kind of - stuff that I might need to take with me. I’ll check out sky rides website and get emails from Active Newcastle, Cycling in the City and from the Cycle Hub, giving out links. But I’ll also have a look at local Sustrans maps for cycle paths and routes.’

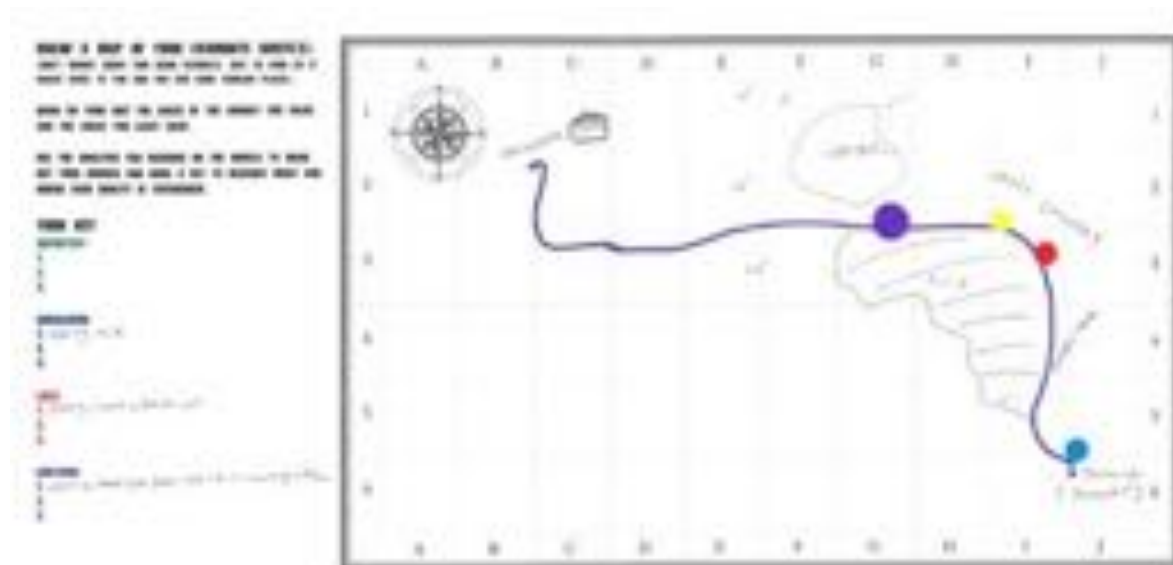
*Jeff 50 Engineer cycling forever*



'I had a knee operation and it was totally painful for ages, but now it's like ... now I've had the operation I already feel tons better. I got my bike ready before the operation to motivate me, give me something to work towards, but I know I'll have to take it easy at first. I won't ... I don't think I'll be able to do the same as I used to for the time being anyway.'

'Always use the app on my phone for maps and music if cycling along on long distances.'

*Kai 32, researcher cycling 2 mths*

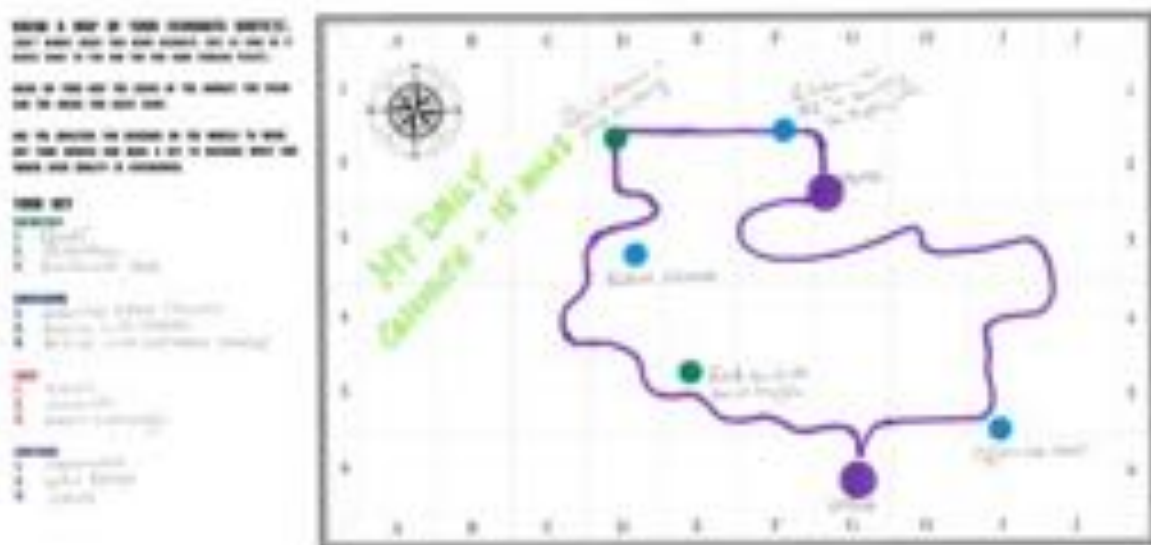


'I check the route (fast) for getting to my destination and also the weather app on my phone usually before I set off somewhere. But definitely like to check more scenic routes when on holidays and find out where to eat on the way. I'm always checking the weather when I'm in work and making cycling playlist on my phone (like to listen to music very quietly ...). I use the health app on my phone to see my heart rate / oxygen level just for a laugh!'

I take a regular 20-40 minute trip to the shops with my husband, usually across the Town Moor and I fit in a regular family visit, to my parents in Jesmond too, for dinner or just a chat. It's a nice space to just go along side by side on the Moor and it's really pretty, and you feel like you're getting a lot of fresh air. Even though it's so close to where I live I feel like I am in the countryside with the lake and the fields, it's like I'm somewhere else.



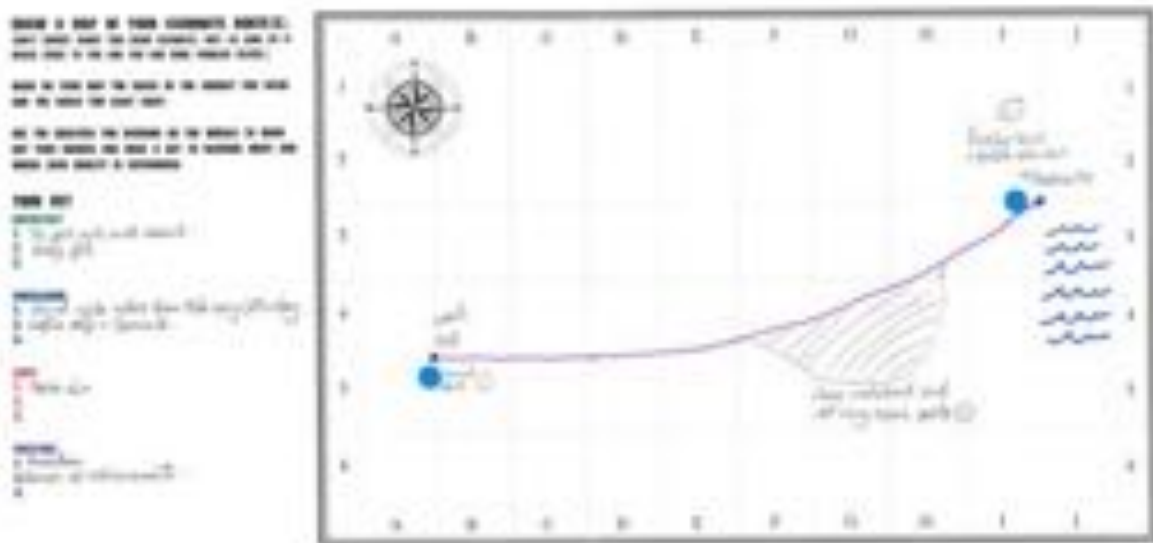
*Karen 49, Administrator cycling 5 yrs*



‘My daily route is 15 miles and it’s a circular route from Wideopen to Newcastle, which keeps it interesting. From home I take a bridge over the A1 avoiding all the traffic jams, which always makes me feel pleased with myself and I get to greet other cyclists and mix with other people, walking their dogs who I wouldn’t meet if I was driving. Then I’m onto quiet tracks, where you can only hear birdsong and usually in the morning it’s pretty amazing to be surrounded by that. I pass a nature reserve which is always a good view and a joy to see all that wildlife and then take some back roads to avoid more traffic and this is a bit of switch off time for me, often finding more peaceful routes before I get into work. On the way home I take a shorter route, but one where I hopefully see some deer, not always but it keeps me on my toes looking out for them. The route isn’t set in stone as I see what the traffic and weather is doing so this means there’s a daily challenge but this is all part of it. I get a lot of happiness from doing this, it gives me a tremendous sense of wellbeing and calm.’

‘I use my laptop and tablet to access social media groups and clubs at home to find out about rides and I use a Garmin to track my rides for a bit of fun really. I plan my own routes with Google Maps, often at work using my phone. I also use Facebook on my mobile to make contact with friends and clubs.’

Donna 46, Finance Officer, cycling 4mths



'I go on social rides either joining ones that are organised or organising something with my group of new cycling friends, who I often meet every Saturday at the Cycle Hub. I want to get out and about and keep fit and get some fresh air and do a bit of exploring and have a chance for a good chat with people. The main route we regularly do is the Hub to Tynemouth, there are some parts that are more wasteland and not very scenic but once you get to Tynemouth there are some lovely views and fresh sea air, so it's worth it, oh and there's always a coffee stop in Tynemouth, which is always appreciated.'

'I check the weather app on my phone and sometimes on my tablet and I use Google maps at home to check out routes and see how long the ride is in miles.'

*Rene 25, student cycling forever*

Rene received a home pack, but then go in touch with us because he preferred to talk through his experiences of cycling rather than answer questions. Our researcher met with him to discuss his particular experiences of cycling in Newcastle. He talked extensively about the differences between where he used to live and cycle and how he tried to manage navigating in a new city.

'I moved to Newcastle to do a course and thought it'd (cycling) be the same as where I used to live, where it was dead easy – dead straight forward and dead flat. It's not like that in Newcastle at all, so that was a bit of a shock. I'd checked out where I needed to go on Google Maps beforehand when I needed to get from my new house to the university. I put the directions on my phone, played it back on my Bluetooth headset and found myself on the dual carriageway at rush hour. I had no idea. Cars were beeping at me and everything – the hostility was immense – it really shook me cause it was so different to what I was used to. So I had to find other ways I could get to where I needed to.'

When I'm choosing a route, I don't like to go somewhere too complex, with stops and starts and through different areas where I don't know. It's really useful when things are familiar because all the city is still new to me. On this one journey I did yesterday I was meeting someone in China Town and I had to get to there from the Coach Lane Campus. The route I was given (on Google Maps) was too complicated to follow and it felt a lot easier if I just tried to follow straight lines. The route it gave me to start with were main roads and estates with snickets into the park and I was like, I couldn't visualise where I was going. I would prefer straight lines rather than these hiddy biddy twists and turns like this. Often it's not just a case of the quickest one (route) as this might be the most dangerous one as it's often on the road. But the quietest one (route) might be a more gravelly path or through some woods, or a housing estate which might not feel safe. Google maps simplifies so much that it makes it difficult to make a choice, because what my safe feels like might not be the same safe as someone else.'

‘When I moved to Newcastle I found that Google Maps really wasn’t that great for finding the best ways to go for me. It tends to focus on the quickest way and doesn’t really give you a sense of the different terrains and types of roads you’re on. So I use a variety of things now, maps, websites, apps. So I start with Cycle Streets on my computer and look at the different stages of a route and I choose a route that is highlighted as safe rather than quick. I export the GPX file and upload to another website – can’t remember the name now – and then I look at this route on satellite view on Google Maps and edit the route on this visual website. I save it and then view on my phone and I’m able to download this into OSM (Ordnance Survey Maps) Android, download each section onto the app and I can then store all of this on my phone and turn on the navigation in my ears and I just go where it tells me. This means I don’t need WiFi or 3G or whatever, cause sometimes you lose connection and your navigation in your ears goes and you’re stuck and it’s like ‘what do I do now?’ This is the only way I know how to get around and it’s like this for all our generation now. This is how we’ve learnt to get around, when someone gives me direction, I don’t remember details of the locations where I need to go, I just rely on this thing to tell me.’

## DISCUSSION

### **How can digital technology be configured to leverage local route knowledge to increase the confidence of new cyclists?**

In our final section we return to our initial question and draw attention to future opportunities for technology design. We do so in relation to capturing and responding to a diversity of experiences associated with finding new routes. Prior literature and our review of existing mobile phone and web design for cycling has shown a predominant privileging of a particular kind of user, by focusing on health data associated with fitness and exercise, or speed and efficiency to move people from A to B. This has potentially been at the cost of a broader range of health and wellbeing factors including how new cyclists feel and what they look for in their routes, how they socialise and feel connected with place. With powerful tools available for mobile phones, such as Strava, city councils are increasingly looking towards big data to enable greater understanding of the movement of cyclists. Yet such tools can limit the view of cycling activity by focusing on the most common aspects of a journey associated with co-ordinates and measurements of time and location. As Le Dantec et al. (2015, 2016) show in developing apps that complicate such mappings, greater curation and interpretation is needed when a diversification of data is presented. It is therefore increasingly important for technology design to respond to the diverse interests and challenges to improve infrastructure and knowledge available to cyclists about their environment to not only take notice of what is already being used, but what also might seem peripheral or diverse use across a number of different constituents.

In this next section we discuss implications for technology design that takes into account such peripheral and diverse cycling activity in relation to the following categories:

- **terminology used by cyclists to describe routes and preferences**
- **motivations to find new routes**
- **technology to support new cyclists to find routes**

### **Terminology used by cyclists to describe routes and preferences**

In drawing from the terminology used within Den Hoed's study of life-long cycling in Rotterdam, we focused on terms that were purposively different to those found on existing websites and applications for cyclists. The terminology highlighted was inherently more positive than negative to highlight the factors that people felt motivated them to continue cycling. The four categories of terms we used broadly fitted within environment, socialising, preferences and feelings. In mapping these qualities terms such as being outdoors, views, weather, safety and beauty were identified as the most important in relation to the environment. In terms of sociality being able to ride in social groups, including both with friends or new people with access to a café was considered the most important. People reported how cycling was important to them because it offered them freedom from travelling by car or on foot, enabled them to explore other places, how it offered some form of distraction from their daily routine and helped discover places they would not usually be able to get to. Finally in reporting feelings associated with cycling, most commonly reported feelings of relaxation, feeling good and satisfaction if their route had been challenging, and sometimes playfulness in being able to try out speed, movement and balance.

At the same time when describing specific details of a particular route to the researcher and marking these onto the map, people described much more of the complicated negotiation of the environment in relation to gates, hills, bumps, humps and issues around feelings of safety. Despite having to deal with such infrastructural issues, people still continued to cycle if there were enough positive features of a journey that made it feel like cycling was a worthwhile choice.

This wide variety of qualities and positivity in responses by all participants underline the potential beneficial effects of cycling on individuals as well as the positive atmosphere around (taking up) cycling in general. Yet within the UK, there are still only a small percentage of people that actually cycle as part of their daily activity. This positivity suggests that sometimes focusing on negative terminology highlighting issues such as safety is not always justified without considering the counter factors that potentially balance these experiences. It is important to bear in mind that a terminology of 'picturesque' environments, sociality, and feelings of nostalgia, achievement and freedom may have

profound effects in the domain of (psychological) health and wellbeing of a wide demographic, but that the routes themselves are not consistently experienced as such and they are certainly never experienced as trouble free, particularly in cities such as Newcastle. In this sense it is important that such a vocabulary is also balanced with an awareness of potential challenges, subjective experiences and time-based sensitivities.

Since many people described their journeys from home, routes often involved finding roads and pathways that eventually connected to dedicated cycle paths and lanes as part of the National Network. Inevitably cyclists were often dealing with a patchwork of infrastructure negotiating a number of environmental features such as hills, crossings and traffic in order to access dedicated cycle paths. Yet even when on a dedicated route there was no assurance for cyclists that a pathway wouldn't be problematic. For those cyclists who we spoke to, some challenges, such as gates and crossings were also opportunities for learning. Geographic areas that were considered not as welcoming or with poor quality surfacing were accepted as part of the journey because other parts were much more enjoyable and included a view, a café or opportunities for more relaxed cycling. For some cyclists areas of a route that they did not like also gave them a chance to explore alternatives and discover their own ways, thereby supporting flexibility in their route.

What cyclists therefore described was much more of a balance and compromise between the dedicated routes and much more improvised negotiation of infrastructure designed for pedestrians and cars. An expanded positive terminology and frames of reference for new cyclists potentially also needs pointers to some of the more situated negotiation and opportunities for learning that can also take place on route. In looking towards terminology that could support the development of a technology that could rate and review locations on a route, along the lines of App Movement, our study highlighted different kinds of vocabulary, not supported by current apps, that may be useful for new cyclists that potentially moves between descriptions and keywords associated with broad stretches of a route down to more specific details to anticipate more situated negotiation of infrastructure.

## **Motivations to find new routes**

Our initial focus was to look specifically at new cyclists, or those who had re-engaged in cycling after a period of time not cycling. In our first phase however, we recognised the importance of widening the scope to include other voices of those people who were in fact more experienced cyclists, but also supported others. This became a wider group of people, who discussed how they searched for new routes and what they looked for. This was interesting in two ways. Firstly it highlighted how although not everyone we spoke to identified with being a 'new cyclist' or being a 'cyclist' at all, because they had been cycling for as long as they could remember, they all described changes in circumstance that had led them to feel they were motivated to find new routes and then go out and discover them with others. These different motivations included:

- *People learning for the first time or coming back to cycling after many years of not cycling to improve their health.*
- *People leading others on cycling rides and training.*
- *People interested in doing more cycling, but lacked confidence or knowledge to know where to go.*
- *People new to the area; students, starting a new job or moving to a new house.*
- *People who were retired and getting into cycling now they had more time.*
- *People who had injuries, or health concerns that had impacted on their mobility and needed to find other ways of getting around.*
- *People who had young families and needed to find more appropriate routes.*

If considering cycling as an activity practiced by a range of ages, groups and abilities for a range of purposes, then people's awareness of routes is often changing over time as they begin to learn or continue to cycle. As was discussed by many people who were re-engaging with cycling, they were learning about routes in many different ways, from friends and family, to online searches and arranged social rides.

Those who we considered to be more experienced cyclists had particular knowledge of routes that they described as navigating differently if they were very familiar with them, or



it was the first time they had used the route. Furthermore, such navigation, although not discussed, would by necessity be experienced differently if a change in personal circumstance related to family, work, aging or health occurs, or due to environmental changes in seasons, weather, traffic or infrastructure. A route is therefore always potentially experienced subjectively and differently even if the route is in many respects familiar to the cyclist.

Familiarity with a route shared by a trainer, friend or online also gave reassurance and confidence to those who were unfamiliar. These in effect showed a trusted network of associates, recommendations and guidance that was given face-to-face, saddle-to-saddle on the ride itself or via online networks. More often than not, it was a combination of access to routes using mobile and online technology, face-to-face social support and embodied experience that helped those coming back to cycling to prepare for what was not known and gave them the confidence to go out and try a route.

Importance of sharing subjective experience and that being of value, being part of a community that was recognised and for those people who we spoke to, to be somehow relatable and connectable through both physical infrastructure, such as cafes, but also digital infrastructure such as websites and networks. As identified with some of our participants in phase 1, many of the cycling apps aimed at health and efficiency target a particular user who many did not identify with. Yet some also found these apps useful to track their exercise and recognise how much progress they had made. It's therefore important to recognise that both types of system may be experienced meaningfully, but there is potential value in supporting a diversity across connected platforms such as Facebook and websites such as Sky Social Rides, rather than as standalone apps.

It is currently unclear whether technology can significantly help to build confidence and support people in continuing to cycle, as much of the research on re-engaged cycling has not specifically focused on technology use. We would argue that any technology intervention does not attempt to isolate its use to the collection of physiological data in determining the health benefits of cycling. What is clear within our study is that technology is already an important way for many people to gently 'keep in touch' with cycling activity or

invest in sophisticated search and curation of their cycling experiences using a range of different digital media and tools, but it's not the only way that cyclists search for routes. With many cycling schemes having limited long-term financial support to invest in new cycling training, it is also more difficult to understand the longer-term potential of technology in supporting new cyclists at the current scale of investment. Yet there is also significant changes in infrastructure as cycling routes also begin to change, which new cyclists may feel the need for additional support in navigating.

### **Technology to support new cyclists to find routes**

A combination of mobile phone, web applications, and work arounds of the technology were described as being practiced by people to find and curate their routes. While wearables such as Jawbone and Fit Bits were also described, these were primarily used to monitor heart rate and speed. Most common across all the route finding and across the different individuals we talked to was a combination that brought together digital, face-to-face and embodied forms of knowledge making and sharing within cycling communities, whether this was with families and friends or more formally through clubs, regular meet-ups and training. We've identified 3 areas where technology could be most appropriately leveraged to support new cyclists in route discovery that is in designing for a) curation b) balancing broad strokes and detail and c) not re-inventing a digital wheel.

*Curation:* There were three ways in which curation of routes was described in the context of route finding, through mapping, music and on the spot improvisation. In mapping, key features described by people when finding and choosing routes highlighted how some searches would take place online via Google Maps or the National Cycle Network website. Some cyclists tweaked the routes they found on platforms such as Google Maps and had developed sophisticated ways in which they could interrogate the particular view of the route by using features such as Street View to get a better idea of what a particular route might look like. Some of the cyclists also described how they transferred these routes onto their phone as a set of instructions so they could listen to them as they were cycling.

One cyclist returning to cycling however, went the extra step of scoping out her route via car before trying it out on her bike in order to manage some of the unknown aspects

recognising the limits of platforms such as Google to highlight particular features that may cause significant problems or discomfort. Even when people didn't describe their search for a route via maps, they further described aspects of 'social' curation in choosing routes that were available as part of organised cycling activity using social media and websites to search and find rides that combined particular views and opportunities for sociability.

Secondly some cyclists described how they augmented their route by putting together a sound track if they were already familiar with it. This was to intensify particular feelings associated with a ride, of being somewhere else, finding an escape or providing a distraction. Finally there was a more improvised and on the spot form of curation when cyclists got to a particular location to find that it wasn't as they wanted and they preferred to try a different way or go and explore because another path seemed to be more interesting. In this sense what was described across mapping, music and improvisation was a combination of both pre-cycle and during cycle curation of routes, combining digital and embodied sense making.

We can imagine a number of interventions in this space that might combine auditory or sensory direction giving using headphones or wearables with soundscapes, nudges or music to act as local guides or buddies to support cyclists to explore further or collectively try out different routes.

*Balancing broad strokes with detail:* As discussed in relation to terminology, current apps and websites available for cyclists don't allow for search categories in relation to terms such as freedom, discovery, distraction or relaxation, but focus either on guiding cyclists from A to B efficiently or safely or on their personal health and performance statistics. Neither do current digital services available help to visualise and make available for cyclists shared issues and concerns, or opportunities for learning if a new cyclist. Our study showed that both ways of preparing for a journey in conversation with both broad experiences and specific detail for a new cyclist could be of value, in different ways. Firstly mapping areas with broad strokes could allow for greater recognition of geographical areas that are felt to support wellbeing in more than physiological ways and therefore help target future investment. Secondly by mapping such areas and making this available publically, this could

support new cyclists search capacity to make decisions based on wellbeing factors that are potentially important and meaningful for them. This enables a much wider variety of associations to be included in measurements of wellbeing as it is often a rich and generative term that can include many different perspectives (Scott 2012).

However this may also need to be balanced with more specific detail about particular routes that all cyclists, particularly new cyclists, will always need to negotiate and in some way be aware of. These might be time sensitive, as in some routes are busy during rush hour, but not at weekends, or some might feel safe in the day time but not at night or a cyclist is on their own. This kind of detail could not only be supplied by new cyclists, but by many cyclists who use particular routes. Most importantly is the idea of multiple layers or perspectives that could be used both by those searching for routes and those seeking to develop routes as a way of widening and diversifying the specific kinds of knowledge available in decision-making around cycling infrastructure from both a grass-roots, strategic investment and public health. It is important here to recognise that by limiting training to strategic and pleasant routes new cyclists would not build confidence in tackling challenging infrastructure. In an ideal world these challenges might not exist, and with future investment these challenges might be removed. However infrastructural changes can take a long-time to happen, so new cyclists do need experience to be able to be aware and tackle these issues in safe and encouraging ways.

*Not re-inventing a digital wheel:* Many cyclists and new cyclists are already using a wide variety of everyday technology from mobile phones, wearables and websites that support them in making decisions about where to cycle. It would be a challenge with such variety and the sheer mass of content and use, for this to be analysed systematically to gain a complete understanding of how new cyclists in particular are making sense of and integrating these different platforms to make them meaningful. From our study, there is some suggestion, as reported by cyclists, that these do provide some way to improving confidence in cyclists by providing a number of mechanisms for them to keep in touch with what is happening locally and for some, enabling them to find new routes that work for their particular geography and needs.

What is clear is that there currently is no singular way in which new cyclists are building confidence using existing technology and what is described is fairly messy with activity cutting across digital and embodied sense-making. It therefore makes sense to match that messiness and aim for technological plurality that potentially connects with existing networks and platforms, rather than building something entirely new. People were already using Google Maps and Open Street Maps via Cycle Streets and these offer routes but the search terms are directive based on safety and efficiency. Cycle Streets for instance have used the API for Open Street Maps to re-define search terms and alternative routes as per those provided by Google Maps. Yet most people preferred to start with Google Maps as the interface and visual structuring of information was easier to interpret and understand.

Social networks such as Facebook and website such as Sky Social Rides promoting cycling activity across the city, which cyclists described as sites they viewed most frequently, were also often done so in isolation of one another and specifically managed by organisations such as Newcastle City Council and British Cycling but often disconnected from the National Cycle Network with Sustrans. In sustaining plurality across different online resources and applications, one approach would be to better connect these different but associated sites more clearly to share some of the terminology and frames of reference that potentially resonate with new cyclists as an activity that they can get involved in and maintain.

While an AppMovement campaign may go some way towards enabling mapping of infrastructure, the way that cyclists are 'on the go' and experience place on the move, mean that the process of rating and commenting may be difficult to achieve in the same way as an activity such as breastfeeding as with FeedFinder. Furthermore, AppMovement does not currently connect with other platforms explicitly so data collected is not transferrable to other platforms. Services such as Waze (<https://www.waze.com>) live crowdsourced GPS navigation and map tool for drivers has also been adapted for cyclists (Cycle Wayz) for specific sharing of routes in Australia, again showing more localised and curated approaches to wayfinding is valued and beneficial.

## CONCLUSION

We have reported on two phases of a design anthropology study to consider the potential of technology to support confidence building in finding new routes for new cyclists. Our mixed method approach gathered insights from 56 cyclists ranging from 25-82 years young, the majority of whom were re-engaging after a significant period of time not cycling. Our study has focused on the city of Newcastle upon Tyne, as one of the recipients of recent government investment to improve cycling infrastructure in 8 cities across England.

The landscape of cycling is currently changing in the UK with significant investment and commitment to support more sustainable and healthier lifestyles. Many UK cities are in the process of improving existing routes and creating new ones in order to increase the number of cyclists on the road. In cities such as Newcastle upon Tyne, with low percentages of commuters travelling by bike, it is widely recognised that changes in infrastructure are not enough to encourage people to cycle. As is well understood in the UK, routes are specific to each location with varying degrees of well-established and accessible infrastructure for cyclists. Further to this, particular demographics, age, gender, health, socio-economics and perceptions of cycling can impact how much people cycle or if people take up cycling at all. Cycling training schemes have supported new cyclists or those re-engaging after many years of not cycling, to join sessions and social rides, with the premise that most adults learn to cycle in childhood and then stop cycling in early adulthood and middle age. Little research has however discussed the proliferation of technologies that currently supports route finding, but more specifically in relation to this particular population and how this may support confidence building in the future.

Current decisions on investment in cycling infrastructure are increasingly based on using combinations of large data sets to make sense of cycling activity using bespoke or commercially available applications such as Strava, traffic sensors and online surveys such as Common Place to encourage comments and ideas. Yet our study showed that many people who were returning to cycling and learning most commonly valued social networks and websites, alongside a range of fitness tracking applications, although this was less common. In order to find routes, searches with Google Maps and via the National Cycle Network were conducted to make sense of what to potentially expect on a bike ride.

Most importantly, in mapping a number of alternative terms that emphasised the holistic experience of cycling associated with wellbeing; environment, preferences, sociability and feelings, cyclists chose different terms than those ordinarily associated with efficiency and speed. This included environmental importance of being outdoors, views, weather and safety, importance of socialising in groups of friends, meeting new people, cafes and talking. People reported how cycling was important to them because it offered them freedom from travelling by car or on foot, enabled them to explore other places, how it offered some form of distraction from their daily routine and helped discover places they would not usually be able to get to. Finally in reporting feelings associated with cycling, most common were feelings of relaxation, feeling good and satisfied if their route had been challenging, and sometimes playful in being able to try out speed, movement and balance.

In purposely choosing a range of terms that emphasised positive connotations of cycling used by cyclists in the Netherlands, we also argue that re-thinking these terms in relation to how routes and places are searched and found using technology could greatly support a different kind of cycling engagement for those seeking to improve their confidence. Most significantly this would be to shift the emphasis away from efficiency and fitness to slower and more experiential qualities that new cyclists potentially find appealing and could identify more clearly with. We further argue that an approach to designing technology that offers opportunities for sensory curation that balances a broader view of experiences with specific details of infrastructure could also further help new cyclists see opportunities and challenges in infrastructure if framed sensitively using perspectives that are trusted and familiar. We further argue that it is important to design with a plurality of existing cycling apps, websites and social networks that support sociability and route finding in mind, that works towards and is mindful of connecting and linking across these disparate online sites and modalities.

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