



## **DAB the gift of the GAP? Augmenting Digital Audio Broadcast with Rich Data**

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Hewlett Packard Laboratories, GWR, Bristol University, ASL and Panasonic Semiconductor are collaborating in a Mobile Bristol project to explore the potential of Digital Audio Broadcasting through a series of user trials. Our first iPAQ-based prototype allows listeners to GWR FM to interact with a set of web pages broadcast alongside the digital audio stream and displayed on a small colour display. In a hands-on study, typical GWR listeners responded very positively to the experience of viewing web pages on a visual radio. Local news, weather forecasts, event listings, and details of the last ten songs broadcast proved especially popular. In forthcoming experiments, we will begin to explore the additional value of a wireless backchannel enabling listeners to interact directly with the broadcaster, for example to vote for records or take part in contests, and the opportunities created for DAB by broadband wireless and location-sensitive services.

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### Abstract

Hewlett Packard Laboratories, GWR, Bristol University, ASL and Panasonic Semiconductor are collaborating in a Mobile Bristol project to explore the potential of Digital Audio Broadcasting through a series of user trials. Our first iPAQ-based prototype allows listeners to GWR FM to interact with a set of web pages broadcast alongside the digital audio stream and displayed on a small colour display. In a hands-on study, typical GWR listeners responded very positively to the experience of viewing web pages on a visual radio. Local news, weather forecasts, event listings, and details of the last ten songs broadcast proved especially popular. In forthcoming experiments, we will begin to explore the additional value of a wireless backchannel enabling listeners to interact directly with the broadcaster, for example to vote for records or take part in contests, and the opportunities created for DAB by broadband wireless and location-sensitive services.

**Key words:** Digital Audio Broadcast, Digital Entertainment, Lifestyle research, Radio listening, Visual Radio, Mobile Bristol

### 1. Introduction

We report back on an interview study evaluating the relative merits of augmenting digital audio broadcast with “rich” data. In this introduction, we outline what digital audio broadcast is and how it can be accompanied by rich data. Then the research framework of Mobile Bristol in which the study took place is described. We follow this by highlighting lifestyle aspects of our target audience and the hypotheses that were explored in the interviews. It is possible to skip from here directly to section “4.Discussion”, where some of the findings from “3.Results” are reiterated.

#### 1.1. Digital Audio Broadcast

Digital Audio Broadcasting (DAB) is a European initiative to broadcast audio *and* data in digital form rather than the analogue form traditionally used by radio stations (<http://www.worlddab.org/>, Eureka, 2004). Today, worldwide, there are 600 different DAB services and over 300 million people around the world can, in principle, receive DAB. Key countries include the UK, Germany, Australia and Canada. In particular wide scale deployment of DAB in China, Korea and India could bring important momentum to the DAB roll-out (Plewes, 2004).

DAB transmission consists of several different audio and data services, collectively known as an “ensemble”. The effective capacity of an ensemble is 1.5Mbits/s, which must be shared by all the audio and data services within it. Multiple ensembles can be broadcast side-by side on different frequencies. An audio service is an MPEG encoded audio stream, typically broadcast between 64 Kbits/s for voice and

256 Kbits/s for stereo music. Associated with an audio service is the Dynamic Label Service (DLS). This contains 128 characters of text that appear on the digital radios small screen and is updated every few seconds. It is mostly used to show the currently playing song, what is coming up next, weather, traffic reports, etc.

It is also possible to broadcast other digital data besides the DLS that may, but need not, be associated with broadcast audio. The Multimedia Object Transfer protocol (MOT) enables broadcasting such arbitrary files (images, html, sounds, etc) over a DAB data service. The data rate for a data service can be set anywhere between 20Kbits/s to the maximum of 1.5Mbits/s, depending, of course, on how much of the ensemble's capacity is allocated to it. MOT works in a "carousel" style, similar to "Teletext"; if part of a file is missed, due to interference, the radio waits for the next turn of the carousel when it will be re-broadcast. The frequency with which files are broadcast can be fine tuned by the radio station, allowing a pre-emptive caching strategy, in order to give priority to data that are relevant to the user right now, while still broadcasting content for the future at a lower rate. In other words the digital radio can be primed with relevant content ahead of time.



Figure 1a. DAB radio



Figure 1b. MP3 player - DAB radio

There are a range of products that feature DAB radio with its small display for the DLS text (e.g. fig. 1a, 1b, <http://www.globalsources.com>), in the form of dedicated DAB radios, alarm clocks, DVD and MP3 players, and so on. Dixons reported record breaking sales of DAB radios in 2003 (Dixons, February 2004) and anticipate that digital radios will outstrip conventional radio sales this December (Dixons, November 2004) However, adding richer visual data to the audio stream necessitates a bigger display than is currently implemented and would require a considerable investment by the manufacturers of DAB radios.

DAB might not be the only delivery mechanism for such extended radio services. The Nokia and HP collaboration in the "Visual radio" venture is an example of how an FM radio station, Kiss FM in Helsinki in this case, might be accompanied by visual information about the music that is on air, providing some sort of interactivity, where for instance people can vote for a song, or play games whilst listening to the radio (<http://www.visualradio.com/>). Similarly the collaboration between Microsoft and Fossil watches (MS-SPOT-Fossil) has resulted in the delivery of simple information, e.g. the weather, via FM to a (wrist-worn) watch, although there is no actual radio broadcast involved.

## 1.2. Mobile Bristol Research Framework

The study took place within the wider framework of "Mobile Bristol", ([www.mobilebristol.com](http://www.mobilebristol.com)). The Mobile Bristol Centre is part of the UK's Department

of Trade and Industry's (DTI) City & Buildings Research Centre. The principal founders are Hewlett Packard Laboratories, the University of Bristol and the Appliance Studio. The purpose of Mobile Bristol is to provide an experimental test-bed for technology and user value research in pervasive mobile media. The program has DTI funding until April 2005. The outcomes from the program are a rich publicly accessible wireless infrastructure covering the city of Bristol, a variety of new business opportunities that can utilise the new capabilities and extensive research publications that advance the science of computing, engineering and psychology. Mobile Bristol revolves around a diverse set of partnerships where partners, big or small, can make use of the Mobile Bristol test-bed.

In the current study these partners are: Hewlett Packard Laboratories, GWR-Bristol (<http://gwrfmbristol.musicradio.com/homepage.jsp>), Bristol University, the Appliance Studio and Panasonic Semiconductor. GWR owns Classic FM, a national radio station, some DAB stations and 35 local radio stations across the U.K., amongst which, GWR-Bristol. The focus of our research is local radio and the aim is to explore the potential of augmented DAB through a series of user trials. Our first, iPAQ-based, prototype allows GWR-Bristol listeners to interact with a set of web pages broadcast alongside the digital audio stream and displayed on the handheld's small colour display, taking up only an additional 96 Kbits/s of the available bandwidth.

Thus, the program envisages that some of the DAB radio channels in the near future will be accompanied by rich(er) visual data, most likely displayed on a small screen and allowing some sort of interactivity between audience (individuals) and broadcaster. This interactivity in certain cases will be informed by the GPS location of a user. The user studies part of the research program will address how combinations of these five elements (radio, data, small screen, interactivity and location) might be able to lead to a compelling user experience and thereby contribute to insights into business opportunities for the players in this project. There is the question how much this mix of broadcast audio and data is a departure from current radio, internet services or even TV. Similarly, since we will be making full use of the Mobile Bristol infrastructure (Hull et al, 2004), we aim to explore which applications would benefit from location sensitivity or what the uptake of a (GPRS) backchannel, to accommodate interaction, would be.

### **1.3. GWR's listeners segmentation**

The traditional approach of user studies and lifestyle research is to conduct a series of relatively small scale qualitative and larger scale quantitative studies, early on in the technology development cycles, which address high level research questions in such a way that we can make an educated guess about the wider population, i.e. to generalise to the millions based on results of the few. The results are then fed back, in order to provide direction to the technology development. Here, in our first user study, we aim to gauge current local radio listening habits and how (and, most importantly, which) added data services, such as DAB affords, might be useful or even compelling.

What are their current radio listening habits? Where and when do people listen to their radio? There are important mobility issues, since people listen to the radio as they move around within the home, in the car, in the workplace (during breaks and during work), as they walk to the corner-shop, when using (or waiting for) public transport and so on. How long do they listen for? How intense? If a small screen accompanied the radio, how would that be used? What sort of appliances will suit a product like this well: a dedicated radio, mobile phones, a laptop, handhelds, etc.?

In order to make a pragmatic start with such broad questions, it makes sense to focus on local, GWR-Bristol, radio listeners. The current configuration of the prototype, iPAQ, DAB-antenna and user interface will provide further focus. Audience research, to a large extent, drives commercial (and national) radio programming philosophies (Ahlkvist, 2001) and in this study, we asked for the participation of GWR listeners who are representative of two segments: Segment P1 and segment P2 (Piggot & Watts, 2004). As we describe those two different audience segments, it is inevitable that we refer to typical U.K. radio shows and presenters. However, readers from outside the U.K., probably will be able to recognise the type of presenters and radio programmes and will have no trouble substituting their own local presenters and programmes.

Segment P1 concerns the real fans of GWR, their primary listeners. They are likely to be in the age range 25-35 years, most are in employment and a sizable proportion are married with (young) children. They have been described as people who don't like shocks or surprises, although they like fun. This propensity towards non-adventurous entertainment is further characterised by the big dip in GWR listening on Saturday morning when Jonathan Ross (a popular UK middle of the road TV and radio presenter) has his show on BBC Radio 2 (a national middle of the road radio station). P1's listen to GWR (close to) all day (but not on Saturday morning, obviously), they like the GWR presenters, although they might not know what exactly the timetable of GWR is for any given day. In short, they love the GWR life(style). There is an emotional, loyal element to their listening. And, of course, they are interested in local issues.

Segment P2, an equally important segment, is different from the P1's in that they listen to GWR in short bursts (15-20 minutes). Their primary radio stations are BBC Radio 1 or Radio 2 but to get local information, local news, weather and travel news, they tune in to GWR. In other words they consume GWR for practical reasons; they love the info. However, they must also like the music and presenters, since there are other sources of local information.

Roughly, the balance between P1 and P2 is as follows for a week of GWR radio listening: In terms of number of listeners, for every two P1's there are three P2's, i.e. 40% P1's and 60% P2's. In terms of time spent listening to GWR, the P1's spent 70% and the P2's 30% of their radio listening time.

The most popular time of listening to GWR is during the 6AM – 9AM breakfast timeslot. In the quotes in the results section, you will regularly come across references to the Bush and Troy breakfast show. However, during the show GWR's accompanying website is not visited much. In the breakfast show presenters will mention that there is something on-line but only after 9 am will this give rise to an increase in GWR website visiting. This conversion, from radio to website, is only coming from 3-5% of listeners. What exactly the restricting nature is of radio-to-website conversion is not really known. There is a "short term attention deficit" element to this, e.g. if people don't respond within two minutes then they won't at all. That lifestyle (or taste) influences website use (and advertising) is demonstrated by Jazz-FM where there can be a 20% radio to web conversion.

There are particular incentives that do lead to a high volume of web-site visiting, e.g. the possibility to win £20K gives rise to a surge at lunchtime. The "secret sound" game on the radio, a type of radio game played throughout the world, where listeners have to guess what a particular short sound is, is also a good reason for people to go to GWR's website. Shortly after the secret sound is played, 98% of web-

site visitors play the secret sound WAV file and individuals listen to it time and time again.

The 6 – 9 AM slot is likely to have different mobile aspects to it. For instance, someone wakes up with the radio alarm tuned to GWR, spends time in the bathroom with a (different) radio on, has breakfast with yet another radio on, jumps in the car and drives to work with the radio on. Alternatively, people who use public transport and, most importantly (particularly in Bristol), will have to *wait* for public transport, might use a radio-walkman. Indeed there is some mileage in identifying the sorts of unplanned (and planned) gaps of idle, dead time, both in mobile and non mobile contexts, during which people might check a small display that is incorporated in an augmented DAB radio, such as waiting for the bus or train, queuing (waiting in a line), walking, over lunch, at work, tea or coffee breaks, cooking a meal etc.

#### 1.4. Hypotheses

A number of hypotheses, guesses, assumptions have been incorporated in the interview questions of this study.

##### **Community value, “For Anyone-as-Someone”**

There is an interesting tension between being mostly a single listener and GWR being a local community radio station. Of course, there will be occasions of small group listening, e.g. the family over breakfast, or even big group listening in a factory hall, but by and large the assumption is that most are single listeners. However, they are single listeners with local community interests. There are also wider interests that are accommodated, e.g. celebrity gossip and other “water-cooler” conversational topics of the day. Simple voting exercises take advantage of this community feel around local radio. As an example, GWR’s “The toast of Bristol” is all about local pride: People can vote for instance for the best hairdresser or baker in their locality.

Paddy Scannel (2000), who has charted the history of the BBC, addresses this phenomenon of how broadcast media such as radio, TV or even broad-sheets, communicate to their listeners, viewers, readers in their masses whilst at the same time it speaks to listeners, viewers, readers as individuals. We might add the internet to this list. He calls this particular communicative structure a “For-Anyone-as-Someone” structure. In short, “For-Anyone” structures relate to mass produced, impersonal products such as a toaster, whereas “For Someone” structures relate to made-to-measure objects, like glasses or dentures, not useful for anyone but the person it is made for. Or, thinking about communicative aspects, which, oddly enough, Paddy Scannel does not mention in his examples, the *manual* for the toaster is a “For Anyone” communicative structure and a letter written by a friend especially to me is a “For Someone” communicative structure. Radio, then, combines both these notions, mechanisms, structures as on the one hand broadcast is sent out to the millions whilst at the same time it speaks to individuals:

*“Thus it is an intermediary structure that mediates between the impersonal for anyone structure and the personal for-someone structure. As such the for-anyone-as-someone structure expresses and embodies that which is between the impersonal third person and the personal first person, namely the second person (the me-and-you). The for-anyone-as-someone structure expresses ‘we-ness’. It articulates human social life.”*

Adding richer data to the digital audio broadcast could then further emphasise such communicative structures. It might evoke aspects of internet browsing and combine the “For-Anyone-as-Someone” structures of radio and internet. In addition, enabling interaction with the local radio station, might enhance the community feel further, or at least increase response rates to, for instance, the Toast of Bristol.

### **Information value, Glance-ability**

Related to (and on occasion contributing to) the community feel, possibly emphasising the “For someone” aspects, is the value of local information. There is an assumption here that the music and presenter’s style is of less interest as the value seems to lie in using the radio to pick up information, information as a commodity, a high value for P2’s. This is also where the small screen of a visual radio might come into its own, e.g. there could be a push-button on our radio which bookmarks a section of broadcast in such a way that users can return to their bookmarks later on in the day (this bookmark catches the last ten seconds of radio before the bookmark button was pressed).

So, which different affordances could broadcast audio and a display provide? What would prompt people to glance at their device, make them dip in (and out) of visuals that accompany radio broadcast? In other words, how does the broadcast audio lead them to screen content? And, of course, how does this work the other way round: From glancing at their screen to listening to the broadcast? There is a possibility that for instance the P2’s will stay tuned to GWR longer (but listen less) because of the slowly updating of the info across the day. As far as the P1’s are concerned, the visual aspects might protect, consolidate or even grow the share of listeners.

### **Location aware value**

Finally there are guesses about the value of location awareness. Where advertising is concerned, there could be, for instance, a non-location aware audio call to action (e.g. “Visit Pizzahut”) accompanied by a location aware visual means to action (“Your nearest Pizzahut is ---“). For larger cities (not necessarily Bristol) localised traffic information would be valuable. Thinking about a likely GWR-Bristol scenario, in case of a traffic accident blocking a particular road, there could be an audio or visual alert based on listeners’ proximity to the accident.

## 2. Method

### 2.1. Prototype



Figure 2. Prototype

The prototype (fig. 2) consisted of an iPAQ, model, 5450, with a PCMCIA DAB receiver (developed by GWR Bristol). The MOT decoding software library is provided by Panasonic Semiconductor. The iPAQ ran under PocketPC2003 operating system and the software and hardware integration of the various components was written in C++.

### 2.2. User interface

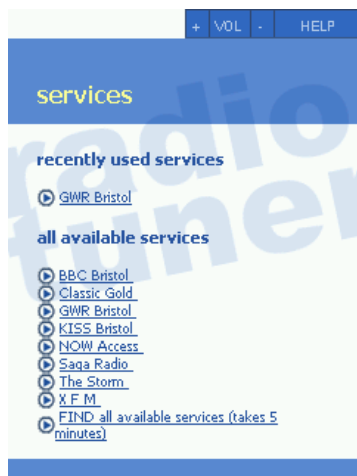


Figure 3a. Tuning in

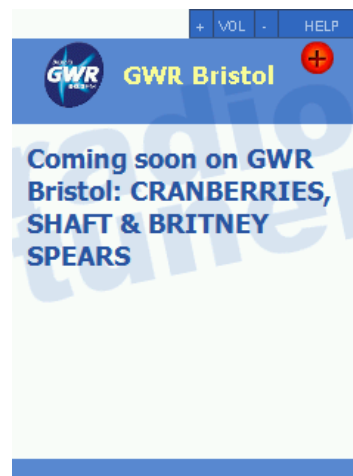


Figure 3b. Coming up soon

The start up screen shows available services and recently used services, here GWR Bristol (fig 3a). Once tuned in into GWR, the accompanying DLS text was displayed as a non-scrolling text in a large and bold typeface (fig. 3b). A volume up and down button, the GWR logo as well as the “radio plus” button were also shown. The DLS



would be updated regularly and for instance could take the form of a “coming up soon” message or would show what was “currently” playing.

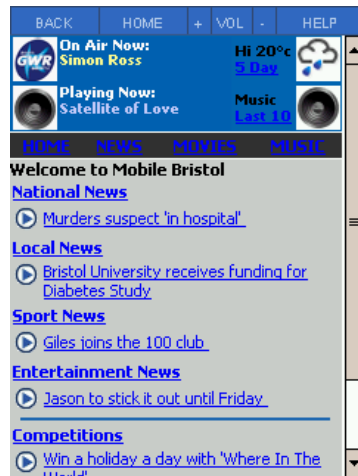


Figure 4a. Home Page

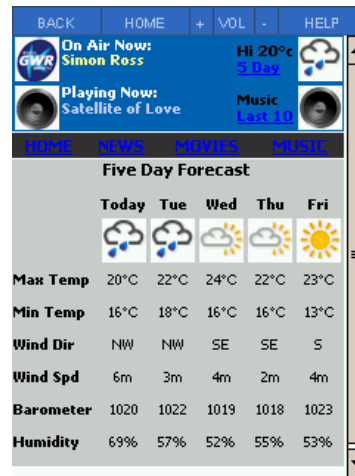


Figure 4b. Five day weather forecast

Pressing the red “Radio Plus” button opened up HTML pages, where at the “Welcome to Mobile Bristol” home page (fig. 4a), a user could select national and local news, sport and entertainment news; scrolling down further, listeners could take part in for instance competitions, or read celebrity gossip. There were a variety of icons: On air now, playing now, weather and “music”. Pressing the weather icon, there was an option to see the five day forecast (fig. 4b). Similarly a user could see the last ten records played. The movies and music sections contained pages with more in depth information and reviews.

## 2.3. Subjects

A total of twenty volunteers took part in this study, 12 women, mean age 29 years and eight men, mean age 31 years. There were 11 P1’s (nine females, two males) and 9 P2’s, (six males, three females). This skewed the sample towards GWR listeners and the GWR visual content was possibly more relevant, or at least more familiar, to the sample as a consequence. If we look at life stage (lifestyle), we see that three participants still live at home, three share a house, two live alone, five cohabit, two live with a partner and expect their first baby and five have a family with one or more children. All owned a mobile phone and regularly accessed the internet. Interviews were carried out in a three week period, 19 July - 5 August, 2004.

## 2.4. Procedure

After a short introduction subjects were asked to describe their radio listening habits for a typical working day, which included non-paid work (e.g. child care). Following on, the prototype was shown and described. Then, subjects were offered an opportunity to listen to GWR’s radio broadcast and see the DLS. After this, the radio-plus button was pointed out and subjects were invited to hold the prototype themselves (fig. 5) and explore the GWR-Bristol internet pages. After initial spontaneous comments, we probed a little deeper about what they liked and did not like, how they would use such a prototype and what form factor they could imagine.

Finally, we asked them about their idle time, their “gap” time. In this manner we aimed to collect information on participants’ lifestyles, how they experience radio and how a product similar to our prototype might fit with/into their lives. All sessions were recorded onto video tape and later transcribed.



Figure 5. Handling the prototype

### **3. Results**

In the first half of the interview we asked participants about their current radio listening habits: where and when they listen to the radio in the course of a day, in-car listening, how they feel about interacting with their radio, the community feel it evokes and how they feel about adverts. The second part consisted of demonstrating the prototype and recording their reactions, to gauge how (or if) this would fit with their current radio listening habits and how it would extend these behaviours or lead to new ones.

#### **3.1. Current radio listening habits**

##### **3.1.1. At what time do you switch the radio on?**

For half of the sample the radio comes on first thing in the morning. Four of them have a radio alarm clock and there are some comments about lying in bed for a little while longer, waking up, listening to the radio.

*“I have a radio on my alarm and then I lay in bed and listen to the radio for about 15 minutes, and I’ll try to set it so that I catch the first news bulletin, if I get up at seven I set it for quarter to, listen to the news bulletin and then I’ll get up.”*

A further five start listening in the car and two start listening at work. Of the remaining three, one might switch it on in the morning for a traffic update, one waits till 10AM when the kids (well, everyone) have left for school (and work) and for a third, a housemate switches the radio on. All in all, there are 15 who listen in the morning before 9AM. There seem to be no differences between P1’s and P2’s, nor does lifestyle (or life stage) have a bearing on this.

##### **3.1.2. Where and when do you listen to the radio in the course of a day?**

Looking across the whole day, then, after waking up, the radio is on during breakfast, for some whilst in the bathroom and when they get dressed.

*“On my alarm clock, --- and then in the bathroom there’s a radio as well, so I can hear the traffic reports and listen to music while I’m getting ready, and then on the drive into work and when I drive home I listen to the radio.”*

Seventeen mention the car as place where they listen to the radio, whether the car is used to commute to and from work, or on family trips. Below we come back in more detail to the use of radio in the car.

The radio is on during the day as well, this could be because the radio is on at work for all to hear (three mentions), or enjoyed privately via headphones by individuals, of whom five mention their use of internet radio.

*“I listen to it during the day, I use the internet, I actually listen to GWR on the web during the day.”*

In addition, of those who look after children, three describe how radio cuts down on too much television watching, bringing the family together around the table, providing a cosy atmosphere.

*“The kids like to watch TV, but I don’t want them to watch TV too much so I tend to put some music on. If you put a CD on, you have to keep skipping through the songs if you don’t want to listen to the whole album. So I put the radio on because it is random stuff and it is background and the children tend to come into the dining room then and do some drawing. They like to have music in the background. Music creates a bit of an atmosphere in the background and everybody seems to get less bored and it reduces the telly time.”*

Although evenings are *the* time for TV watching, there are some who listen to the radio then because of specific interests and for two, the radio is there to fall asleep by. Again, there were no differences between P1’s and P2’s.

### **3.1.3. Where are the radios in your house?**

Radio waves are received in the house in a great many forms and guises. There are old-fashioned dial radios, alarm clocks, stereos with presets, broadband TV (cable, and satellite), Internet, DVDs with radio in and DAB radios. It is not an overstatement to say that the house is full of radio appliances and people are happy to move through the house switching radios on when entering rooms and off when leaving a room or simply not bothering to switch it off at all.

*“I’ve got a DVD sound system with a radio in my room. My dad got one in the lounge, and my mum has got one in the kitchen, she’s got that on all the time. --- Even when she’s not there, it’s on, she puts it on for the dog.”*

On the mobile radio side there is first and foremost the car radio with its presets, but some participants mention their Nokia phone with FM radio.

*“My Nokia mobile’s got the radio on, put my headphones on and listen through that. I used it a lot when I was bussing it a lot. I use it now if I’m walking around local and don’t really need to use the car.”*

There are one or two people who use a dedicated mobile radio but there are more who mention that they have one and don’t use it anymore. In short, independent of lifestyle (if there are children they too have radios) or taste (P1, P2), our lives are permeated with radio and in a great many, usually fixed, incarnations. Satellite and cable TV also provide digital radio (DAB) and occasionally this allows (some) people to tune into local radio stations far away from their actual locality, often for reasons of nostalgia.

*“I have loads and loads, I am a real radio listener, I have a radio in my bedroom, I have a radio in the bathroom, have a radio in the kitchen, have a radio in the car. Because I have a kitchen-diner, I kind of have my radio in my dining room, so it’s basically my downstairs, there are only two places I can’t hear the radio, it’s the back bedroom and the garage. [On satellite TV] I listen to my radio station which I remember from my days in London, Heart FM, because my parents still live in London, and I have it on for the traffic [when going to visit the parents].”*

### 3.1.4. Whilst mobile: Mainly the Car

The car is the radio (and music) listening booth par excellence, and routinely so, as it breaks the monotony as well as the silence. There are several comments highlighting that the car-radio is there for lightweight (musical) company, preferably in the background. A few sing along to their hearts content. The car is also a place from which to watch (and be part of) other drivers listening to the radio.

*“I can’t stand being in a quiet car. --- In the car it is for company, it is something there, I hate quiet anyway, so it’s something extra, I do find myself singing along, laughing in my car, so I think people must be staring at me so I stare at them when they do it, but I do enjoy it, and yesterday, in the car next to me and they were singing along with the radio.”*

*“I like to listen to the radio in the car. It breaks the monotony, because I drive the same route every morning.”*

Of course traffic information, either by local radio station or via RDS (Radio Data System, which is used to transmit traffic alerts) is seen as very important but people also listen closer when the (local) news comes on.

*“I might prick up my ears when the news is on or the traffic reports, especially if they are accurate. And local stations will give more relevant information about the area.”*

Most interviewees listen to the radio whilst travelling to work and they tend to stick to one station. When travelling back from work they are more inclined to flick over, as the adverts start to annoy them (even though there are more adverts during the morning show), but they will usually flick back to their main station.

*“If the adverts starts to annoy me I will switch, but I will switch back. Quite quick, because they are preset.”*

Those who travel more extensively for work during the week or in the weekend for private reasons, mention how they go (or at least try to go) from one local radio station to another. In other words they have a (mental and/or physical) map of where local radio stations are.

*“Trips I do frequently, like Bristol to London I can tell you GWR at junction 16 disappears, you can pick up GWR for Swindon, and you can take that to the Membury services and then you can pick up Heart, I am more of a fan of local radio”*

When they are tired of flicking and when reception gets poor, people tend to put on CD’s, but by and large radio is preferred as it is less hassle and, when travelling with others, radio finds a happy medium (a compromise) between diverse tastes.

*“I usually listen to the radio, the CDs in the car are mostly my husband’s CDs and we have a different taste. The radio is a common ground.”*

Even the very few who do not own a car or whose car radio has been stolen, mention that when in someone else’s car, the radio goes on. There are fewer comments about

the use of radio in other mobile situations. As mentioned above, some use their Nokia phone to listen to FM radio. Dedicated mobile radios are used even less; one interviewee listens while cycling.

### **3.1.5. Interacting with Radio (& TV)**

Our interviewees love interacting with radio and TV. The sheer volume of our transcripts on the topic of interaction is already a strong indication. Some initially deny interacting but then go on to tell about occasions when they did, or how they play along in their head or with a family member. Interaction can take several forms, ranging from playing along with a game in one's head, shouting at the radio even (or especially) when by your self, texting (sending an SMS), phoning in, internet interaction and pressing the red interaction button on the remote control of the digital TV.

*“Oh yes, definitely, sure I do that, Bush and Troy do a quiz, about ten past eight, and I'll invariably be yelling at the radio”*

*“I phoned in a couple of times about traffic accidents, I phoned in about an accident on the M4, 2 minutes later it was played on air.”*

The context may be a quiz, voting for e.g. Big Brother, charity, requesting a song or even making a complaint. There seems to be an intensity of experience, which might be related to the community feel that we comment on in the next section, with strong emotions. There can be frustration, sheer delight but always there are “other people”, on the radio, in the office playing along, or talking about it.

*“My mum has, she was on GWR with Secret Sound. She was almost on the border of obsession, she used to phone all the time and she got through once, but she didn't get it right. --- I really enjoyed that. When my mum started taking an interest in it, when people around you are taking more of an interest in it, you tend to listen to it more. And I did used to actually switch on at these certain times of the day, basically just to listen out to see if there was anybody on it that I knew. Because I knew a lot of my family was trying to phone in.”*

*“At one point, everybody in the office was trying to work out what the hell these things were.”*

On a more prosaic note, a chance to win is definitely a strong incentive. Feedback about how the rest of the local people (or nation at times) voted, answered a question is well received, reinforcing that community spirit.

*“The only time I will go out of my way if there's something I want to win. I think why not, local call, a Bristol number, if I win it's worth a phone call.”*

*“I log on to GWR, I'll click the 'listen here', whilst that's buffering, I scan that first page for anything that takes my interest, and then I'll vote on the daily vote because I want to see what everybody else has voted on.”*

People are acutely aware (sometimes after a bad experience) of the cost of voting. It might not be the main reason for *not* voting though. People are more willing to spend their money if it is for charity. There also seems to be a gender difference with more men commenting how they will not take part, or rather, how they will not part with their money.

*“I did once with GWR, I entered that secret sound, for about three days it was driving me mad because I knew what the sound was and I just could not get through and I phoned and phoned and phoned and I could not get through, because you had to register and then if you were the lucky 100<sup>th</sup> person they then phone you back on the hour, and the hour would go past and the person would say it’s this and it wouldn’t be and it would carry on, and it went on for a week and I kept phoning every day, and unbeknown to me every time I phoned it would be costing 50 P and they did not actually say that, I only had to register once, give my name, ---- and the bill came to about twenty seven pounds. --- I won’t ever do that again, it was to win 5000 pounds. I did have the right answer and it was really annoying.”*

*“Cost is not the first thought when deciding not to, half the time I cannot be bothered.”*

There is a clear preference for texting, it is not necessarily perceived to be cheaper but for most it is more convenient, or rather they are already in the habit of texting. On the other hand one interviewee mentions that with texting you never know whether the text has reached the program makers.

*“I prefer texting through habit, I text my friends, I don’t think it is cheaper.”*

*“With a text message you are never quite sure whether it got through. If you actually speak to somebody or put your voice as a voicemail, it feels more secure that you entered. I don’t really trust the texting method. But with radio it is always a case of phoning, because they usually want to talk to the person that has won.”*

The red button on the TV remote control (cable, satellite) has attractions but is as yet still unwieldy for some.

*“I tend to use that, I use interactivity when it’s associated with some show, for example some shows have catch-ups, Sky one in particular does that, and you can read what happened in the previous episode, UK gold, Living, they have a very nice feature, they tell you what’s on all their UK channels, at NOW! And the next program which I like, ---- that’s sad, I apologise but it was the Eurovision song contest.”*

*“Yeah, they all got ‘press the red’ but I never seem to get on with it.”*

Phoning in has several drawbacks it is perceived as expensive, you even pay when you are in the queue to register for an interaction, there is very little chance of actually getting through, it is far from immediate, by the time you are able to cast your vote, give your answer, you may well be in the car to work and people do not always want their voice (speech) heard on radio.

*“Yes, I have done, I’ve entered a few competitions, it tends to be ‘give away’s, when you enter a competition you have to play in 15 minutes by which time I’m driving.”*

*“No, because they make you speak on the radio and I don’t want to do that.”*

### **3.1.6. Local Community Feel, presenters, music and info**

There were many comments about what (local) presenters and information about people’s locality mean to our sample. Here there are several themes, the morning show, local events, local news and talking points, topics of conversation later in the day.

Most of our interviewees listen to the radio in the morning; it sets them up for the day. For this morning show the presenters are of utmost importance. It is a team thing, the chemistry between the presenters that the interviewees appreciate, comment on; the banter that sets them up for the day, form a diversion from the tedium of driving into work and although they do like the music as well, this does not seem to be the most important reason to tune in to a particular morning show. People identify with presenters, are very loyal to them, feel they know them. These presenters speak to the heart.

*“I really like listening to Bush and Troy in the morning. They banter very naturally, I happen to know that the presenters are friends in real life. They’re nice, they’re not too loud in the morning, with annoying phone ins, they’re just easy listening in the background, so that’s my favourite show for sure. I can tell you what they talked about this morning, for example, you know, or what they talked about last week, or whatever, and I notice that they’d been on holiday, I listen to that radio show, rather than the format of it, or the music, whereas the rest of the day, I don’t listen to what people are saying.”*

The following rather lengthy quote sums it all up, how they, Bush and Troy, cheer her up, there is identification with the presenters, with Bristol, with the people of Bristol, being a ‘nosy neighbour’, and how she is one of them, part of it all, with her broad Bristolian accent:

*“Especially I like listening first thing in the morning to the Bush and Troy show mostly, when I listen to GWR, GWR is the only station I listen to, so that’s the main program I tune into ---- I don’t know I think it’s that they’re just so stupid, it’s really a stupid sense of humour and it all relates to local areas and local people and things like that, it’s just easy listening, plus you don’t have to think about that, but it makes you laugh as well, and it’s an entertaining thing as well --- it’s sort of on the ball, and everybody who phones in they just take the ‘Mick’ out of them. Sometimes you hear them going to pieces and they say, I don’t know what I gotta say next now. And I like that angle. They work well together, it’s that combination of people together for a show. -- It’s local stories as well, such and such has happened you think oh I know where that is, that’s my story, you can relate to that, yeah, I know, I’ve been there, I know what they’re talking about. --- It’s almost you’re listening to some of these conversations, it’s the nosy neighbour within coming out, so you think ooooh, well really? [laughs]. I can completely interact to some extent and keep my distance.--- [likes listening to people phoning in] I heard myself a few weeks ago and I thought I*



*sound like all those people I take the 'Mick' out of, my really broad Bristolian accent. At the same time, I know, they're just like me, they're listening to the radio station in the car, there was a bit of a delay and they played it, my friend phoned me up oooh I heard you on the radio and my mum said I don't believe you spoke like that really broad Bristolian."*

There are some for whom there is an internal battle as they switch between local (GWR) radio and national (Radio 1). The distinction between P1 and P2 listeners concerns taste and possibly a stronger local focus by P1 listeners, but by and large the radio experience seems the same.

*"Yeah, because it is on the same time each day --- Bush and Troy on GWR and Chris Moyles Radio 1, more often than not I switch between those two, The morning team always seems to be quite good, I think I probably prefer the GWR ones to the Radio 1, I'm not a big fan of Chris Moyles, he tends to talk too much, I rather they'd get on with some music. But on the same respect GWR play too many adverts. My partner listens to the radio as well, generally we both drive in the same car, so we tend to listen to the same stations as well."*

*"In the morning it tends to be a mixture of GWR or Radio 1. Quite recently since Chris Moyles went to the afternoon it's GWR, coz of the Bush and the Troy show, I find it quite funny, some of the stuff they kinda mention is quite related to the Bristol area, if you listen to national radio stations in terms of Radio 1 or Radio 2 you don't kinda get that. What you do get is their interpretation of events going on in London which is what I'm not overly interested in."*

There are some who listen in the afternoon (Steve Wright) again showing their great loyalty over the years and stressing that light-heartedness is important.

*"Particularly fond of Steve Wright in the afternoon, a very lively show. Yeah, I like the way the whole group interacts with each other. They work really well as a team. You hear the fun in their voice."*

As much as they know who they like (and what time they are on), at the same time, people know who they don't like:

*"They are really annoying and obnoxious like Chris Moyles and Sara Cox. Their tone of voice, their cocky attitude, their kind of, don't know, just an annoying personality -- - wouldn't get along with them in real life either."*

The participants also mention that through GWR they become aware of up and coming local events.

*"I didn't realise that the harbour festival was on last weekend and it was quite amusing, I think it was Tony Murrell, who said that thing about the harbour festival and he said it was the weekend previously and he had to come back and said oops, it's next weekend, so I thought I haven't missed it, went to the web, and went down, saw the fireworks, it was lovely. We had fab weather for it, very sunburnt underneath this shirt."*

*“Recently with Thunderworlds was up on the Downs, with GWR plugging it so much I’d thought I’d have a look, and I really enjoyed it, I do get so much information from it and it doesn’t take a penny of my time, because I listen while I’m doing something, so it’s not that I have the paper and I have to trawl through it myself, it’s there on tap, when I want it, I can have it.”*

*“They tell you when the mobile speed cameras are out. They do that mostly in the mornings.”*

Local events are also mentioned later in the day as talking points at work or with family and occasionally, but not often, there are upsetting topics in these morning shows, e.g. a fatal traffic accident..

*“Especially like local events, I tend to discuss those, or with my partner, when I get home, like with the Red Hot Chilli peppers concert in Cardiff, that was one, because they originally were just going to London and Manchester and then they added Cardiff and I only found out about it by listening to the radio and we booked tickets. --  
- And when there was a road accident and two people died in.”*

*“The only thing I can remember the, eh, wind up call, a really awful one once, I remember telling people about that, and it was quite funny. It’s about a year ago, I remember it being absolutely awful, I remember sitting in a traffic jam, and cars around me, just like looking at each other, I think we were all listening to the same thing, in absolute horror.”*

### **3.1.7. Adverts**

There were also a great number of spontaneous comments about adverts. Mainly, as can be expected, about how annoying they are and how they are a reason to flick channels, but someone adds that adverts per se are not the reason, it is the annoying ones. Although our sample flicks when adverts start, they also seem to have a fair idea of how long adverts are bound to last and will flick back when they think they are over. On a more comical note the Coldseal advert mentioned in the quote below concerns the owner-director of Coldseal playing guitar and singing on his own advert.

*“ Actually adverts don’t bother me, it’s only when they’re really irritating me, there’s one for double glazing window company called Coldseal, which was a particularly annoying advert, and there’s one for a Pine warehouse, if not I would just carry on, if there’s one I hate, I change channels.”*

*“One pet hate is adverts. So I probably listen to the first 30 seconds and then when I’m in a position to flip channels, I will, If I’m in the car I will flick to another channel, but I will probably flick back, I have a fair idea how long it is going to last, so I’ll be back to the presenter talking”*

Adverts can put you off, but there is an awareness suggesting that, really, advertising can be very useful.

*“They do local advertisements for local companies which can be quite interesting even though it can be annoying.”*

## 3.2. Reactions to prototype

In this section we describe the reactions to the DAB prototype. This covers some very simple, almost trivial, issues but with a high user value, from tuning in and seeing the DLS text for the first time to the information that pressing GWR's red button, the mini WEB site as one of the interviewees describes it, delivers. The five day weather forecast and local information met with enthusiasm. Similarly information on the last ten songs played, highlighting how important listening to the music is; in the previous section on presenters (mostly) we could have lost sight of this. It seems that a simple wireless web interface that comes effortlessly to a listener has many advantages and would lower the barrier to interacting with the radio station.

We also gauge how they might use a product like our prototype and how they envisage an actual product might look like. Finally we ask them when (or if) short periods of idle time, gap time, occur in their lives and whether a product like the prototype would (could) be used in those brief periods to glance at information.

### 3.2.1. Tuning in, DLS, audio quality, screen and the red button

Most subjects had not encountered DAB before and reactions to visually tuning in were positive, possibly because of the novelty value. There was also an indication that, should DAB radios have a (slightly) bigger screen than currently, this visually tuning feature would soon be forgotten as a nicety as it would become an expected, standard interface. There were many spontaneous remarks upon seeing the DLS texts. For most it was the first time they saw a DLS text and some expressed their disbelief, marvelling at the magic of this technology.

*“Does this say what plays at the moment ? So it tells you what it is playing next as well? No way!!! That is good. I like that a lot.”*

People liked to see what is playing now and which songs are coming up. It would even keep them tuned in longer and wait for the adverts to finish, although there are some sobering thoughts. In particular it seems to address a common frustration that when you switch on the radio and you hear a (new) song that you like but you have missed what the song is called or who the artist was. In addition, you have more time to prepare to record a song.

*“It's quite useful, it's telling you what's coming up--- If it's something I really do like, I might sit through the adverts for it. To be honest, I'm not really sure whether these two tracks would make me stay.”*

Few noticed that the audio quality was better, partly because we did not always have a good reception, but, more likely, because audio quality is not of a high concern for the majority of users. Three did comment on the *“Good quality sound”*. Two others commented on the screen quality, highlighting that handheld computers are so much less prevalent than mobile phones.

*“The nice screen that this thing has got. The screen is fantastic!”*

After showing the DLS, participants were told they could press GWR's red "plus" button. This would lead them to GWR's handheld bespoke website, showing information on the local, national and international news, the five day weather, movies, music and the last ten songs played.

*"It is like having a magazine. I would totally love a device like this"*

*"Like a mini web site."*

### **3.2.2. The weather**

In the first part of the interviews where we ask about their radio listening habits, there are spontaneous comments about how (and why) they currently find out about the weather. The weather is both trivial and all important. We all talk about it. We depend on it. And so does our sample. All twenty subjects have got something to say about it, even when they say that they don't trust the weather forecast. People consult a number of sources for weather information. Nine participants mention how they listen to the radio to find out what the weather will be like, although there is the downside (for those of an impatient nature) that you have to tune in at a particular time. Seven, indeed, point out the convenience of looking up the weather on the internet, where you are not bound to particular timeslots, although it often does mean starting up the computer. Five mention watching the TV morning news for (amongst others) the weather and two use the often forgotten but convenient "teletext". There is even one, who asks *other* people what the weather is going to be like.

*"Might listen to the weather, if I'm going to do something in the weekend, trying to get three, four five days forecast. Again, it depends on hitting the station at the right time, on the hour, quarter past, half past, when you know some news report is being done."*

*"For weather I rely on the television more than on the radio or we might use the computer sometimes for the weather or the traffic when we go down to the coast. On the computer, it is there when you want it rather than that you have to wait for a certain time slot. "*

There are four subjects, who tell that, for different reasons, they have less or no interest in the weather.

*"Maybe on Fridays, the rest of the week it does not matter, I drive in and out of work so it doesn't matter and most of my activities are indoors. But for the weekend---"*

The reason for finding out about the weather are all to do with planning days out, where, of course, the weekend is of utmost importance. But there are other reasons.

*"The weather is vital in the morning. What am I going to wear?"*

*"To find out what mood I'm going to be in for the next few days, because that can depend on the weather."*

When shown the five day forecast weather button on the prototype, the reactions are unanimously positive, even enthusiastic, leading to exclamations such as:

*“THE WEATHER!!!! That is good.”*

*“Ooh, it’s going to rain on Sunday.”*

They are quick to point out how useful this (location based) information is:

*“This is really useful again. It gives you some sort of idea. If you want to go somewhere in the weekend, you can see that Saturday would be the best day for it. There are so many different things tied up in there.”*

They all compare the DAB information to the internet, but with important added advantages: it’s mobile and it is light, simple and it does not require booting up. Receiving this information effortlessly as part of the radio broadcast in a lightweight, one click, fashion whilst mobile is a potential big user value.

*“It’s like being on the Internet, with the weather. It’s a compact little thing and you can do loads of things on it, like checking the weather and news and entertainment news.”*

*“And you can read it any time you want to. You don’t have to walk up to your computer and turn it on. It has the weather.”*

### **3.2.3. Cinemas and movies**

The majority of the sample enjoys movies and they go to the cinema regularly. They do like the “What’s on” section and reviews. Again, accessing this information in almost broadcast fashion, i.e. the information comes to you, from the display of a DAB radio, has advantages over having to listen out for it on the actual radio broadcast or to start up a computer and going on to the internet. Regularly they remark that to know where and at what time a movie is shown *and* a way to order cinema tickets via the device would be very useful, it provides evidence that there is a lot of mileage in converting those buying impulses, making sure they are not lost. Providing little tasters, short trailers could help with this.

*“This would be an easier way to get the movies details, to get the reviews, it would save on having to get on the net, if I get it here, I could see what it be saying about it, I could make my mind up then.--- if they could somehow get cinema times on here for some of the main cinemas in Bristol , that sometimes is the hassle you gotta go and find a newspaper to find the individual times or gotta go onto their website to find the actual times, not all the times can you get, occasionally they say that it’s showing on Friday --- but never do they give out all of the times, that would make life so much easier , I could click on what I want to see, if it tells me it’s on at so and so a time at your local cinema that would be fantastic.”*

*“It would be fantastic if they can tell you where and what times it is on, --- book tickets on the credit card. I would use that on this as well.”*

*“Maybe a trailer as well. Just reading about the film might not give you a good impression. A 5 seconds trailer might give you a better impression of what it is like than just reading about it.”*

There proved to be a distinction between how people expressed them selves in relation to celebrity gossip and having more information on an artist. Five, four females and one male, mentioned that they like celebrity gossip, although one also commented that “OK magazine” was enough for her and she would not need to see it on the prototype. Similarly there was an initial male comment that he did not like celebrity gossip but did like movie gossip. Six people also commented that they would like further information on artists such as when they would be touring, when an album would be coming out.

### **3.2.4. Local here, local there, news and events**

We already mentioned how interviewees appreciate the ability to get local information on cinemas and cinema times, as well as being able to book tickets. In this section other location specific comments are mentioned, local news and local events. Some participants also mention how a product like our prototype might link up with the satellite navigation system in the car. It is good to bear in mind that local does not always mean the place of residence, i.e. Bristol. As people travel around they would like to know what is on in other local areas, including local traffic information.

*“Definitely local information. --- I look on the council web site and the tourist board web site You don’t have to buy Venue or tune into the TV or to be at home, you have it with you all the time. You can look it up immediately.”*

*“What would happen then, say if you got it in the car and you just travel up North, what would happen to all the information, would it just switch to the local one up there? If I had it in my car --- because I’m probably going to get my self a navigation system, so if I set it up to pick up that kind of, if that program was on there --- “*

*“I spend quite a few weeks away in Dorset; it would be a good way to get the information, because you miss that. When you are at home you got the local radio and they can say that they’re running this event and it’s for free, if you’re somewhere else you don’t always get that information, or you hear about it when it’s too late. So to be able to have something local to where you are at the time, would be really handy because then you think I am here that day and I can do that. That would be brilliant. With cinema times, listings and local stories; to have it there to read it, that would make life a lot easier.”*

Localised advertising is viewed with some trepidation by some, although another is quick to piece satellite navigation, local information and localised advertising together.

*“With a SatNav system, you never get on there where your hold-ups are. So it would be really cool if you could link this and show where the hold-ups are, obviously separate from this. Or if there is an album coming out, or there is an album out; what album it is on obviously and you can go and buy the album. Would be good to know*

*where to buy it – when you're heading to the shops, it can tell you where your local record store is. And it also means that HMV can pay for some of this."*

### **3.2.5. The last ten songs played**

The website also displayed the last ten songs that were played on GWR-Bristol. We received an abundance of comments. For some initially there was no immediate positive reaction, which was, after a moment's reflection, followed by a sudden recognition of how useful this would be, in particular if accompanied by extra information.

*"Mmmm, I don't know whether I'd use it, UNLESS! No that's a lie, I probably use it if I thought what is that song, because I hate it sometimes if you hear a new song and you really liked it and they already said it who it is or you missed the bit where they said who it was, that would be really handy, so I could look it up on here --- more information on when it's going to be released or something, or what album it is on, you know, I don't buy singles anymore, mostly buy albums, so if I heard on a song by somebody if I hear a second that I like I might buy the album, that would be a good way of finding out more, because there is so much on the market these days, you can't know them all. That would also be a good way of finding out if they are doing any concerts, if they could tell you the most local concert to you, tell you the date, that would be helpful I like the idea, thinking more about it actually, of the last ten tracks that he played, I think that is fantastic idea, because so often you hear something and you think what was it and who was it by."*

This service would also open up possibilities for interaction. For instance being able to play a song again, vote for a song, or give GWR feedback about their play list.

*"I like some way to actually comment on the play list, GWR don't actually come to their listeners enough about what's on their play list"*

Buying, (impulse or not) could also be facilitated in this fashion, as most expressed the wish to be able to order, buy a song or an album, via the GWR interface or download a song on iTunes (the return of the single). There were three who would rather have the *next* ten songs.

*"The last 10 is brilliant, because you can buy tunes individually now, so I don't need album information. Buying the music thing would be interesting."*

*"Information, maybe a release date, or if they are playing in your local area, maybe where you can buy the album or whether it is available for download on iTunes."*

### **3.2.6. Games, competitions, voting.**

Above we reported how passionate our sample is about taking part in competitions, quizzes, voting and phone-ins. This included voting in quite a wide sense, from Big Brother, to voting on the web, to (not) phoning in to GWR. Here the context is much narrower as we asked them about interacting with GWR via our prototype. Eleven people, just over half of the sample, and significantly, nine women and only two men, commented on entering competitions and in particular voting. They reiterated their

current barriers relating to cost, phone queues and not wanting to hear their own voice on the radio. The immediacy of voting (and feedback probably) could make this type of simple interaction highly attractive.

*“If it didn’t cost as much, yeah, if I could do it this way, instead of sitting in queues, yeah, then it would appeal to me more. Yeah, coz I never say no to that.”*

*“I probably would if it was something really like handy,--- if it said just click here and enter, then I would, sometimes they get the polls on and you just got to click and submit, --- so much easier, I would be more inclined to enter.”*

*“There is something about phoning up, it kind of ‘scares’ me. I wouldn’t really like to hear my voice on the radio. With this I wouldn’t hesitate to enter.”*

### **3.2.7. Wishes, possible usage, form factor.**

We asked the interviewees, what else they would like to see on the device, how they envisage a product like our prototype would look like and how they would use it. We need to bear in mind, that some of them had not heard of DAB before nor had they used an iPAQ before. In addition the current prototype is bulky, cumbersome and (on occasion) does not always function well, which might also form a barrier to imagine what a product would look like. The nature of the comments is spontaneous but is informed by the demo capabilities as well as the more or less self-reflective discussion around their own use of radio. As a focus group type of brainstorm it makes for interesting reading but it should be stressed that in no way does this exercise resemble participative design. We were helped here by the fact that the interface is very easy to use.

*“It is easy to use, especially if you have used the internet before.”*

In addition to expressing the wish to buy music or order tickets for the cinema, or take part in competitions, there were suggestions to add traffic alerts, TV-information, horoscopes, little (light-weight) games, a picture of the presenter(s), a web-cam, a diary, music, email capabilities, stock quotes, useful adverts etc. In addition there were some comments about personalisation, e.g. music or adverts that you are interested in.

*“One thing that I think sometimes with adverts and everything, they play ads, well actually, the majority of times you may tune out and switch off from an ad, sometimes you listen to an ad and you get to the end of it and you think hang on that was actually quite applicable, I actually like to hear that again, or I actually like to hear more detail. So if it gave you the option to say playback this ad again. And you could pick that ad, or save the ad, or text, so if you stop off later, phone up.”*

But it is good to remember that its most important functionality is being a radio, the extra information has to be lightweight.

*“If you want any information from it, you have to continually interact and I’m not that interested in interacting all the time with it. I just prefer music to be played and I prefer just to listen to it as opposed to constantly have to do things, stuff to get*



*something from it. I would just use it as a tool for a bit of news and just interest to show me on the screen what is playing.”*

In addition it has to be integrated in the car.

*“If it can work the way car radio works. If you can buy an extra holder for you car, it could be your SatNav, your radio, and an MP3 player. It could be your whole one-stop-shop.”*

But, not every one would use it, at least not as a device which primary function is radio. The mobile phone was indeed an obvious candidate even though interviewees realised that the smaller screen might pose problems. It would have the advantage of taking it with you when going out.

*“If I’m out with friends and they want to go to the cinema, they can look it up on this. Most people will carry their phone with them.”*

*“I’m definitely a smaller type of girl. I have to say, it doesn’t have to be that much smaller --- in my handbag, I’m carrying around my diary, I would throw that away.”*

*“I quite like it on my wrist. It’ll be nice as a girly mag, nice when you are travelling, with horoscopes and celebrity gossip.”*

But there was also a feeling that having the radio on the phone would somehow be incompatible with the phone’s main function, talking and listening to other people. In addition they worry about battery life.

*“It depends on size and weight. And the battery will die.”*

*“I think I’d rather it be a separate device than my phone and I think I’d be using it all the time, I’d use it more than the internet, it’s quicker to be going to.”*

Inevitably there are comments about the all-in-one device, about converging media: phone, radio, PDA. In this manner, regularly the topics of iPod and iTunes come up.

*“Touch screen, no buttons except on/off. --- attach to the home hifi, maybe a small speaker, headphone out. Not on a phone; I’m a ‘phone is a phone-type person’, but if it’s all in one device it is better that it is all in place. And if the iPod would do it, that is good. And you can put it up in the cradle on your desk and maybe you can click a button saying you only want the weather or travel information because you might not be interested in what is coming up next.”*

*“iPod would be cool. Especially if all radio stations would have this, that would be amazing. Most mobile phones don’t have radio. For travelling it is wicked. Better than an iPod. Visual, it has a colour screen. You can use your walkman on these. Especially if you can pick your own tracks. Or like with iPod, if you can store your own music on it. Or instantly download tracks or just be able to choose what you listen to. That’ll be cool, pick your own songs. It could be the future walkman”*

*“Buying the music thing would be interesting. It has to work with iTunes. Maybe you can have an account on the GWR web site with a record of the tunes you have bought.”*

But, whatever the case:

*“It’s a handy little thing. The screen is fantastic. I definitely would find a use for it in my every day life.”*

## 4. Discussion

In this document we report back on an interview study, where we asked people about their radio listening habits and what radio means to them. We presented to our interviewees a mobile prototype that combines local radio broadcast, GWR-Bristol, with rich visual information and asked them for feedback.

Through the interviews we built up a vivid, rich and consistent picture of how deeply radio listening is embedded into people's lives. Our interviewees rely heavily on being able to routinely switch the radio on; in particular first thing in the morning. *What basic need does this serve?* For the interviews we recruited a mix of dedicated GWR-Bristol listeners (so called P1's) and people for whom GWR-Bristol was their secondary station, after BBC-Radio 1 or Radio 2 (P2's). *Why is it that some people have one particular station that they listen to most?* Radio is typically listened to whilst people are busy with other things. Our prototype displays visual data accompanying the radio broadcast. *Why should people want to look at their radio?* As we have seen from the results, quite regularly people move around the house whilst listening to the radio and switch a number of fixed radios in different rooms on and off and on as they move from room to room. Outside of the car radio there is very little mobile radio listening. *Are there "visual" opportunities for mobile radio appliances?*

Our lives are permeated with radio. Radios come in a diverse set of incarnations: old fashioned dial radios, alarm clocks, stereos with presets, via broadband TV, Internet, DVD's with radio and DAB radios. The house is full of radio appliances and people are happy to move through the house switching radios on and off or leaving it on even when there is no one else but the dog. Figure 6 summarises graphically and in broad brush terms how we might describe the local radio listening experience.

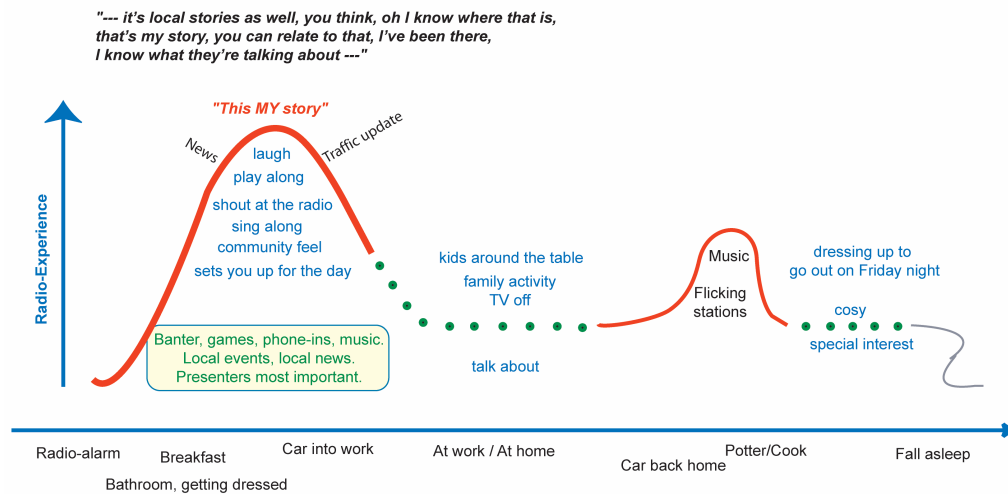


Figure 6: The local radio experience

Along the horizontal axis we see the time (of day) from when the (radio) alarm goes off and the radio comes on through to when they fall asleep, some with the radio on. The vertical axis refers to the more abstract notion of intensity of the radio listening

experience. The thickness of the red line signifies the strength of the community feel as a result of the radio broadcast.

## **Community Feel**

During the morning, the Bush and Troy show, the intensity of the radio listening experience as well as the community aspects are at its peak. For half the sample, irrespective of lifestyle, the radio comes on with the alarm clock, or is switched on as soon as they wake up. Most of the other half of the sample starts listening in the car. Many interviewees talk about what (local) presenters and information about people's locality mean to them. Here there are several themes: the work routine during the week, the morning show, local events, local news and talking points, topics of conversation later in the day. For this morning show the presenters are very important. It is a team thing, the chemistry between the presenters that the interviewees appreciate, comment on; the banter that makes them laugh and forms a diversion from rush of getting ready and the tedium of driving into work; it sets them up for the day. Although they do like the music as well, this does not seem to be the most important reason to tune into a particular morning show. People identify with presenters, are very loyal to them, feel they know them. These presenters speak to the heart. Hearing about local events and traffic information further emphasises being part of the community, the people of Bristol. All in all, it provides energy to start the day, a sense of belonging, as well as topics of conversation, talking points for later in the day.

This community feeling is continued when they take their car into work on their daily commute. Individuals in their soundproof bubble sing along; even being noticed by other car drivers does not seem to deter nor embarrass them. They comment on how they hate the quiet, highlighting their urge to switch that radio on.

The green dots (in the graph) represent that fewer interviewees listen during the day; some listen whilst at work, for all to hear or enjoyed privately via headphones (internet radio) and those who look after children mention how radio cuts down on too much television watching, bringing the family together around the table and providing a cosy atmosphere.

The commute home sees some sort of a return of radio-excitement, but now music and information, for most, are more important than the banter and the adverts annoy them more. Cooking is accompanied by radio listening, but community related comments are scarce. Often people put on CD's whilst cooking. Evenings are more associated with watching TV than listening to the radio. The thin black squiggly line at the end of the "listening curve" hints at the few who fall asleep with the radio; and there could well be a community element here, feeling safe.

The basic need that radio serves and the reason why they have one particular station they identify with, are so loyal to, may well have to do with the situation that as soon as people open their eyes, they find themselves alone (sometimes), cut-off from the world, in the quiet and there is an urgent need to be part of the world, their local community, as quickly as they can. And they can; with the flick of a switch. It is almost as if, in their daily march to work, from the safety of their homes or their cars, they link arms. The "For-Anyone-as-Someone" communicative structure (Scannel, 2000) describes that sense of community feel that GWR morning show listeners experience. It relates to the interviewee, who, whilst driving her car and listening to the radio, sees others in their car laugh and sing in response to the same radio program, or to the "water cooler" conversations later in the day:

*“Thus I find, when I turn on the news, that I am spoken to while knowing that millions of others are watching at exactly the same time and seeing and hearing exactly the same things. --- It is thus an experience that I share with others and as such is, in principle and in fact, talkable-about by me with anyone else who has watched the same program. --- express a public shared and sociable world-in-common between human beings” (Scannel, 2000)*

Scannel makes the point that radio is timetabled, it is happening *now* for everyone:

*“One of the most obvious and overlooked aspects of broadcasting is that it runs a timetable. --- Each one of us knows that just as it speaks to me it speaks to millions of others at the same time, now”*

The hard to describe excitement of a live broadcast football match, where from millisecond to millisecond we have no idea how the match is going to pan out (very different from seeing the repeated highlights), is woven into the argument, as follows:

*“This now of concern is doubled, and it is this doubled spaciality and temporality that yields the specific for-anyone-as-someone structure of daily media as a new kind of available now. There is the now of the broadcast event and at the same time the now of listening. Each of these nows is distinct (each has a different location) --- the soccer stadium and the now of listening is always elsewhere, in the car, the home or wherever. But the broadcast now is for the situated now of reception. The broadcast now gathers us - in millions - into a shared now of concern.”*

Our interviewees love interacting with radio (and TV for that matter). This interaction takes the community feel to the level of participation, well beyond the “For -Anyone-as-Someone” communicative structure. Interaction can take several forms, ranging from playing along with a game in one’s head or with a family member, shouting at the radio, even (or especially) when by your self, texting, phoning in, internet interaction and pressing the red button on one’s digital TV remote control. By the end of 2003, the UK, with 44% the highest penetration per household worldwide of digital TV’s (Maclin, 2003) is a leading nation in interactive TV, although it is still in its infancy, painful and cumbersome, it seems unstoppable.

The context ranges from quizzes, voting for e.g. Big Brother, charity, requesting a song or making a complaint and is accompanied by strong emotions, frustration, delight and always there are “other people”, on the radio, in the office playing along, or talking about it. A chance to win is also a strong incentive to vote.

Feedback about how the rest of the local people (or nation at times) voted, answered a question, is well received, reinforcing that community spirit. People are aware of the cost of voting but that doesn’t stop them. There seems to be a gender difference with more men commenting how they will not take part. There is a clear preference for texting, it is not necessarily perceived to be cheaper but it is more convenient. The red button on the TV has attractions but is as yet still unwieldy for some. Phoning in has several drawbacks it is perceived as expensive, you even pay when you are in the queue to register for an interaction, there is very little chance of actually getting through, it is far from immediate, by the time you are able to cast your vote, give your answer, you may well be in the car to work and people do not always want their voice (literally their speech) heard on radio.

On a more commercial note, the presenters, the culture workers as Ahlkvist (2001) calls them, instigating and reinforcing the community feel of the morning show, also play an important role, as “mediators” (rather than gatekeeper) between the music producers on one side and the audience on the other. All the banter and chat might well produce a well-oiled conduit for (newly produced) music to be heard *and* sold:

*“Other researchers have applied an interpretive perspective by studying culture producers as mediators between culture creators and receivers ---- ‘mediator’ is conceptually preferable to the ‘gatekeeper’ metaphor commonly used in production models because it draws attention to the fact that these culture workers are not merely ‘selecting, sorting, and ordering a vast quantity of “raw materials” which then flow through the system . . . to the public’, but are constructing cultural objects by drawing on particular interpretive knowledge frameworks. Mediators are seen as analytically important because they highlight the role of culture workers as simultaneous producers and consumers (interpreters) of cultural objects.” (Ahlkvist, 2001)*

In an earlier study we found that most people become aware of music, which they end up buying (or at least owning), via such mediators, through the direct experience of listening (radio, TV, film/video) rather than indirectly experiencing music by reading about it in reviews (Geelhoed, 2001). Thus with the rise of iTunes (Gibson, 2005), enhancing radio broadcast with data, e.g. the last ten songs played, might benefit providers of iTunes services.

## **Mobile Radio**

The car is a radio (and music, Brown et al 2001) listening booth par excellence. The car-radio is there for lightweight (music and chat) company and the community feel is continued. A few also sing along to their hearts content. Of course traffic information is seen as very important but people also listen closer when the (local) news comes on. Most interviewees listen to the radio whilst travelling to work and they tend to stick to one station. When travelling back from work, however, they are much more inclined to flick over, as the adverts start to annoy them, but they will usually (always) flick back to their main station. Although there are more adverts during the morning show people notice these less. We could speculate that on the way back listening to music becomes more important than the chat and that therefore the adverts are more likely to be noticed. Those who travel more extensively during the week or in the weekend, mention how they go (or at least try to go) from one local radio station to another. In other words they have a mental map of where local radio stations are.

When they are tired of flicking and when reception gets poor, people tend to put on CD's in the car, but by and large radio is preferred as it is less hassle and, when travelling with others, radio finds a happy medium (a compromise) between diverse tastes.

On the mobile radio side, some participants mention their Nokia phone with FM radio. There are one or two people who use a dedicated mobile radio but its use seems negligible. The ones who use their Nokia phone to listen to FM-radio say that they use it on busses or whilst walking to the corner shop.

## **Technology Savvy**

Our sample consists by and large of “ordinary” Bristolians, who do not perceive themselves as technology savvy. However, it is good to realise that these days certain technologies are so mainstream, ubiquitous and pervasive, routinely used in mundane situations that they are not perceived as “technologies” per se. The mobile phone is the obvious example, but we didn’t expect that some interviewees would routinely use their mobile phone to listen to FM radio and talk about it in such a matter of fact manner.

Internet, which invariably involves the tedious booting up of computers, is used routinely for checking the five day weather forecast, which films are on, listening to the radio, “Googling” away, finding out about any and every topic under the sun, downloading stuff, etc. GPS under the name of SatNav has very quickly made its way into their every day vocabulary.

On the entertainment appliance side several participants have more than one DVD-player in their house (with built-in radio), listen to radio on their cable or satellite TV, use presets on their car radios (although some females still have problems setting that up). They are familiar with MP3’s, iPods (although these are still perceived as too expensive, which only shows that they *are* familiar with the product) and iTunes.

This general awareness of available technologies and familiarity with them means that certain technology perception hurdles of the past have now been taken.

## **Reactions to the prototype**

Most subjects had not encountered DAB before and reactions to visually tuning to stations were positive, possibly because of the novelty value. There were many spontaneous remarks upon seeing the DLS texts. Again for most it was the first time they saw such text and reactions were positive, some expressed their disbelief, marvelling at the magic of this technology. People liked to see what is playing now and which songs are coming up. It would even keep them tuned in longer and wait for the adverts to finish. In particular it seems to address a common frustration that, when you switch on the radio and you hear a (new) song that you like but you have missed what the song is called, who the artist was and which album the song is from. Few noticed that the audio quality was better, most likely because this is not of a high concern for the majority of users.

We pointed out GWR’s red “plus” button, which linked them to GWR’s website, showing information on the local, national and international news, the five day weather forecast, movies, music and the last ten songs played. This gave us a first impression of how useful an instant website, a mini website as one participant called it, with short, everyday but highly useful, information, which comes to you as part of radio broadcast, actually could be.

When we asked about their radio listening habits, there are many spontaneous comments about how (and why) they currently find out about the weather, highlighting how the weather is both trivial and all important. Currently, people consult a number of sources for weather information: the radio, although you have to tune in at a particular time; there is the convenience of looking up the weather on the internet, where you are not bound to particular timeslots but it often does mean starting up the computer; watching the TV morning news for (amongst others) the

weather. The reason for finding out about the weather has to do with planning days out, where, of course, the weekend is of particularly importance. In spite of the fact that people already have their daily routines to find out about the weather, the prototype sparked off enthusiastic exclamations and they were quick to point out how useful they found this (location based) information. Currently there are some barriers: people have to wait for the right timeslot (radio, TV) or have to set up their computer. Receiving this information effortlessly as part of the radio broadcast in a lightweight, one click, fashion whilst mobile is a potential big user value.

The majority of the sample enjoys movies and they try and make an effort to go to the cinema regularly. They do like the “what’s on” section and reviews of the mini-website. Regularly they remark that to know where and at what time a movie is shown *and* a way to order cinema tickets via the device would be very useful. Following O’Hara and Perry’s (2003) notion of capturing lost impulses, this provides further evidence that there is opportunity to convert those impulses. Providing little tasters, short trailers, could help with this.

The advantage of accessing local news and separately local forthcoming events via the prototype follows a similar pattern. Some participants also mention how a product like our prototype might link up with the satellite navigation system in the car. It is good to bear in mind that local does not always mean the place of residence, i.e. Bristol. As people travel around they would like to know what is on other local areas. This includes local traffic information.

The website also displayed the last ten songs that GWR had played. Again, there was an abundance of comments on how useful this would be, in particular if accompanied by extra information. This service would open up possibilities for interaction. For instance being able to play a song again, vote for a song, or give GWR feedback about their play-list. Buying, (impulse or not) could be facilitated in this fashion, as most expressed the wish to be able to order, buy a song or an album, via the GWR interface or download a song as iTunes (the return of the single). That voting for songs provides a strong sense of community has been described in Mobile Bristol’s Jukola trial (O’Hara et al., 2004).

We asked them about interacting with GWR via our prototype. Eleven people, just over half of the sample, and significantly, nine women and only two men, commented on entering competitions and in particular voting. They reiterated their current barriers relating to cost, phone queues and not wanting to hear their own voice on the radio. The immediacy of voting (and feedback probably) could make this type of simple interaction attractive (for the ladies). Females also like celebrity gossip; others (males) commented that they would like further information on artists such as when they would be touring or when an album would be coming out.

In addition to expressing the wish to buy music or order tickets for the cinema, or take part in competitions, there were suggestions to add traffic alerts, TV-information, horoscopes, little (light-weight) games, a picture of the presenter(s), a web-cam, a diary, personalisation etc. In addition, in spite of strong negative comments about radio advertising, there were some suggestions about how useful (personalised) adverts could be.

But it is good to remember that its most important function is being an audio channel, a “traditional radio”, the extra information has to be lightweight, at a glance and not interfere with the pleasure of (background) listening.

We also asked our sample how a product like our prototype would look like and how they would use it. Most people reiterate that first and foremost it is a radio



but they add that they will use the information, as long as it is in a lightweight manner. In addition it has to be integrated in the car, e.g. in a dedicated holder or even with GPS.

The mobile phone was indeed an obvious candidate to have an integrated DAB radio, even though interviewees realised that the smaller screen might pose problems. It would have the advantage of taking it with you when going out. But there was a feeling that having the radio on the phone would somehow be incompatible with the phone's main function of talking and listening to other people. In addition they worry about battery life. Inevitably there are comments about the all-in-one device, about converging media: phone, radio, PDA. In this manner, regularly the topics of iPod and iTunes come up.

Elaborating on how they would use an appliance like our prototype, we asked people about when they have a bit of idle time and how (if at all) they would use the prototype during that "gap" time. There is a range of times, places, mobile and non-mobile, situations. In the evenings, when not watching TV, after dinner at 8.30 and lunchtime are mentioned regularly but also when the baby is asleep in the day time or simply when bored. Places in and around the home such as in the garden or when tidying the bedroom (apparently something you only do when having a bit of idle time) come up. Mobile situations with longer gaps are mentioned: on a bus, waiting at the bus-stop, long coach or train journeys, on a plane, walking to work, whilst shopping with their partner (a male comment of course) and on the beach.

## Opportunities

So, now that we have heard twenty GWR listeners talk about their radio habits, how this fits into their lifestyles, what type of radios they have, where and when they listen and what they like and not like listening to *and* we have gauged their reactions to the prototype, what are the opportunities for adding a slightly bigger screen with more information to a DAB radio, how would (location related) information be of benefit to them, or most importantly, to the millions of local radio listeners out there in the real world, outside the lab? What would a successful product look like? What kind of functionalities would a product range require?

Let's first consider **where** they listen currently.

At **home**, there are a great number of dedicated radios or appliances with a built in radio, e.g. alarm clocks, the stereo, the DVD player, the digital TV. These are located all through the house and, as people move about in their homes, they are in the habit of switching radios off and on, as required; they do *not* carry mobile radios with them in the house. It is also in the home that they listen out for local information and interact with the radio broadcast.

At **work**, the radio might be on for all to listen to, or they might log on to the Internet and listen privately via headphones. In the first case, radio broadcast is there mainly as background and spreads widely through the workplace. Adding a small screen (with a small visual reach in the foreground of our attention) to such a radio seems incongruous with the far-reaching audio in the background. It would probably be no more than a nicety that some individuals may consult on very few occasions. Those individuals might even relay to others around who are at a distance what they have seen on the screen, but the impact of adding a screen seems minimal. In the second case of people listening to radio on the Internet via headphones, they already

have a much larger screen and all the information in the world on tap. Moreover, as some of our Internet radio listening participants tell us, the radio should not cut in too much into the work activities as this interferes with the concentration, i.e. it should be far into the background as audio only.

If there is one place where all our interviewees listen to the radio, it is in the **car**; mainly during the commute into work and back home again, sometimes on longer work related trips as well as in the weekend. Whatever the opportunities are for adding visual information, it is obvious that drivers will spend most of their time looking at the road and not at a little screen. When thinking about what the opportunities in the car might be, it is good to keep in the back of our minds, that CD's (or tapes) are also of high value while driving (Brown et al, 2001).

Very few of the interviewees mention using a dedicated mobile radio, significantly there are a couple who say that they have one, but cannot remember where it is. The **mobile phone** however is used for listening to the radio already and people comment how much easier it is to take the phone than to take a portable CD player (interestingly, minidisks are not mentioned as mobile music devices). The sample is aware of **iPod** (as well as iTunes) and as attractive as the device is, the iPod is still seen as expensive.

Thus, there are opportunities for adding a screen to the radio at home, all the more since battery life is of low concern, and in the car, although the latter needs to be carefully designed, possibly integrating satellite navigation. Good immediate candidates are mobile phones and MP3 players. We can easily imagine how the phone screen could display simple information and how an iPod could feature a radio in the future. Currently the use of mobile radio is limited but, since adding visual radio to a mobile phone or MP3 player is feasible, these are serious candidates; all the more since DAB would provide the quickest wireless internet currently available. The workplace, on the other hand, does not seem to offer good opportunities.

Let's now shift our focus to the **content** of the visual **information**.

Visually tuning and seeing the DLS text were well received and we can easily imagine that in near-future product roll outs there will be DAB radios with slightly bigger monochrome screens to accommodate 128 characters of text and make visually tuning even easier. Our prototype featured GWR's "plus" button, which opened up the GWR-branded mini-web site. This proved to be a big hit with the interviewees.

Simple, lightweight, "at a glance" information that is not necessarily linked to the content of the ongoing radio broadcast, such as the five day weather forecast, information on local events, films, local news and local adverts, that has the advantage of "coming" to you as part of the broadcast, instantly, wirelessly, rather than requiring lengthy booting up, has all the hallmarks of high user values.

When people talk about local information, this does not always only concern Bristol. As people travel around they pick up other local radio stations, they would like to know what's on in that locality, what will the weather be like, is there important traffic news etc.

Information that has a more direct link to the actual broadcast, such as the last ten songs played (and/or the next ten songs, as some our sample suggested), or a little bit of information on the artist (e.g. when is the artist coming to Bristol?), the single and the album, that the single is from, might enhance the radio listening experience considerably.

Finally there are some good possibilities for **interaction**.

On digital TV, the red button is slowly lowering the barriers for interactivity. Voting for Big Brother with the red button has been made considerably easier, i.e. you vote on the same appliance as you watch the show; you do not need to switch to a telephone (to ring or to text) or a computer. In the high street only about 5% of bookmakers' customers are women. But with television it is predicted that this jumps to 20-30% (Hargrave, 2004).

Visual radio too, could feature an interaction button for simple voting, opinion polls and quizzes. Good and timely feedback would contribute to making the whole interaction experience a satisfactory one.

A good number of subjects in the study said that, not only do they want to check the films, the cinemas and the show times but they also expressed the wish to book their tickets via the appliance. The success of iTunes could point the way forward to downloading music on the visual radio device. Here the car might offer good opportunities, e.g. in the same vein as people put CD's on when they want a change from the radio, people could download tunes, e.g. when stationary at the services.

### **To conclude**

We conclude that this interview study clearly highlights the user values of what a visual DAB radio such as our prototype might provide and there could be some commercial advantages to this. However in other areas the opportunities are less straightforward.

**Audio:** First and foremost the radio provides an audio channel, to be listened to mostly in the background. DAB offers a little marginal benefit in visual tuning, but that is of no serious consequence.

**A branded mini-web at a glance:** The DLS provides simple, glance-able, lightweight but important information. By adding richer data, at the push of a button and still part of the radio broadcast, simple web-based information (weather, local news, local events, last ten songs played) comes to you, carrying the (GWR) brand.

**Interaction:** There is potentially a powerful opportunity to interact, at the push of the button, e.g. to immediately download a sample iTune, answer a simple opinion poll, vote for a song etc. The interaction becomes more complicated when financial transactions are involved, e.g. to order an album, order a cinema ticket, or pay for iTunes, but there are still some good opportunities to convert otherwise lost impulses.

**The morning slot = Local community feel:** The deep emotions evoked by the morning show can be capitalised on to draw the audience in.

**Home:** A good deal of the audience starts listening when waking up and continue to listen whilst rushing about and getting ready. In spite of the rush, some find the time to phone up or text, whilst others merely shout the answers at their radio. Thus quick interaction with DAB radio offers the opportunity to act upon the call to action from the presenters (and in some cases advertisers) even though the "gaps" in people's life, time are minimal, because the strong emotions motivate people enough to take action.

The smaller audience that listens at home during the day could be mobilised of course, but this might be more of a trickle than a burst. People also use their digital TV to listen to DAB. The set-top box might be a good candidate to provide DLS and possibly other visuals as part of DAB in future.

**Car:** There are obvious barriers to interact with the radio station or follow impulses to buy whilst driving. There are opportunities to somehow integrate satellite navigation systems with the radio based information services. When people make longer trips there are good possibilities for tapping into other local information or even take advantage of a break at the services to download iTunes.

**Mobile:** Mobile radio listening is currently not a big factor. However MP3 mobile listening is widespread. Adding DAB capabilities to MP3 players, in particular adding visual located information, might have a (positive) disruptive effect.

### Next user research steps

With the prototype becoming more robust, we are planning a field trial for February 2005, where prototype DAB visual radio units with some interaction capability (via GPRS) are placed in households for the duration of a week.

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