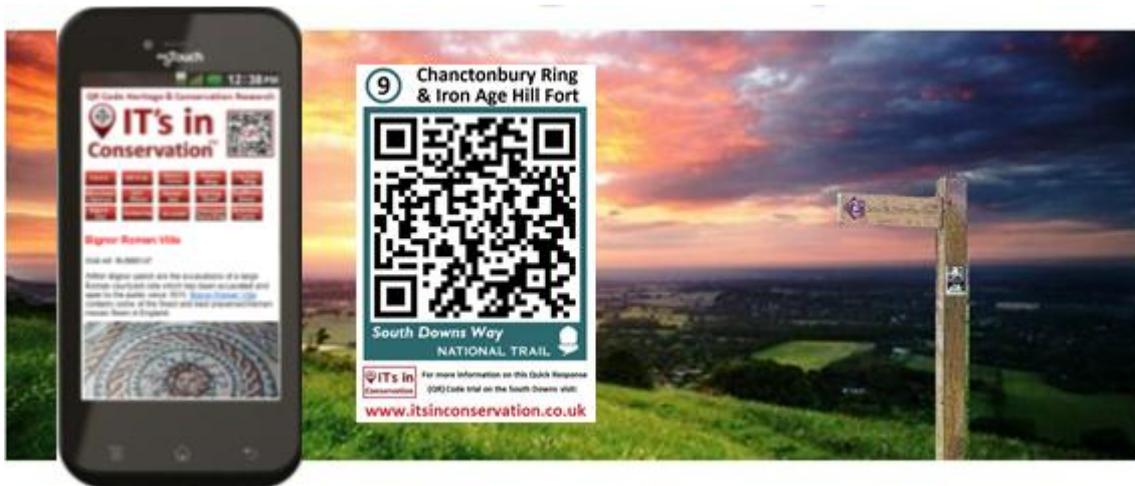


What opportunities do Quick Response (QR) codes offer to heritage organisations and how can their use help improve public appreciation of UK heritage sites?



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www.itsinconservation.co.uk

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Smartphone technology – the future of heritage interpretation



The smartphone has rapidly become the tool of choice for people of all ages, the mobile 'hub' from which many users run their busy social, leisure and family lives.

We are now in the age of the 'always online' generation where 81% of smartphone owners keep them on all the time to browse the web, download applications, network with each other socially and use their smartphones to find out about almost anything around them.

The key factors for success of mobile technologies to deliver instant heritage site interpretation benefits, such as QR codes and Near Field Communication (NFC) tags is good public awareness, that the information they link to can be accessed using most mobile devices, that they are quick and easy for people to use, and that they can link to a range of content that is perceived as being immediately useful.

Quick Response (QR) codes, the most popular contactless technology, are two dimensional barcodes that can be scanned by a smartphone's built-in camera and QR reader application to access online or text based information. With **94% of the UK public owning a mobile** and **50% having an advanced smartphone**, both of these devices have the capability to scan QR codes.



QR codes are free to create, easy to site, distinctive to spot and have low printing costs but, whilst used regularly in the commercial world, they have rarely been used to date in outdoor heritage settings. Online and on-site South Downs QR code research, undertaken with 144 respondents as an MSc dissertation, showed that **85% of the public are aware of QR codes** and **63% have scanned a QR code** with a smartphone. **86% of respondents also found it fast and easy to scan a QR code** to connect to text, website pages, video, audio and other online content.

On the South Downs, on average each mobile page link was visited once a day from a QR code. Once people know what QR codes are, what they link to, and have scanned them for the first time, they respond favourably to them and are keen on their potential future use at heritage sites.



Free QR code reader 'apps' are available for most mobile owners to download and mobile web browsing costs and mobile device monthly payment plans are becoming cheaper by the month. By using the practical ITiC implementation guidelines for QR codes, they offer significant benefit to heritage sites for additional, fast, low cost and effective site interpretation.

An introduction to QR codes and smartphone interpretation

QR codes, an example of which appears below with its distinctive square boxes, are actually not new, and have been in use in manufacturing since 1994. However, it's only in the last two years that the public has seen them regularly, usually in magazines and on posters and on TV. QR codes are now starting to appear at UK heritage sites, together with newer NFC tags and Augmented Reality.



94% of people in the UK own a mobile phone and over 50% have a more sophisticated smartphone or device, such as an iPhone, Android phone, iPad or tablet. Smartphones usually have a small built-in camera, they can browse the internet when out and about, and they allow users to download applications from mobile 'App' websites.

What are QR codes and how do they work?

A QR code is a 2D barcode that, when scanned, can link to text or anything accessed over the web such as web pages, pictures, audio, videos, map locations or interactive games.

Using QR codes in heritage and conservation

It is recognised in the heritage sector that there's great potential in the use of QR codes to help people of all ages visiting heritage sites, and a QR code trial was recently run in the South Downs National Park to prove their visitor benefit.



The results showed QR codes were liked by visitors, helping them to gain an appreciation of our unique conservation and heritage, and aiding people of all ages to understand our history and culture better.

Scanning QR codes at visitor sites



To scan QR code users need just three things:

1. A mobile with a camera to point at the QR code
2. A small mobile 'App' installed to read the QR code
3. Web access to go to the page the QR code links to

QR code reader Apps can be downloaded free from mobile websites such as www.i-nigma.mobi or www.qrstuff.com which cater for almost all smartphones and device types.



Spot a Quick Response Code Scan the code with a QR reader Click the web link from the code

On a phone or device just select the QR code scanning app, which should start up and link with the built-in camera on any mobile. The App has a square box to focus the QR code in to. As the user gets closer to the code, the QR reader then picks the QR code up.

Scanning a QR code takes users directly to a web page, or may ask the users to connect to the internet to go to the web page. Scanning a legible QR code usually takes no more than 5 to 10 seconds. If the user doesn't have time to read a web page from a QR code link they can save it to read later at their leisure.

What are the advantages of QR codes in heritage and conservation?

Compared to features like visitor site interpretation boards QR codes are cheap to create and easy to site, such as on existing posts or way-markers, and can be easily stored and replaced if they get damaged.

Use your mobile - please scan the QR code to find out more



IT's in Conservation For more information on this Quick Response (QR) Code trial on the South Downs visit:
www.itsinconservation.co.uk

The majority of interesting UK heritage sites, such as castle ruins or National Parks, can't always offer a visitor centre or access to a site expert. So, when visitors want more information about something they've discovered on their visit, they can use their mobile to scan a nearby QR code quickly and easily to obtain more details about a particular point of interest.

In fact, used cleverly, QR codes can act as a personal tour guide, providing background details at key points all around a visitor site, in a quick self-service way. These codes can be produced to almost any size, so they're easy to spot, but their small size avoids any negative impact on a user's visual enjoyment of a heritage location.

The mobile website pages each code links to can also be changed or updated with each season, or improved over time so they won't go out of date.

Further mobile interpretation research

Many ideas about how best to use QR codes are still new and that's why the research on the South Downs will continue with the addition of NFC Tags in addition to existing QR codes. This ongoing research will help develop and improve mobile interpretation effectiveness, so it can be used at more heritage sites.



Each site will have links to download a QR reader, if users don't have one already, plus an opportunity to take part in the new 5 minute mobile research questionnaire.

For more information go to www.itsinconservation.co.uk and visit the 'QR NFC and AR' website page.

QR code Research – South Downs National Trail- Summer 2012

This QR code research was undertaken by Andrew Kerry-Bedell, Managing Director at ITiC, as part of a final dissertation for an MSc in Building Conservation that is due to be awarded in February 2013.

QR code pre-survey online research

To boost the total responses and statistical significance of the QR code wayposts research survey results for the nine South Downs locations, it was decided to undertake extensive pre-survey online research with as wide a range of people and ages as possible.

The aim was to determine their current awareness of QR codes and attitudes towards them, whether they would be likely to scan them at any UK heritage site and, if they did, what type of information they might want QR codes to link to.

Research methodology

An online research pre-survey questionnaire was created using Survey Monkey. The on-site questionnaire that had already been created was used as the basis of the pre-survey questionnaire, in order to compare and contrast results.

This was believed to be important as the pre-survey questionnaire focused on a perspective of respondent's previous experience of QR codes, whereas the on-site questionnaire sought to understand the experience of users with the specific QR codes located across the South Downs.

Research questionnaire design

Survey Monkey, an online survey questionnaire system, was used to develop the pre survey research questionnaire. The questionnaire was designed using a 5 point scale where subjective responses were required e.g. extremely easy, very easy, moderately easy etc for questions one, three and six. The remaining questions gave multiple options on perceptions of QR codes, to allow for enough questions and answer variants to ensure a detailed response to the perceived benefits and negatives of the potential use of QR codes at heritage sites. Ten questions were used in order to ensure that the questionnaires were easy to fill in online within the target time of around 5 minutes, which was also tested in advance.

QR code on-site research on the South Downs

The on-site research sought to understand the experience of users with QR codes located along the middle section of the South Downs from Old Winchester Hill Fort in the west through to Chanctonbury Ring in the east. The QR codes scanned over the two month trial were as follows:

QR code scans - July 1st to Aug 31st	Page Views	Per month	Visits	Per month	Landing page	Visit duration (mins)
Google cycle map	118	59	114	57	85	1' 65"
Mobile website home page	98	49	85	43	83	1' 45"
Online QR research survey	76	38	48	24	48	2' 00"
Butser Hill	66	33	56	28	56	1' 05"
Chanctonbury Ring	64	32	55	28	56	1' 14"
Bignor	61	31	19	10	25	1' 16"
Old Winchester Fort	57	29	33	17	33	1' 39"
East Meon	57	29	7	4	9	1' 23"
Harting	48	24	32	16	32	1' 22"
Amberley	18	9	7	4	7	1' 29"
Graffham	15	8	7	4	7	1' 43"
Arundel	10	5	3	2	3	1' 30"
Total / Average	688	344	466	233	444	1' 22"

Figure 1: Scans for the 12 QR codes from Google Analytics statistics over 2 months

Onsite survey research methodology

The on-site research questionnaire was directly accessed by scanning the 12 QR codes sited on 30 gates and wayposts highlighting nine South Downs points of interest. Survey Monkey was used to develop the onsite research questionnaire. In addition to the link provided on wayposts from QR codes, respondents were interviewed at the popular Butser Hill Wood Fair in July and at Old Winchester Hill Fort.

On site survey results and pre-survey comparisons

The results were a combination of all those collected directly in the Survey Monkey website as a result of South Downs QR codes scanned between July 1st and August 31st. Face to face survey results were added and collated and analysed to make it easier to compare and contrast with the pre-survey results.

There were a total of 466 mobile website visits and 688 page views over the two month QR code trial period, as a direct result of scanning the 12 QR codes. The top six sites of visitor interest averaged 30 QR code scans per month, or one scan per day on average.

Duration of mobile web page visits varied but the average was 1 minute 22 seconds (90 seconds target).

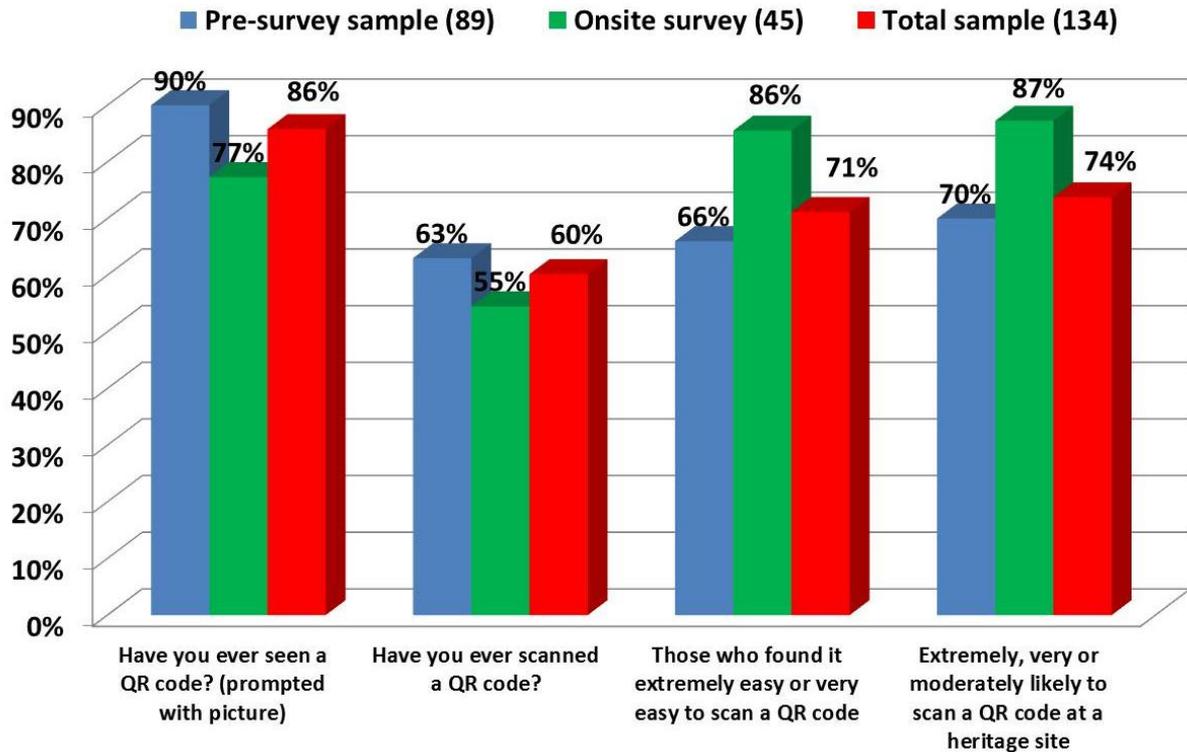


Figure 2: General awareness and acceptance of QR codes (Q1, Q3, Q2 and Q8)

Differences between the pre-survey and onsite survey groups are approximately the sampling error which is 15% at a 90% confidence limit.

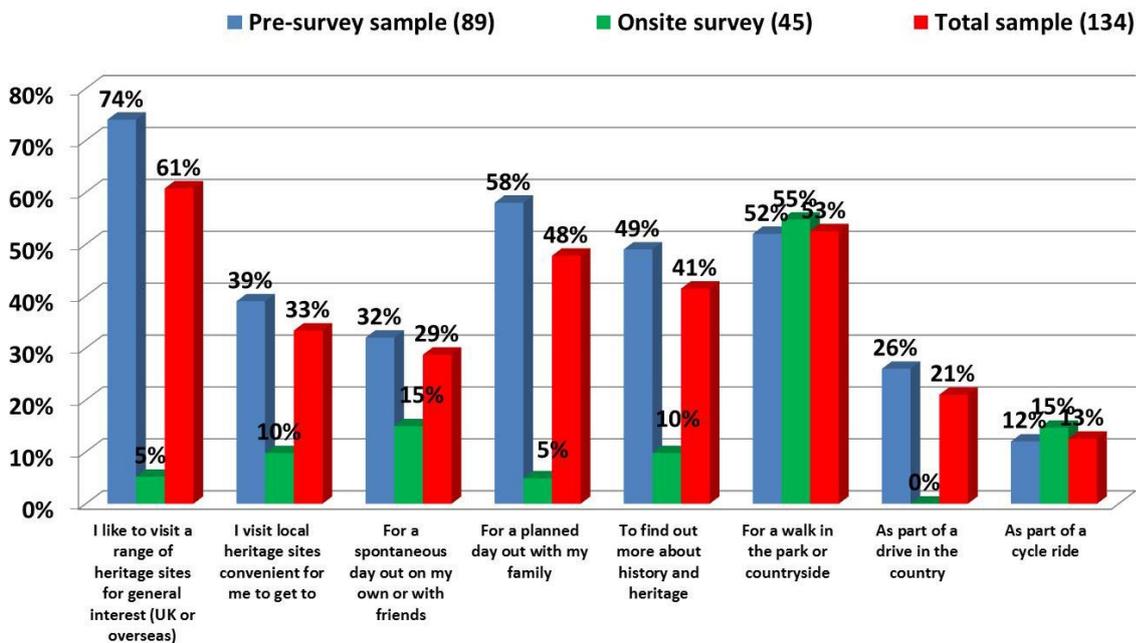


Figure 3: Q9 - Why do you visit UK heritage sites?

Note: respondents to the on-site survey did not appear to have time to record multiple answers as most (55%) just answered “For a walk in the park or countryside”.

What might you like about having QR codes at heritage locations?

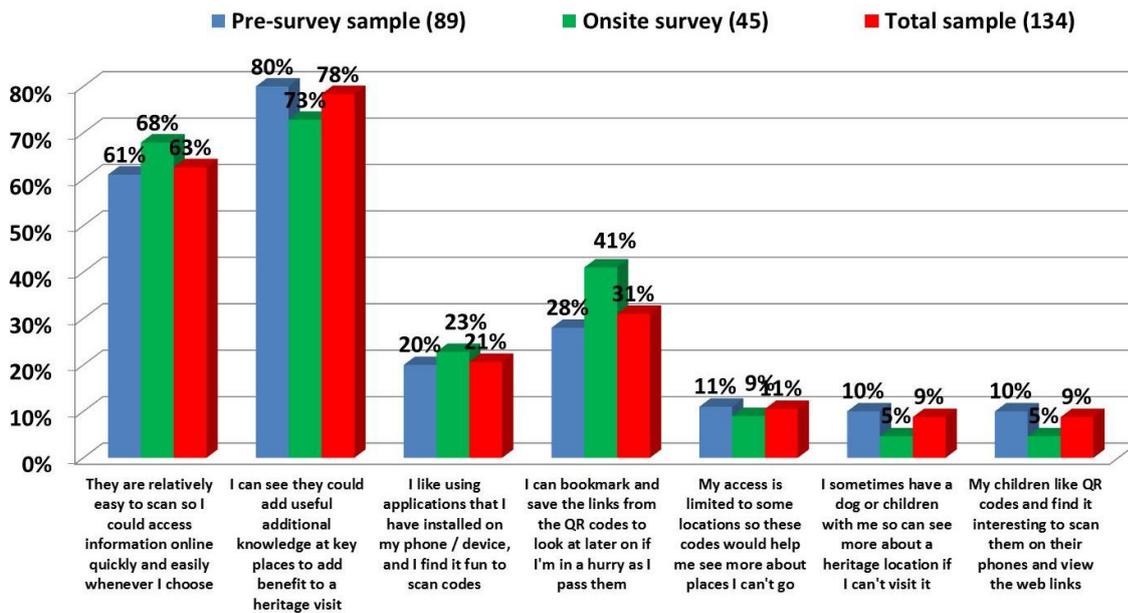


Figure 4: Q4 - What might you like about QR codes at heritage locations?

Note: there was very little difference between the pre-survey and onsite survey groups.

What would benefit your use of QR codes at heritage sites?

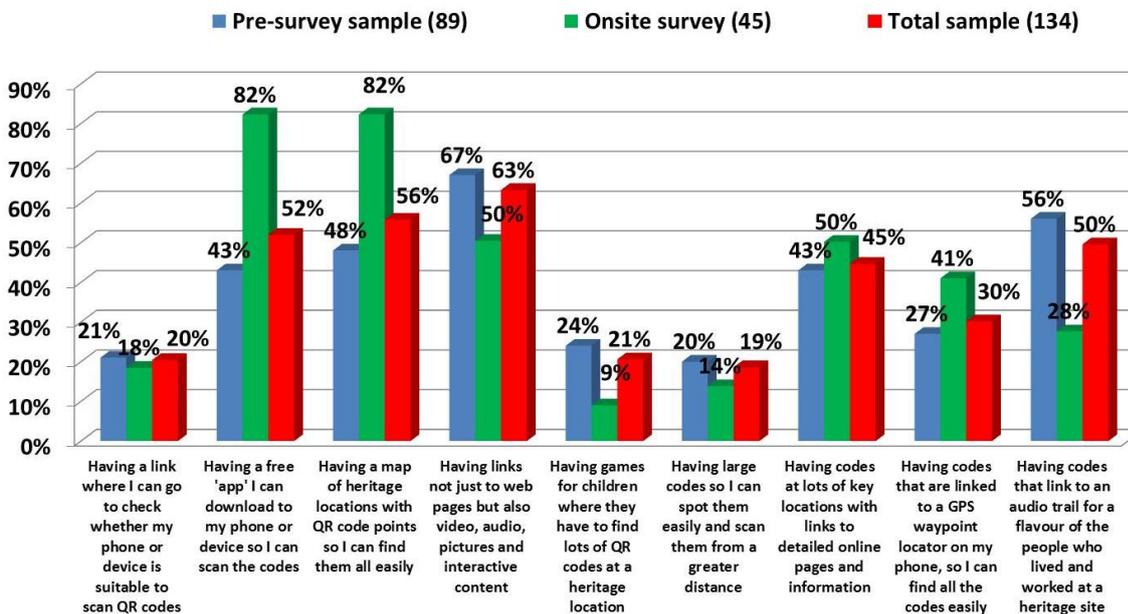


Figure 5: Q5 - What would benefit your use of QR codes at heritage sites?

Note: the pre-survey sample was keen on interactive content such as online video and audio, including audio trails. The onsite survey sample were keener on an online map to link all the QR code points and those that were questioned in particular wanted a free mobile application to scan QR codes (those that filled in the onsite survey already had a QR scanning app installed to link to the online survey page).

What would make you likely to scan QR Codes at heritage sites?

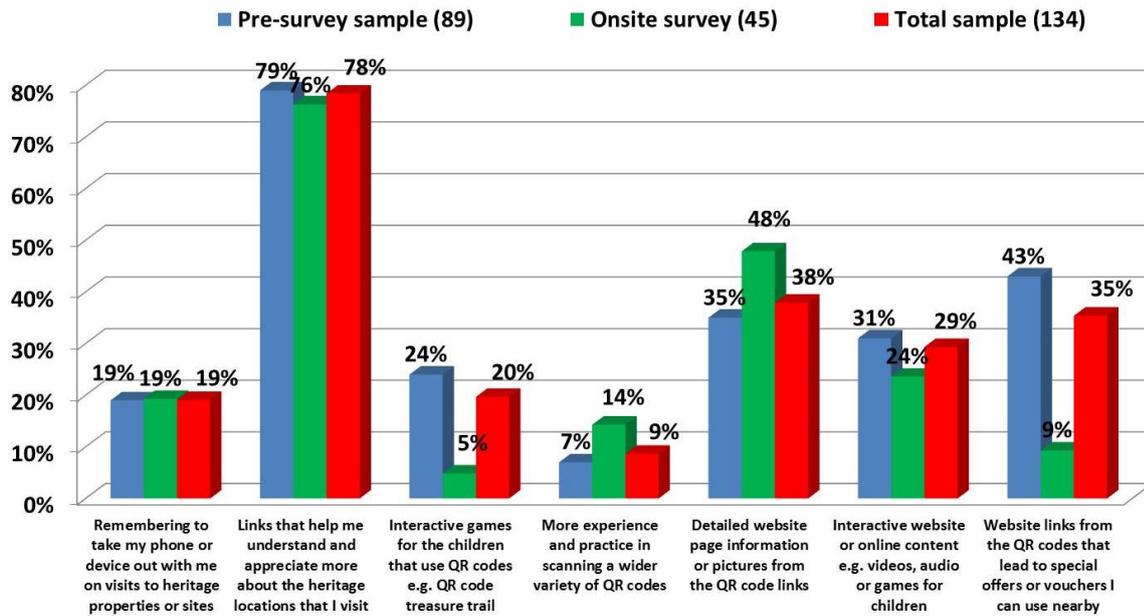


Figure 6: Q6 - What would make you likely to scan QR codes at heritage sites?

Note: There was little difference between the pre-survey and onsite survey groups except on-site survey respondents were not as interested in on-site offers or vouchers.

If you are not likely to scan QR Codes at heritage sites, why not?

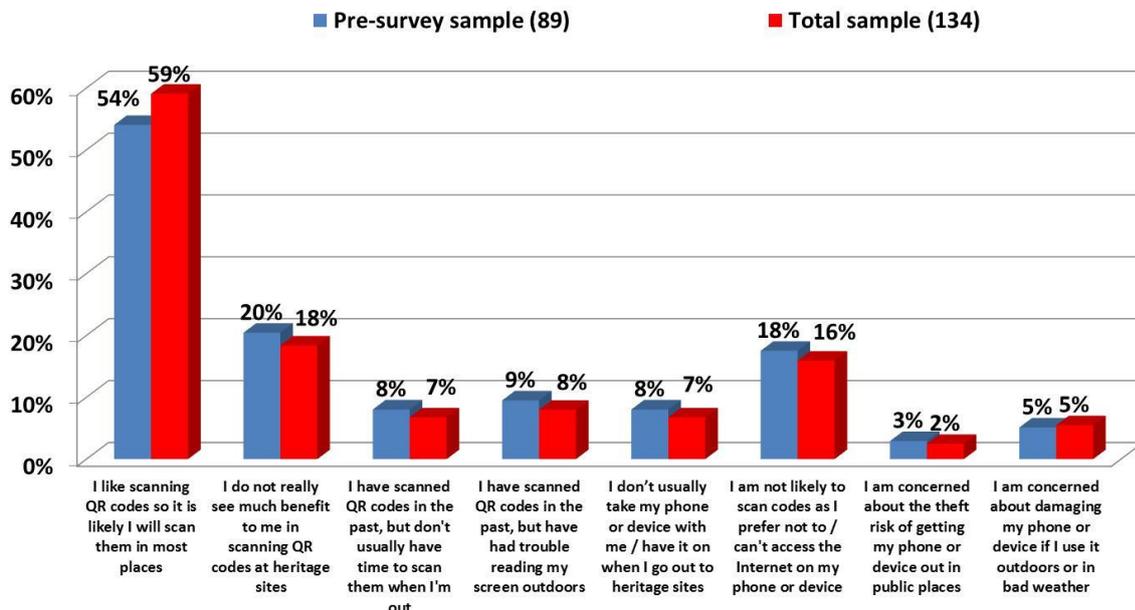


Figure 7: Q7 - If you are NOT likely to scan QR codes at heritage sites, why not?

Note: there was very little difference between the pre-survey and onsite survey groups.

What is the age of the person who scanned a QR code for the survey?

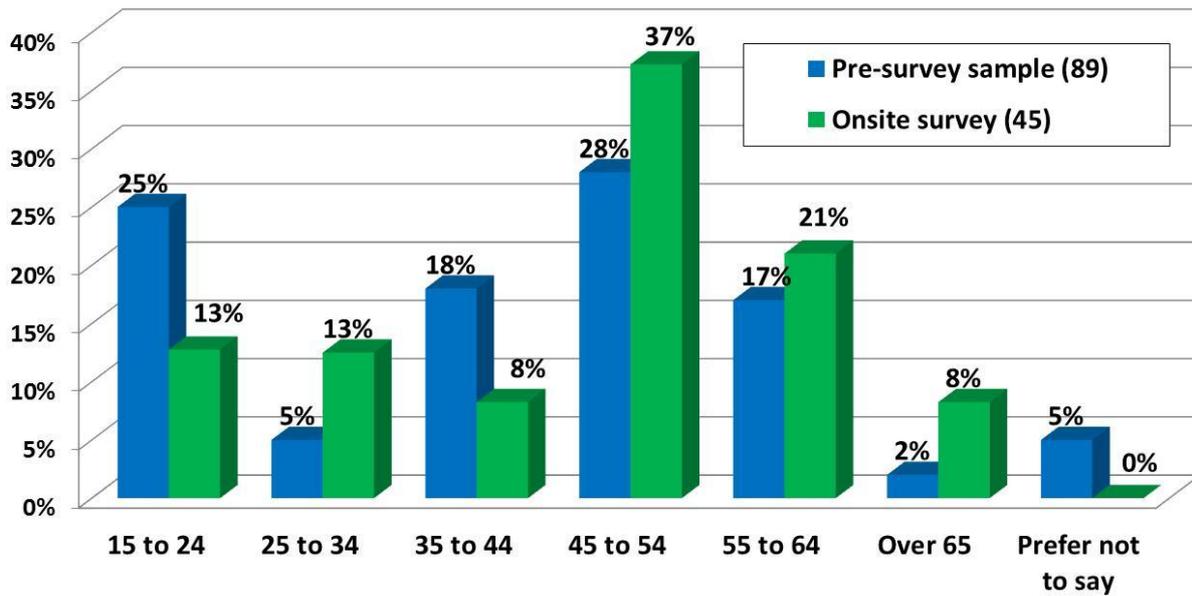


Figure 8: Q10 - Age of the person who scanned a QR code for the survey

Note: the pre-survey sample group was a slightly younger group overall with 48% under 44 years old and a higher percentage in the 15-24 and 35 to 44 age groups.

Visitor comments made about the use of QR codes (and the advent of NFC...)

74 comments were received in response to requests with particular online survey questions, but there were also general comments made about the use of QR codes on the South Downs:

“They would be perfect for historic monuments and memorials”.

“They could become outdated quickly and replaced with other technology, like NFC Tags”.

“A great way to use easy mobile technology and save money on printed material, which dates”.

“The idea of QR codes is fine, but it should be remembered there is still a substantial proportion of the population who do not have access to devices which allows them to utilise the information”.

“Generally it's a good idea, but many people don't know that you have to download a 3rd party app to scan QR codes, and probably won't be bothered to download one just for a day trip. In the longer term NFC would be a better option as with that a visitor could be automatically logged in to the local wireless network and directed to media that would load more quickly than using a wireless network. I think the best solution would be to have a bespoke app to download that could be browsed offline, but could also utilise GPS to deliver content relevant to the visitors' location”.

QR code research in detail

QR code views by mobile device and user location

Website analytics	Total	All mobile	QR code scans	Percent
Visits	849	531	466	88%
Unique visitors	558	--	--	--
Page views	1,607	688	666	97%
Unique page views	1,250	--	--	--
Pages per visit	1.89	1.31	1.43	--
Average time on page (mins)	5' 12"	0' 45"	1' 22"	--
Percent bounce rate	76%	85%	83%	
Percent exit	53%	53%		

Website visit sources	Visits	Percent
QR codes scanned	466	55%
Google Adwords link	173	20%
Direct page visit	156	18%
Web search engines	32	4%
Social media referral	22	3%
Total	849	100%

63%

Mobile devices

Operating system	All Mobile visits		QR codes scanned	
	Visits	Percent	Visits	Percent
iOS	262	49%	198	42%
Android	222	42%	189	41%
Blackberry	29	5%	25	5%
Windows Phone	8	2%	7	2%
Symbian	4	1%	4	1%
Windows	6	1%	20	4%
Other	0	0%	23	5%
Total	531	100%	466	100%

Visitor location

Country	All Mobile visits		QR codes scanned	
	Visits	Percent	Visits	Percent
United Kingdom	498	94%	436	94%
Switzerland	3	1%	3	1%
France	2	0%	2	0%
Netherlands	2	0%	2	0%
US	2	0%	1	0%
Germany	1	0%	1	0%
Hong Kong	1	0%	--	--
Unknown	22	4%	18	4%
Total	531	100%	466	100%

Touchscreen mobile devices >

81%

Mobile device screen size	All Mobile visits		QR codes scanned	
	Visits	Percent	Visits	Percent
320 x 480	264	50%	222	48%
720 x 1280	27	5%	23	5%
768 x 1024	18	3%	1	0%
480 x 800	17	3%	15	3%
540 x 960	16	3%	12	3%
800 x 1183	15	3%	15	3%
800 x 1125	14	3%	8	2%
480 x 360	11	2%	11	2%
800 x 1333	9	2%	9	2%
800 x 390	9	2%	9	2%
320 x 240	8	2%	8	2%
720 x 1184	7	1%	7	2%
360 x 480	7	1%	7	2%
960 x 540	6	1%	6	1%
480 x 320	5	1%	1	0%
800 x 480	5	1%	1	0%
Unknown / other	93	18%	111	24%
Total	531	100%	466	100%

City / Town	All Mobile visits		QR codes scanned	
	Visits	Percent	Visits	Percent
London	313	59%	304	65%
Guildford	20	4%	10	2%
Reading	11	2%	12	3%
Portsmouth	10	2%	9	2%
Brighton	8	2%	9	2%
Findon	6	1%	4	1%
Stoke on Trent	6	1%	7	2%
Godalming	4	1%	8	2%
Romsey	4	1%	4	1%
Southampton	4	1%	3	1%
Teddington	4	1%	6	1%
Zurich (SW)	3	1%	3	1%
Croydon	3	1%	1	0%
Tamworth	3	1%	3	1%
Worcester	3	1%	3	1%
Paris (FR)	2	0%	2	0%
Amsterdam (NL)	2	0%	2	0%
Others or unknown	125	24%	76	16%
Total	531	100%	466	100%

Mobile Devices	Visits	Percent
Apple iPhone	228	1267%
Sony LT15i Xperia	40	222%
HTC Desire	29	161%
Blackberry	29	161%
Samsung Galaxy SII	19	106%
Apple iPad	18	100%
Apple iPod Touch	16	89%
Samsung Galaxy Nexus	13	72%
Samsung Galaxy Ace	11	61%
Nokia Lumia 800 / N800	9	50%
HTC Sensation	8	44%
HTC Wildfire S	7	39%
HTC other	6	33%
Google Nexus One	2	11%
Unknown / other	96	533%
Total	531	2950%

Mobile service provider	Visits	Percent
Orange	87	16%
O ²	82	15%
Undefined mobile provid	63	12%
Vodafone	62	12%
Mobile broadband	34	6%
T-Mobile	28	5%
RIM Blackberry UK	27	5%
NTL	21	4%
Sky Broadband	17	3%
Virgin Media	10	2%
Other mobile provider	100	19%
Total	531	100%

Figure 9: Details of all mobile trial website visits from QR codes scanned

About IT's in Conservation

IT's in Conservation (ITiC) provides specialist advice on the effective use of mobile technologies in the heritage and conservation sectors to aid visitor education and onsite interpretation. Our aim is to help conservation and heritage bodies throughout the UK to make the most of their heritage assets and get knowledge and information about the assets they manage across in a practical way to the wider public.

Our mobile technology solutions help visitors to UK heritage locations by creating online and text information for mobile and smartphone devices, helping people of all ages to develop a better understanding of important local buildings and history, and an improved appreciation of their outdoor environment, heritage and culture.

ITiC offers a full consulting and technology development service including:

- Heritage site consulting to improve interpretation, visitor satisfaction and online information access
- Advice and implementation of mobile technologies such as QR codes, NFC Tags and Augmented Reality
- Technology development including mobile website and content creation and application development
- Managing multiple technology, mobile app and interpretation vendors to deliver projects successfully

Current ITiC heritage site projects

ITiC is currently working with National Parks, Councils, heritage and conservation organisations to explore the effective use of smartphone technologies including mobile websites, apps, QR codes, Near Field Communication (NFC) and Augmented Reality (AR). These mobile technologies are only a few of a range of new, cost effective and practical online and offline solutions ITiC is researching and implementing.

Detailed research has just been completed along the South Downs National Trail that proved the value and benefit of QR codes to highlight visitor points of interest at key waypoints, gateways and visitor sites. The South Downs will also be adding NFC Tags in a second phase of development starting autumn 2012.

ITiC Partners

ITiC works with local technology and business partners to deliver a range of visitor interpretation services:

- Mobile application development for Android, Apple iPhone, Windows, Nokia and Blackberry phones
- GPS, QR code, NFC Tag and Augmented Reality applications and optimised mobile website content
- Onsite printed visitor interpretation signage developed using aluminium, PVC, polycarbonate or GRP
- QR code, Augmented Reality and NFC Tag design, creation and mobile website content management

Other ITiC technology and consulting services

Our technology services include communications, website and intranet development, web application development and content migration, cloud solutions, accessibility and usability requirements, user training and mentoring, multiplatform mobile technology, branding, interpretation development, editing and copywriting, agency management, customer surveys and online statistical analysis and reporting.

See more about QR codes and how they work at the video on our YouTube channel: <http://bit.ly/QRITIC>

For more information call **Andrew Kerry-Bedell** at ITiC on **07899 741939** or email **a.kb@live.co.uk**