WHITE PAPER

QR Codes

A Guide for Printers

Digital Printing Council

PRINTING INDUSTRIES OF AMERICA

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QR Codes: A Primer for Printers

The graphic communications industry continues to change at an accelerated pace. The technological advancements in both software and hardware have led to new products, services, and applications that were not possible even just a few years ago. Many of these advancements are in response to the explosion of the Internet. Much of what is seen on television, heard on the radio, and seen in print is designed to drive the customer to a website to obtain additional information and/or purchase a product or service.

Historically, the printing industry has evolved and adapted to meet the changing needs of its customer. Innovative printers have always taken advantage of the challenges presented to them and offered products and services that enabled them to prosper, even in the most challenging economic times. Today, printers who are on the "bleeding edge" of technology are those who can manage databases of customer information, produce relevant, customized printed pieces, integrate the Internet with print, and provide reporting mechanisms to show ROI for the customer.

Marketers are always looking for new ways to leverage print, gather customer information, create more targeted, meaningful promotions, and reduce costs all at the same time. Printers have responded to the challenge with PURLs, customized print, and analytics reporting. Another technology—QR codes (sometimes referred to as 2D barcodes)—represents another way of extending the value of the printed page while providing more interactive, engaging information for the customer.

QR (short for quick response) codes were invented by the Japanese company DENSO WAVE, Inc. The term quick response is used because the inventor of the codes intended them to be read at high speeds. DENSO WAVE trademarked the term QR code and owns the patent rights—but does not exercise those rights—allowing them to be freely available for creation, distribution, and use.

QR Codes: Then and Now

The CueCat was the first product that allowed consumers to interact with the Internet using barcodes and print. Invented by the company Digital Convergence in 1998 and deployed in 2000, PCWorld Magazine gave it the dubious distinction of one of "The 25 Worst Technology Products of All Time."

Why didn't the CueCat work? In a nutshell, the device was too hard to use, it was a closed system, and the scanner itself looked more like a toy instead of a technology device. Additionally, the technology may have been ahead of its time as there were privacy concerns. Each CueCat contained a unique serial number, and users suspected that Digital Convergence could track all barcodes scanned by a given user, compile a database, and connect it to the user's name and address. Ten years ago, we may not have been ready to "put ourselves out there" in cyberspace—a far cry from the social web that we know today.

The use of QR codes is mainstream in Japan, growing in Europe, and gaining traction in the U.S. The key to success is that they take advantage of the exploding popularity of a device that many of us always have close by—our smartphones. According to Nielsen, 17% of the U.S. population own a smartphone—a phone that contains (at the very least) a camera and a browser to access the Internet. A few other compelling statistics supporting the popularity of smartphone use are:

- The number of times we access the Internet daily from our smartphones has almost doubled in the last year (Source: Pew Research Center's Internet and America Life Project 2010 Tracking Survey).

- 20% of all consumers used their phones to browse and research products (Source: ATG Cross-Channel Commerce: The Consumer View).

- 37% of U.S. smartphone users have made a purchase on their phones in the last six months (source: Compete, Inc.).

- Mobile commerce tripled in the U.S. in 2009 to $1.2 billion (Source: ABI Research).

- In 2015, $119 billion in goods and services will be purchased via mobile phone (Source: ABI Research).

- eBay m-commerce in 2010 was $2 billion, up from $600 million in 2009

The QR code is a call to action that can be added to any printed piece and has the ability make print more interactive. Think about it—one of the ideas behind Web 2.0 is participation. QR codes with smartphones provide a simple and easy way for readers to participate with the printed material that they are reading, regardless of location. A reader may scan a QR code for a variety of reasons: to learn more about a product or service; to watch a video; to receive coupons or discounts; or simply because they are curious.

QR Codes: Nuts and Bolts (and Squares)

There are many types of QR codes, and the ones that are currently being seen most often in print are DENSO WAVE's QR code and the Microsoft Tag (Figure 1). QR codes are fairly compact in printed size and can hold a tremendous amount of data (Figure 2). The more data that needs to be encoded into the QR code, the more complex the image will be (Figure 3).

The data contained in the QR code is meant to trigger the smartphone in an intelligent manner once it's been scanned (photographed with the smartphone's camera) using a QR code reader application. Most commonly, when a QR code is scanned, the consumer is given a URL and taken to a website that has been optimized for mobile devices. There are, however, many other ways to interact with the consumer beyond just a URL. A QR code can also contain a calendar event, contact information (vCard), an email address, an SMS (text) message, or geolocation (mapping) information.

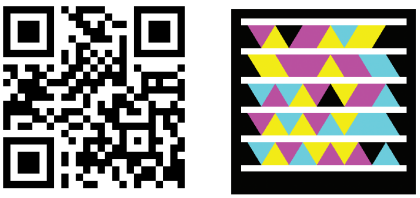

Figure 1: An example of a QR code (left) and Microsoft Tag (right).

Numeric only	Max. 7,089 characters
Alphanumeric	Max. 4,296 characters
Binary (8 bits)	Max. 2,953 bytes
Kanji/Kana	Max. 1,817 characters

Figure 2: A chart showing the amount of data that a QR code is capable of encoding.

QR codes can be created free of charge on a number of websites (simply Google "QR code creator" and no less then a few dozen will show up in the results). Some QR code creators can be quite limited (they only give you the option of encoding a URL), so it pays to take the time to search and find one that best suits your needs.

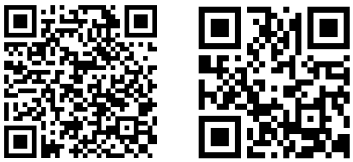

Figure 3: An example of a QR code containing a long URL (left) and a short URL (right). The short url is www.printing.org and the long URL is http://efiles.printing.org/eweb/docs/workshops/AgendaCM4P.pdf.

Why Marketers Will Use QR Codes

As mentioned earlier, marketers are looking for innovative ways to engage the consumer. A QR code is a very powerful tool because it extends the value of the printed page. Consider an 8.5x11-in. ad in a publication. The marketer has very limited space available to convey their message. But, add a QR code that links to a URL with videos of a product, a coupon, or more detailed information, and that printed ad suddenly has much more value (without incurring any additional print-related costs). QR codes also provide the following benefits to marketers:

- ***They allow marketers to connect.*** Eliminating the need to type in a long URL into a smartphone browser, a QR code enables consumers to quickly and easily scan and connect to the information they want to see.

- ***They can be personalized.*** Individual codes can be generated from a database of names and linked to a PURL, giving the consumer an even more personal experience.

- ***They are viral.*** QR codes facilitate and encourage people to pass along a marketing message that can be easily forwarded to others via their smartphone or computer.

- ***They Convert.*** QR codes turn passive readers into active participants through the use of online surveys, PURLs, coupons, making purchases via m-commerce sites, or geolocation information to direct consumers to the point of the event or sale.

- ***They can be tracked.*** Marketers can access and see daily (and hourly) how many people have scanned the QR code and where it was scanned. This is particularly interesting because printed material is often passed along from person to person. Marketers will be able to track how far reaching their printed promotion has had an impact.

- ***Campaign effectiveness.*** Marketers are able to compare metrics across an entire campaign and determine if a QR code performed better on a postcard, a flyer, or a poster.

- ***They have a wow-factor.*** Using QR codes gives companies a more brand and tech-savvy impression.

QR Code Costing and Pricing

Creating a QR code is free and, as stated earlier, there are many resources available on the Internet to do so. However, if hundreds or (even thousands) of individual QR codes must be generated for a personalized campaign, there are services available to satisfy that need. When it comes to QR codes, what costs money is the technology behind what the code does and the time that it takes to develop that technology—such as linking to a campaign or creating a website that is optimized for mobile viewing. Essentially, the destination is where the money is spent, so the complexity of that destination will ultimately dictate costs.

As for figuring out how much to charge for QR codes, they should absolutely not be given away for free. The time and thought process that a printer spends on a project is valuable. Printers must consider activities such as meeting with the marketer and coming up with creative, innovative ways to implement and deliver the technology so that they can communicate deeply with their customer base.

Some printers might have a tendency to think of QR codes in terms of a commodity instead of a solution. For example, a printer may look at a project and think "I have 1,000 custom QR codes for this project. How much should I charge for each one?" Remember that QR codes are a component of the solution—not the solution itself—and pricing individual QR codes is commodity thinking and actually devalues the technology.

With QR codes, the analytics is where the value lies—giving marketers the ability to understand how print is performing from direct mail to catalogs to billboards to packaging, and then customizing the content based on the feedback. Just as with VDP, printers need to be flexible on pricing based on the scope and complexity of a campaign. The range is going to depend on the economic area where the customer lives, the size of the customer, and the solution. Some customers won't blink at a $50,000 deployment, others might only have a budget of $2,000. QR codes are part of a program that engages

the user that combines print with Web with audio with video. Clients should be charged to create and manage that experience on an individual project basis.

QR Code Hits and Misses

To implement QR codes within a campaign successfully, a printer must have a have a good understanding of their customer's needs and requirements. Information gathering is key; asking questions about the goals associated with the project will allow the printer to offer ideas and implement a solution that meets or exceeds customer expectations. There are many examples of projects that use QR codes—some good and some bad—that we can learn from.

Real Estate Example

An example of QR code use that misses the mark is a real estate ad in the Arizona Republic (Figure 4), a major newspaper that serves the Phoenix and surrounding areas. The full-page ad contains 20 real estate listings, and each listing contains a Microsoft Tag barcode that is specific to each property offering. This is a terrific idea, but where the implementation suffers is where each barcode takes the user to a different mobile web experience. For example, some link to the main website MLS listing (not optimized for mobile), some to a YouTube video, and others to a flash video website. The video experience is useful in that it shows what the house looks like, but what was lacking is address information to map the property and contact information for the listing agent.

Figure 4: In this example, the QR code links to a website that is not optimized for mobile devices.

Finally, note the Tag barcode at the top of the ad. This barcode links to the realtor's company website. However, instead of taking the user to a mobile-optimized website, it links to this realtor's standard website that is difficult to navigate on a smartphone. Although this real estate company made an effort with integrating Tag barcodes with print, they didn't take full advantage of the mobile experience.

Calvin Klein Example

A better example of QR code usage is Calvin Klein's campaign in New York and Los Angeles that featured eye-catching red and white billboards (Figure 5) for their first implementation of the technology. The billboard linked to a mobile site that showed a very racy commercial video with models scantily dressed in Calvin Klein clothing.

The site was optimized for mobile and could be shared on Facebook and Twitter, taking advantage of the social media and viral capabilities of QR code use. However, the mobile site did not capture any additional information from visitors, nor did it direct them to additional content.

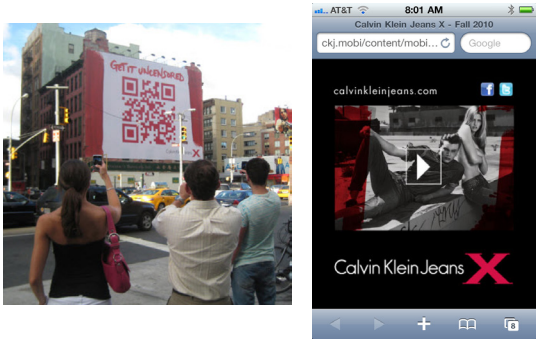

Figure 5: The billboard QR code linked to a mobile site containing a video along with the capability to share the site via Facebook and Twitter.

Ford Taurus Example

Ford is including Microsoft Tag barcodes in both advertisements and new car brochures for its 2010 Ford Taurus (Figure 6). The tag barcode links to a well-designed, easy-to-use mobile site that features six different video clips explaining the new features of the automobile. In addition, there is a photo gallery along with a dealer locator link that displays local Ford dealership contact information and locations. Finally, the mobile site offers a link where it can be shared with a

Figure 6: Ford incorporates the Microsoft Tag barcode in ads and new car brochures. The mobile site contains short video clips and an easy way to share the mobile site with others.

friend—a great example of how a printed QR code can become viral on the Internet.

Mobile Site Creators and Services

Part of a successful campaign that includes QR codes is linking to a website that has been optimized for mobile viewing. Mobile websites can be created from scratch using website creation software such as Adobe Dreamweaver, but there are also alternatives for those lacking in website design capabilities.

Many services exist that offer affordable mobile website design and hosting packages. These options are great for those who do not have HTML or CSS experience, but keep in mind that these solutions may limited in design, layout, and capabilities. The mobile sites are actually designed via a Web browser and include options such as analytics, shopping carts, custom domain names, and other features. Plans and prices are based on feature requirements and range from free to $199 per month. Some examples of online mobile site design and hosting solutions include:

- http://www.motivware.com/
- http://www.mobisitegalore.com/
- http://www.wirenode.com/
- http://www.freemobiz.com/
- http://www.mofuse.com/
- http://www.widgetbox.com/

QR Reader Applications

The reader application is the tool that allows the consumer to scan and access the information embedded in the QR code using a smartphone. There are dozens of different reader applications available for the various mobile operating systems on the market today. Many of these applications are free, some are not. Regardless of cost, many of the applications have one thing in common: they are capable of scanning, but not capable of intelligently utilizing the data embedded within the QR code.

For example, one way to use a QR code is to incorporate contact information (vCard) on a business card. Many of the reader applications will interpret the contact information as a simple text file when scanned but will not intelligently save the information to the contacts application on the smartphone. Various attributes, including text messaging, URLs, and email addresses were tested on 27 different reader applications, and the results can be found in Chart 1 at the

end of this white paper.

QR Code Implementation Checklist

QR codes are more than just simply adding a barcode to printed material. Considerations have to be made with regard to size, design, and mobile requirements. Here are a few important key points to keep in mind when integrating QR codes with print:

- ***Link to content that matters.*** QR codes are all about engagement and added value, so it's important to link to information that the consumer will find engaging (a product video) or valuable (a coupon). Linking to your home page is an example that probably will not add value.

- ***Link to a mobile site.*** Many QR codes that have been deployed in a campaign link to a website that is meant to be viewed on a computer display. Since most QR codes are scanned on mobile devices, make sure that the website has been optimized for mobile viewing.

- ***Track usage.*** Use different codes based on the product being printed within the campaign even if the intention is to link to the same website. This allows marketers to track usage by media placement.

- ***Provide instructions on how to use them.*** Although there is tremendous growth in the use of QR codes, don't assume that everyone knows what they are. Adding a short tagline in proximity of the QR code on how to use it is recommended.

- ***Make sure they work.*** QR codes must have a minimum size requirement and minimum amount of white space around them to be read properly. Test the codes to be sure that they can be read by different reader applications and phones after they are integrated with the final printed piece. In short, test, test, and test the QR code.

- ***Size matters.*** Remember, the more characters that must be embedded in the QR code, the more complicated the QR code image will be. Shorten the URL and simplify to create a more compact QR code image that is easier for smartphones to read.

Summary

When you look at the market segment of individuals who own smartphones,

they represent very high value prospects for marketers. They are technically savvy consumers who want to interact with QR codes. As the smartphone market continues to grow, the use of QR codes will also continue to grow.

Advancements in hardware and software, along with a forward-thinking approach to partnering with marketers to offer new business opportunities, will become the standard for successful printers. QR codes represent an innovative opportunity for printers who have both offset and digital printing capabilities to deliver messages that integrate print and mobile technology with the power of the Internet to create campaigns that command attention.

Chart 1: QR reader application capability tests.

QR Code Reader—Capability Tests

Product	Company	Version	Date tested	Price	Calendar	vCard	email	SMS	URL
2D Sense	2D Sense, Inc.	4.10	2/21/2011	Free	DNR	Yes**	Yes	DNR	Yes
2DCodeMe - QR & Datamatrix Barcode Scanner	2DCodeMe	1.0.1	2/21/2011	Free	Yes**	No	Yes	Yes*	Yes
AT&T Code Scanner	AT&T Inc.	2.0.2	2/21/2011	Free	Yes**	Yes*	Yes**	Yes	Yes
Bakodo-Barcode Scanner and QR Bar Code Reader	Bakodo	3.20	2/21/2011	Free	Yes**	Yes**	Yes	Yes**	Yes
BeeTagg Reader Pro	connvision AG	3.1.1	2/21/2011	Free	Yes	Yes	Yes	Yes	Yes
CodeZone	Manpreet Singh	1.20	2/21/2011	$0.99	Yes**	Yes**	Yes**	Yes**	Yes
i-nigma qr datamatrix barcode reader	3GVision Ltd.	3.07.01	2/21/2011	Free	Yes**	Yes	Yes	Yes*	Yes
iRobin QR Code Scanner	appthology.net	1.60	2/21/2011	$0.99	Yes	Yes*	Yes	Yes*	Yes
MAAD Qr	MAAD Ltd.	1.10	2/21/2011	Free	Yes**	Yes	Yes	Yes*	Yes
Mobletag barcodes reader	Moble Tag - SAS	3.1.24	2/21/2011	Free	DNR	Yes*	Yes	Yes**	Yes
NeoReader	NeoMedia Technologies, Inc.	2.00	2/21/2011	Free	Yes**	Yes**	Yes	Yes**	Yes
Optiscan - QR code scanner and generator	Airsource Ltd.	1.8.5	2/21/2011	$1.99	Yes	Yes	Yes	Yes	Yes
QR app	Block5	1.10	2/21/2011	Free	Yes**	Yes	Yes	Yes*	Yes
QR Code Reader and Scanner	Big in Japan	1.0.1.1	2/21/2011	Free	Yes**	Yes	Yes	Yes	Yes
QR Reader for iPhone	TapMedia Ltd.	1.00	2/21/2011	Free	Yes**	Yes**	Yes	Yes**	Yes
QR Scanner	Grpi'd	1.20	2/21/2011	Free	Yes**	Yes**	Yes**	Yes**	Yes
Qrafter	Kerem Erkan	1.10	2/21/2011	Free	Yes	Yes	Yes	Yes	Yes
Qrazy 4- QR Code Reader	Qrazy	1.00	2/21/2011	$0.99	Yes**	Yes	Yes	Yes*	Yes
Qrcifix	dajool UG	1.0.1	2/21/2011	Free	Yes**	Yes**	Yes**	Yes**	Yes
QRCode	connvision AG	2.3.10.8	2/21/2011	Free	Yes**	Yes**	Yes**	Yes**	Yes
QRdeCODE	DENSO WAVE	1.40	2/21/2011	$1.99	Yes**	Yes**	Yes*	Yes*	Yes
QuickMark QR Code Reader 4	SimpleAct Inc.	4.0.9	2/21/2011	$0.99	Yes**	Yes*	Yes	Yes	Yes
quiQR - QR code reader and QR code creator	Studio Tentpole	2.0.1	2/21/2011	$1.99	DNR	Yes	DNR	Yes*	Yes
ScanLife	Scanbuy Inc.	3.09	2/21/2011	Free	Yes**	Yes**	Yes	Yes**	Yes
Semacode - free QR code scanner	Semacode Corporation	1.0.2	2/21/2011	Free	No***	No***	No***	No***	No***
Snappr Barcode Scanner	BayBrain, Inc.	2.3.0	2/21/2011	Free	Yes**	Yes	Yes	Yes**	Yes
Tag Reader	Microsoft	3.90	2/21/2011	Free	N/A	Yes	Yes	N/A	Yes
Up Code	UpCode Ltd.	2.10	2/21/2011	Free	DNR	DNR	DNR	DNR	DNR

DNR = Did not recognize QR code
*** Read barcode, only partial data was interpreted and used successfully**
**** Read barcode, displayed data, but did not interpret data and use properly**
***** Reader forces you to create an online account with username and password to read codes**

All applications were tested on iPhone 4, software version 4.02
Barcodes used for testing were created using *QR Code Generator from the Zxing Project* at http://zxing.appspot.com/generator/

QR Codes: A Primer for Printers explores how QR code technology can effectively be integrated with print. As marketers continue to look for ways to get the most value from a promotion and track its success, it's important for printers to understand the capabilities of QR codes. QR codes are extremely powerful because they have the ability to extend the value of the printed page. This technology is being used to direct a consumer to more specific information, promote a product or brand, and track the ROI of a promotional campaign. This white paper examines QR codes and how they are used to integrate print more closely to the Internet.

The Digital Printing Council (DPC) is a select program open to all Printing Industries of America members. The DPC provides its members and the printing industry with informative tools and publications that are designed to help firms be more productive, efficient, and generate more sales with new digital technologies. All members of Printing Industries of America and its affiliates are automatically DPC Core members.

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