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White Paper: Redefining Government Communication With QR-Codes

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Introduction

Quick Response Codes, or QR-codes, may seem like just another barcode that can be used for labeling products or providing an aid in inventory systems; but in Manor Texas, they are used for much more, including citizen communication, emergency management and at historical sites. QR-codes are two dimensional barcodes that can be generated at no cost and subsequently decoded at no cost on most newer-model camera phones.

The Challenge

The City of Manor was faced with the challenge of how to engage citizens, businesses and tourists by utilizing mobile technology on a very limited information technology budget.

The Solution

After extensive research on barcode standards, the City of Manor elected to utilize QR-codes for document management because of the ability to decode the barcodes using a cell phone. As the document management program advanced, management soon realized that QR-codes could be used as a new method of communication with residents as well as for economic development and tourist information. QR-codes provide residents information on-demand and add an additional layer of transparency to government that never previously existed.

Overview

Manor deployed QR-coded “Digital Stop” signs throughout the community two years ago, to provide residents with on-demand information. Manor chose to configure each QR-code sign as a hyperlink to web content as opposed to embedding content within each barcode. Using an online QR-code generator (listed in the resources section), the City of Manor was able to encode specific URLs onto each QR-code. The benefit of embedding a hyperlink in a QR-code is that content can be changed at any time without having to generate a new QR-code. For example, let’s say a URL is embedded in a QR-coded sign to a website with information about one of the city’s construction projects. If any information changes during construction project, the website can be updated without modifying the original QR-code. Utilizing this system gave the City of Manor the flexibility to update information and change the placement of signs without additional cost.

The Way The System Works

After installing free decoding software (listed in the resources section), an individual can scan a City of Manor QR-code with their camera phone. They are taken directly to the linked site or prompted with the embedded URL. Although each QR-code appears to be the same image, each links to separate websites relevant to their location and placement.

Physical Sign Configuration



Version 1.0 of the City of Manor’s QR-code solution consisted of a QR-code printed on a 24” x 18” laminated aluminum (0.040 gauge) sign mounted on a standard street sign pole or mounted on a chain link fence as shown to the left.

Under the same version, the City of Manor also printed a few 48” x 48” laminated aluminum (0.040 gauge) signs for placement at high-visibility locations as you enter the city along the key highway.





Version 2.0 of the City of Manor's QR-code solution consisted of the same sign specifications as above, but also utilizes RFID tags that provide another means of receiving information.

Version 3.0 (Not yet deployed) of the City of Manor's QR-code solution utilizes the same sign specifications as the previous two versions, but adds a networked RFID reader instead of an RFID tag. More information about Version 3.0 will be forthcoming in the next few months.

Implementation

The City of Manor QR-code campaign was implemented in multiple phases to allow management to more accurately gauge and tweak the effectiveness of the program. The preliminary step toward achieving a successful QR-code campaign was to first identify potential uses of the technology. Next the City of Manor utilized a phased deployment approach to measure and gauge sustainability at each step.

First Phase: Pre-deployment Education

One month before the first stage of deployment, the City of Manor launched an educational campaign utilizing the local newspaper to tease and gauge initial interest in the technology. An example of one of the advertisements can be seen below:




Each week, additional teaser information was added to the initial advertisement, and on the final week the City of Manor provided full information about how to install the QR-code reader on a cell phone.

Second Phase: Pilot Deployment

This phase of deployment involved a small scale launch of the fixed-mounted QR-code solution developed by the City of Manor. The City of Manor's pilot consisted of 8 fixed-mounted QR-code signs placed throughout the community. The City of Manor initiated the pilot in coordination with the launch of our SmartPark and wireless mesh.




City of Manor Pilot QR-Code Locations



The map displays the City of Manor, Texas, with eight red circular markers numbered 1 through 8 indicating QR-code locations. The markers are placed at various points of interest: 1. Bloor Mansion (US Hwy 290 E), 2. Old Elevated Tank (W Parsons St), 3. New Elevated Tank (Old TX-20), 4. Manor New Tech High School (W Parsons St), 5. Manor Methodist Church (W Parsons St), 6. Downtown District (W Parsons St), 7. Jennle Lane SmartPark (W Parsons St), and 8. James Manor Grave Site (US Hwy 290 E). The map includes major roads like US Hwy 290 E, Old TX-20, and W Parsons St, and smaller streets like W Murray Ave, E Ln Ave, and W Carne Manor Rd. A copyright notice at the bottom of the map reads: ©2008 Google - Map data ©2008 LeadDog Consulting, NAVTEQ™ - Terms of Use

1. Bloor Mansion	6. Downtown District
2. Old Elevated Tank	7. Jennle Lane SmartPark
3. New Elevated Tank	8. James Manor Grave Site
4. Manor New Tech High School	
5. Manor Methodist Church	

CITY OF MANOR



SMART TOUR

After the completion of a 6-month pilot test the City of Manor used the results of the campaign to identify potential changes that needed to be made. It was at this point that the City of Manor determined that the URL embedded into the QR-codes should generally be no more than 60 characters. This prevents pixilation of the barcode to better accommodate various camera phone resolutions (examples below). In order to keep the embedded characters at a minimum, the use of URL compression technologies such as Tiny URL can be utilized as an alternative.

Examples of QR-codes With Varying Lengths

18-character URL
<http://www.cnn.com>



87-character URL
<http://www.cnn.com/2009/US/09/23/california.runners.missing/index.html?iref=mpstoryview>



Third Phase: Full QR-Code Roll Out

This phase increased the total number of fixed-mounted QR-code signs to 24, placed on various structures throughout Manor. The City of Manor also used this phase to tag additional physical infrastructure that residents have inquired about. For instance, the sewer lift-station shown on the next page has a QR-code placed on the outside that when scanned, takes the end-user to a wiki page with a step-by-step process of how the system works.



In addition to the fixed-mounted QR-code signs, the City of Manor has also deployed QR-codes on most city vehicles (picture below). The QR-codes are 16" x 15" laminated car magnets that have been placed on each side of public works vehicles as well as the trunks of the police cars. The benefit of having QR-codes on city vehicles is that they are the most visible representation of a city on a daily basis and provides a unique branding opportunity. If an employee is pumping gas in their city vehicle, and a resident is curious about the barcode on the side of their vehicle, the employee can actually demonstrate how it works utilize his truck.



Eventually, the City of Manor will tie the QR-codes on city vehicles into a realtime work order system so that if a resident is curious about why a city vehicle is in their neighborhood, they

could simply scan the side of the vehicle for a real-time work order update. This would bring a layer of transparency to government that was never possible before.

Final Phase: Post-Deployment Education & Adaptation

The City of Manor determined that post-deployment education is just as vital as pre-deployment education in order to maintain a sustainable QR-code campaign. One of the most effective post-deployment educational opportunities is through educating and demonstrating the technology to local students. Students are quick to pickup the technology and are often the best catalyst to advance the program as they can educate their family members on the use of QR-code technology. Upon completion of a presentation, students are encouraged to help install the QR-code readers on their parent’s phones as well as demonstrate the technology to them.

Another method of post education is to maximize visibility of QR-codes through the use of QR-coded promotions. For example, the City of Manor participates each year in a neighboring community’s business expo. This provides an opportunity to showcase the city and its restaurants for economic development purposes. Each year the City of Manor incorporates a piece of its innovative technology infrastructure into its showcase. At the 2008 business expo, Manor city staff handed out QR-coded stickers (pictured below) to each attendee. At that point, the individuals were directed to the City of Manor’s booth so that the QR-code sticker could be scanned to determine if they won a door prize. Upon arrival at the City of Manor’s booth, staff would scan each barcode sticker with their cell phones to read the embedded text (as opposed to a URL). This method of marketing not only intrigued all of the individuals present at the business expo, but further provided an opportunity to demonstrate the technology to potential end-users.



In addition to post-deployment education, adaptation of an existing QR-code program, to encompass new uses, is vital. As a QR-code program develops over time, many potential uses of

the technology will become apparent. Instead of continually deploying new QR-codes, each proposed use should be evaluated to determine how it can be included in the existing campaign.

Government Benefits

Benefit 1: Builds Citizen Engagement

Users are empowered to interact with their community through the use of mobile technology. Instead of inundating users with costly newsletters and printed materials that are usually discarded, users scan and receive electronically only the content they request. This model of information dissemination empowers users to interact with their community as oppose to only reading about it.

Benefit 2: Costs

The City of Manor is known for innovating solutions on a shoestring budget and this program was no different. The only cost that is associated with a QR-code program is the cost of the material that the barcode is printed on.

Benefit 3: Revitalizes Print Media

A successful QR-code campaign does not seek to replace print media. Rather, it seeks to compliment and revitalize print media.

Benefit 4: Spurs Economic Development

QR-codes can spur economic development by equipping small businesses with the resources and knowledge to market their business more broadly at a fraction of the cost of traditional means.

Government Challenges

Challenge 1: Data-Connection

As a result of embedding URLs in each QR-code, users must have a data connection on their mobile phone in order to receive content.

Solution: The City of Manor plans to increase coverage on their existing wireless mesh to provide free access to all residents and tourists who wish to scan QR-codes.

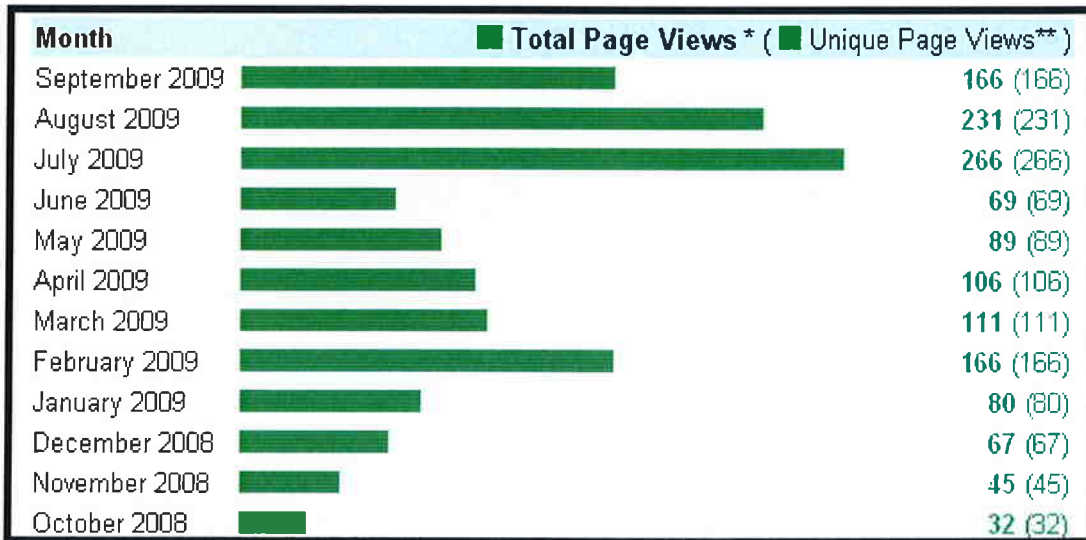
Challenge 2: Users Must Select & Download Reader

Currently, users are unable to scan a QR-code without having manually installed the proper reader for their phone.

Solution: The City of Manor is working with manufacturers and wireless providers to have QR-code readers preinstalled on US phones.

Response

The City of Manor's QR-code scans have grown considerably since its first deployment in March of 2008. Below is an example of the steadily increasing interest and adoption of the QR-code campaign.



In addition, city staff has educated local businesses on how QR-codes can be utilized in their current marketing programs. Below is an example of a local developer that has begun implementing QR-codes in marketing materials.



The QR-code on the sign is hyperlinked to additional content about each property for prospective buyers.

The Future

The City of Manor has identified numerous applications for QR-code use in the United States, and such potential uses are as follows:

- Embedding Hyperlinks In Newspaper Advertisements
- Embedding Hyperlinks Nutritional Content Into Restaurant Menus
- Embedding Hyperlinks To Sales & Promotions Outside Of Stores
- Embedding Hyperlinks To Emergency Contact Information On Water Meters
- Embedding Hyperlinks In Multiple Aspects Of Real Estate

In addition, City of Manor has been working with staff at Alcatel-Lucent on the next generation of QR-code applications, and we have provided a few examples below:

- Current Applications That Have Been Tested:
 - Scanning a QR-code to deliver a recorded message to your phone.
 - Scanning a QR-code to deliver an SMS message to your phone.
 - Scanning a QR-code to connect your phone to another phone.

Summary

Through the utilization of QR-codes the City of Manor has overcome the typical constraints that exist within a bureaucracy and created a new model of information dissemination for government agencies of all sizes. Not only can citizens and tourists receive information on-demand, they now can interact with government like never before.

Resources

- **Free Online QR-code Generators**
 - Google ZXing
 - <http://zxing.appspot.com/generator/>
 - 3GVision's I-Nigma
 - <http://www.i-nigma.com>
- **Free Mobile QR-code Readers**
 - Google ZXing (Android)
 - <http://www.zxing.org/w/>
 - 3GVision's I-Nigma (Variety of Devices)
 - <http://www.i-nigma.mobi>
 - Block5 (iPhone)
 - <http://www.block5.com/iphone>
 - Also listed As "QR App" In The iPhone App Store
 - Comprehensive List of Readers and Compatible Phones
 - <http://www.qrme.co.uk/qr-code-resources/qr-code-readers.html>

- **Helpful Sites With Extensive Information On QR-codes**
 - QR-Me
 - <http://www.qrme.co.uk>
 - 2d Code
 - <http://2d-code.co.uk/>
- **Physical Sign Printing**
 - Pro Graphix (<http://www.prographixaustin.com>)
 - 807 Stark Street Austin, Texas 78756
 - (512) 371-1964
- **RFID Readers & Tags**
 - Touchatag (Formerly Tikitag)
 - <http://www.touchatag.com>
- **URL Shrinking**
 - Tiny URL
 - <http://www.tinyurl.com>