
**The Uses of Proximity Beacons, Tracking, Analytics & QR Codes.
Knowing Who Walks Through Your Doors & Facility, Then Reaching Them**

How do users interact with products in a store? What is the best disposition of artwork in a museum? Why a Science Center can know more about their visitor's interests and inform them via video or written information directly to their Smartphone. How can airports prevent queue formation at security checks? Predicting crowd behavior through proximity sensors is the means and the solutions for today and in the future.

We do exactly the same for Public Safety, your City and even the event centers, entertainment districts, even the convenient store and much more! Importantly inexpensively and securely.

Let us explain Public Safety. There is a move afoot for a new communications solution across the nation, ***FirstNet***, bringing everybody on the same page. ***We already have that capability to do without worrying which network you are on.*** It would be exceptional if all radios, Smartphones, and devices were on the same network and we do not suffer as we did back in the day of Hurricane Andrew, where all radios from other counties and states would not connect!

Some areas of focus for potential developers include, but are not limited to:

- Situational awareness
- In-building mapping/Way Finding
- Field reporting and records management
- Wearable devices and telemetry solutions
- Forensic intelligence gathering

We have all of this Affordably NOW! Not months and years down the road, NOW!

We even can be the ***in-house navigation*** or as a ***Way Finder*** for a facility as well.

Why Use Proximity Sensors?

Proximity information is rich compared with coordinates on the planet of each individual, such as those provided by GPS. Through our technology, the proximity sensor is easier to measure, as it does not depend on complex infrastructure (like satellites in orbit). Aspects of collective and crowd behavior are captured with solely proximity, but for those aspects and behaviors that do allow for it, proximity is a means to measure behavior at a larger scale because of its superior simplicity.

Luckily, queues/lines, pedestrian lanes, community, and co-worker relationships can be analyzed through proximity information, and the possibilities are countless, which includes sending direct information to a smartphone within airports, smart parking, conferences, event centers, even a video file at a specific science exhibit, coupons in a supermarket, medical information within a healthcare facility, tracking firefighters in a burning building and even a menu in a restaurant! Oh, the food delivery service once it reaches its destination, telling those around them that *Jimmy John's* just delivered. That simple and that defining!

Because of their simplicity, companies like Google, Apple, and Facebook have invested in platforms based on proximity data, for example, through so-called proximity beacons. Beacons are small and inexpensive devices provided with a proximity sensor based on Bluetooth Low Energy, that we can install at places like shops/supermarkets/sports goods/outdoor stores, the hall of a train station, a bus stop, even the bus and even on a person as an asset tracker. They allow our smartphones or computer systems to pinpoint where they are, hence enabling location-aware computing.

Proximity information also allows the owners of the beacons, like the shop owner or the manager of the train station, to gather a picture of how individuals behave and move inside of their space. With customer proximity data, practitioners can compute all sorts of analytics that are not so different from the analyses the same companies run on the traces their users leave behind when they interact with their products and platforms online through a browser. Is product placement effective? Do customers come back? How long do they spend in each department? What is the path used most commonly to reach train platforms throughout the day? When are bus stops crowded during the day?

The Challenges Down the Proximity Road

When one decides to go down the road of proximity-based spatial information, there are a number of challenges that need to be tackled, which *ProxComm Technology* has taken care of with our professional hand-holding and installation process.

Our gathering of proximity data is with supported data analysis. One effective way of representing proximity data is through so-called proximity graphs. These graphs represent the relationships between two entities that were within a certain distance and available in real-time!



Then, once the data is collected and represented through proximity graphs, one needs to identify the right data mining algorithm to recognize, quantify, and qualify the behavior of interest. Graphs are well studied in Computer Science literature, and there are a number of algorithms that can be used or adapted when it comes to understanding behavior in proximity graphs. This is where we excel with our logical global data background.

Crowd Behavior in Museums

At the CoBrA Museum of Modern Art in Amsterdam, they deployed a number of proximity sensors to be either installed at artworks, which were able to track the smartphones and some worn by the visitors of the museum and used them to measure how long volunteering visitors spent in front of each artwork and in which order. Subsequently, the data collected informed the museum staff of the behavior of their visitors, in particular, how visitors distributed their time across paintings and rooms have been examined.

The clustered visitor data was used to identify group behavior. Enable discovery that around 10% of the visitors actually went through the exhibition from the end to start, perhaps confused by the signs. In addition, the majority of the visitors tended to walk along the perimeter of the museum, giving less attention to the more internal walls. Showing that there were groups of individuals who distributed their time in a similar way across paintings, perhaps due to similar taste, and these visitors did not come to the museum together. This was a leveraged aspect to predict how much time visitors would spend at an artwork, looking at her past behavior.

A similar study was conducted by the Van Gogh Museum, but, instead of sensors, they used human observers that tracked the movements of a number of individuals. They obtained similar data to the one we obtained at CoBrA (but because it was based on human observers, it was a one-shot study), and they used it to rearrange part of their exhibition, showing indeed the validity of the approach.

A repeated similar experiment at the NEMO Science Museum in Amsterdam. There, we tested whether our monitoring technique could operate in the conditions when it was most needed (and when existing technologies fail): in a complex and crowded building. We ran a similar experiment during the days before Christmas when the NEMO hosts some of the largest crowds.

The NEMO building is particularly challenging for sensing technologies, as it is a big multi-story open space, full of children running around. Another interesting aspect of NEMO is that it has some periodic events that attract the attention of large portions of the visitors, potentially creating flows of people across floors and high densities around the area where the event takes place.



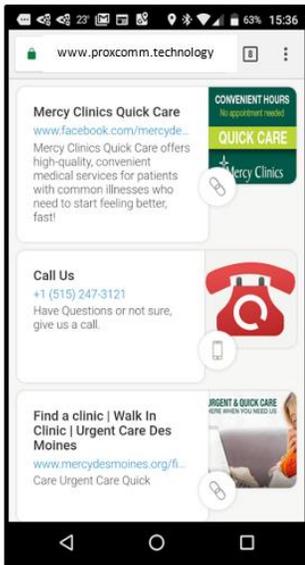
It showed how the “Chain Reaction”, taking place on the first floor of the NEMO Science Museum, influences flow of visitors from and to the first floor of the museum.

Special timed events where the “Chain Reaction” takes place, increase right before the event itself takes place at 11:15 AM, 12:15 PM, 2:45 PM, 3:15 PM and 4:45 PM and the number of people leaving the floor spikes right after the event finishes 15 minutes later, as they leave the location. This information gives quantitative data for provisioning enough space for the visitors at the event location.

Now, it is ProxComm Proximity Beacons, NFC and powerful QR Codes with multiple notification capabilities.



Cutting through the noise



Branded messages that each of us sees every year is every rising each and every single day, it is growing by leaps and bounds.

We will only notice 8% and react to maybe 10 notifications in a day in some sort of positive fashion. And of these 10, we instantly treat half as unwelcome intrusions into our lives, but accepting as normal, leaving only five messages a day we actually really notice, reacting/responding positively to and absorbing.

The battle for our individual attention has taken on a whole new meaning.

When crafting a direct notification that can qualify as one of that handful, you also have to remember the five-ninths law. This law states that five-ninths of marketing messages will be misattributed to the leader of a market segment, rather than the company paying for the message.

For organizations that aren't in this leadership position, they are essentially cementing the position of their leading competitor with their own marketing budget. Overcoming this gap, and crafting messages/notifications that actually move market share away from competitors is, therefore, the key to building a successful **Proximity Social Marketing campaign**.

In A Nutshell

To conclude, the **ProxComm Technology Proximity Social Sensors** have opened a window into the digital world over our lives in the real world. The number of sensors and devices we are carrying, in the smartphone and installing in our homes is growing and it is just the beginning. Already the next generation of appliances and Internet of Things are able to collect, share, and analyze a large volume of data about our behavior which we can put to great use to increase our safety and comfort.

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WE ARE IN THE NOW AND KEEP YOU; IN THE KNOW...

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