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You Are Here:
Navigating Advances in Location-Based Technology

Museum of Science

JCa — Jacobson Consulting Applications, Inc.

GEORGIA AQUARIUM
at Pemberton Place

About Your Presenters

Steve Jacobson

Steve is the President and CEO of Jacobson Consulting Applications, Inc., a firm providing information management services to non-profit organizations. For over 25 years, Steve has worked with clients including the Metropolitan Museum of Art, the American Museum of Natural History, Bronx Zoo, Aquarium of the Pacific and many others.

Steve is an active member and frequent speaker for the Museum Computer Network (MCN), American Alliance of Museums (AAM), and the International Ticketing Association (INTIX). Mr. Jacobson holds degrees in Economics and Psychology from Stanford University.

About Your Presenters

Marc Check

Marc is the AVP of Information and Interactive Technology at the Museum of Science, Boston where he directs a team of over 30 technology professionals in both classic infrastructure and interactive technologies. He is passionate about museums and the use of technology in informal learning spaces, and has been working on both the interpretive and curatorial ends of technology for a number of years.

Marc's past roles include Associate Director for the International Center for the History of Electronic Games (ICHEG) and Director of Technology for the National Museum of Play. Marc holds a BS in Mathematics from the State University of Brockport in New York and a MS in IT from the Rochester Institute of Technology

About Your Presenters

Amit Dongerdive

As the Chief Architect and Director of Information Technology, Amit oversees multiple aspects of Georgia Aquarium's technological operations. His position encompasses point of sale, ticketing, telecommunications, server and network infrastructure, Aquarium's internal and external websites and overall management of Aquarium's IT department.

Amit is a Pune India native, having graduated from St. Patrick's High School before earning his Bachelor's degree in computer information systems at Mercer University in Macon, Georgia.
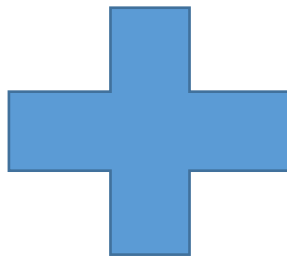
Overview

Location Services

Location Services

You Are Here!

Location PLUS Identification

Why Is Location Important?

"If you don't know where you're going, you might not get there…"
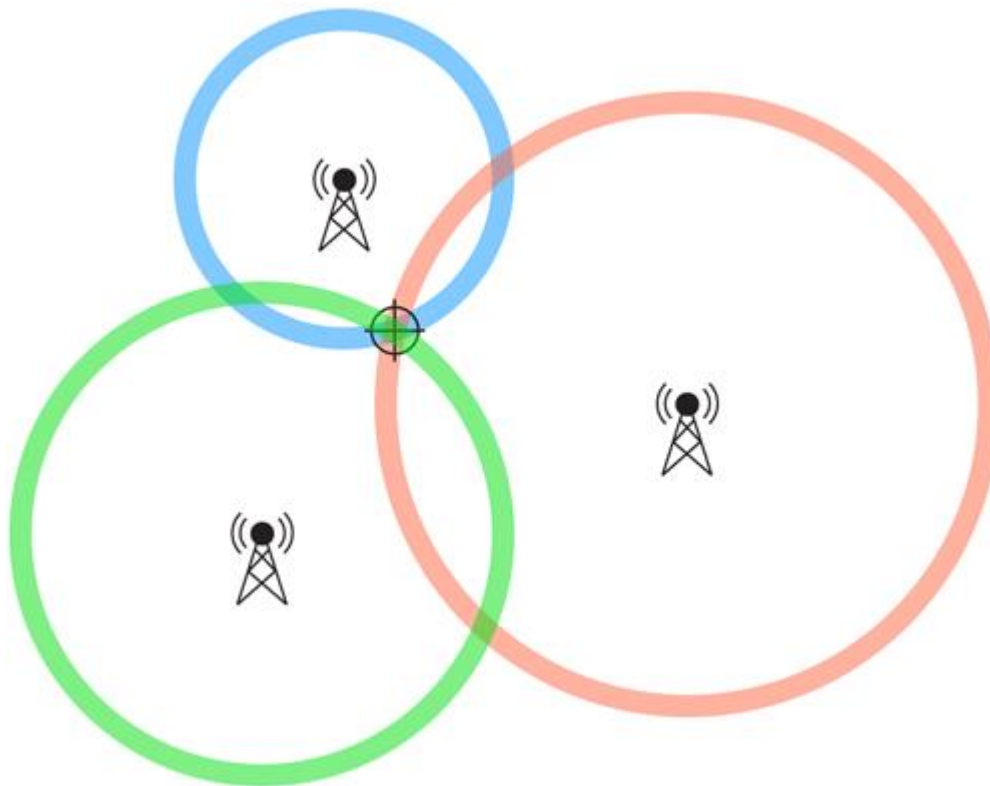
-- Yogi Berra

"Traditional" Applications

- Wayfinding (GPS)

- Lost child

- Guest services

- Push notifications

How Does It Work? Triangulation

- Cell tower or wireless access points

But, When You Get Indoors...

Next Generation Applications

- Interactive queue management

- Exhibit interaction

- Visit optimization

- Personalized experience

Bar Codes

39123439

39123439

QR Codes

Passive RFID

Active RFID

NFC (Near Field Communication)

And Some New Stuff...

- Bluetooth Low Energy (iBeacons)

- Biometric scan

- Camera (RetailNext)

- WiFi with Infrared (Eckahau)

- LiFi – LED lighting

Case Study

Georgia Aquarium

Indoor Navigation/
Crowd Management

About Georgia Aquarium

The largest aquarium in North America

Over 650,000 square feet in area

Houses 100,000 animals - representing 500 species

More than 10 million gallons of water

To date, Georgia Aquarium attracted over 11 million visitors

Location Based Technology Needs

RFID

iBeacon

Wi-Fi

Mobile

Big Data

Cloud

Guest Management

- Georgia Aquarium is a large venue with thousands of guests and a number of exhibits and galleries
- Understanding how guests are visiting each gallery is important to manage their flow effectively
- Overcrowded galleries can adversely impact guest experience

Personalized Assistance

- Guide the guests as they view different exhibits
- Provide effective indoor navigation for guests

Loyalty and Marketing

- Understand long-term guest behavior to retain guests and bring new ones
- Give guest on time alerts about different activities happening around the aquarium

Location Based Technology Needs

RFID

iBeacon

Wi-Fi

Mobile

Big Data

Cloud

Technologies We Considered

- RFID
- Wi-Fi Triangulation
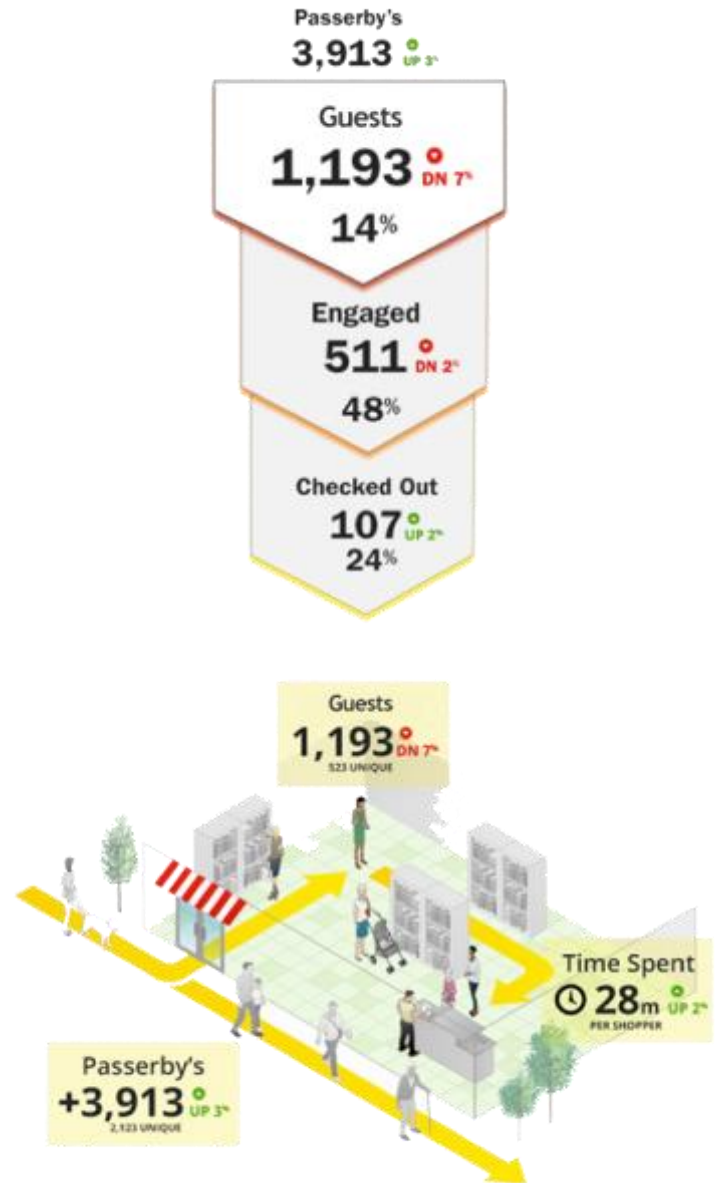- Proximity Beacons
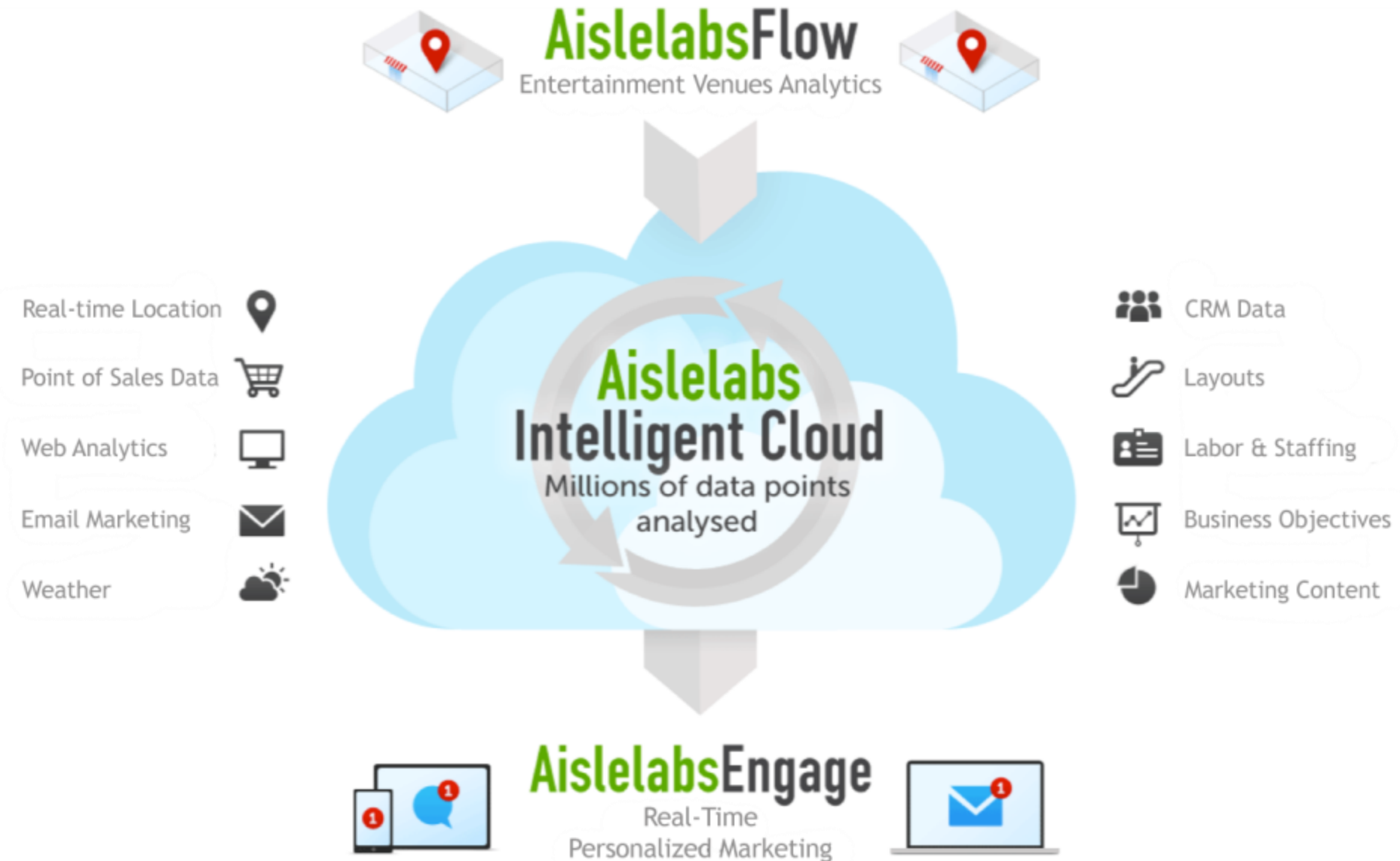- Cameras

Technology Vendors

- **Location Analytics and Engagement is a new emerging technology**
  - Several companies provide different solutions
- **Georgia Aquarium chose to partner with Aislelabs**
  - Toronto based company with an end-to-end location platform for venues, amusement parks and attractions

The Platform: www.aislelabs.com

Technologies Deployed

Anonymous Location Analytics

- Most guests now have a smart phone
- It is possible to monitor traffic flow anonymously through Wi-Fi
- Able to capture up-to 70% of all guests anonymously for their indoor location, paths, and dwell times

Navigation and Notifications

- Mobile phones can act as guests' personal guides
- Provide them navigation and floor plans
- Send them information on gallery and exhibits that are around them

Guest Management and Operations

Manage Crowded Spaces

- Automated alerts sent to staff when any gallery is starting to get crowded to prevent guest discomfort
- Immediate feed to screens displaying "which exhibits are not busy right now"
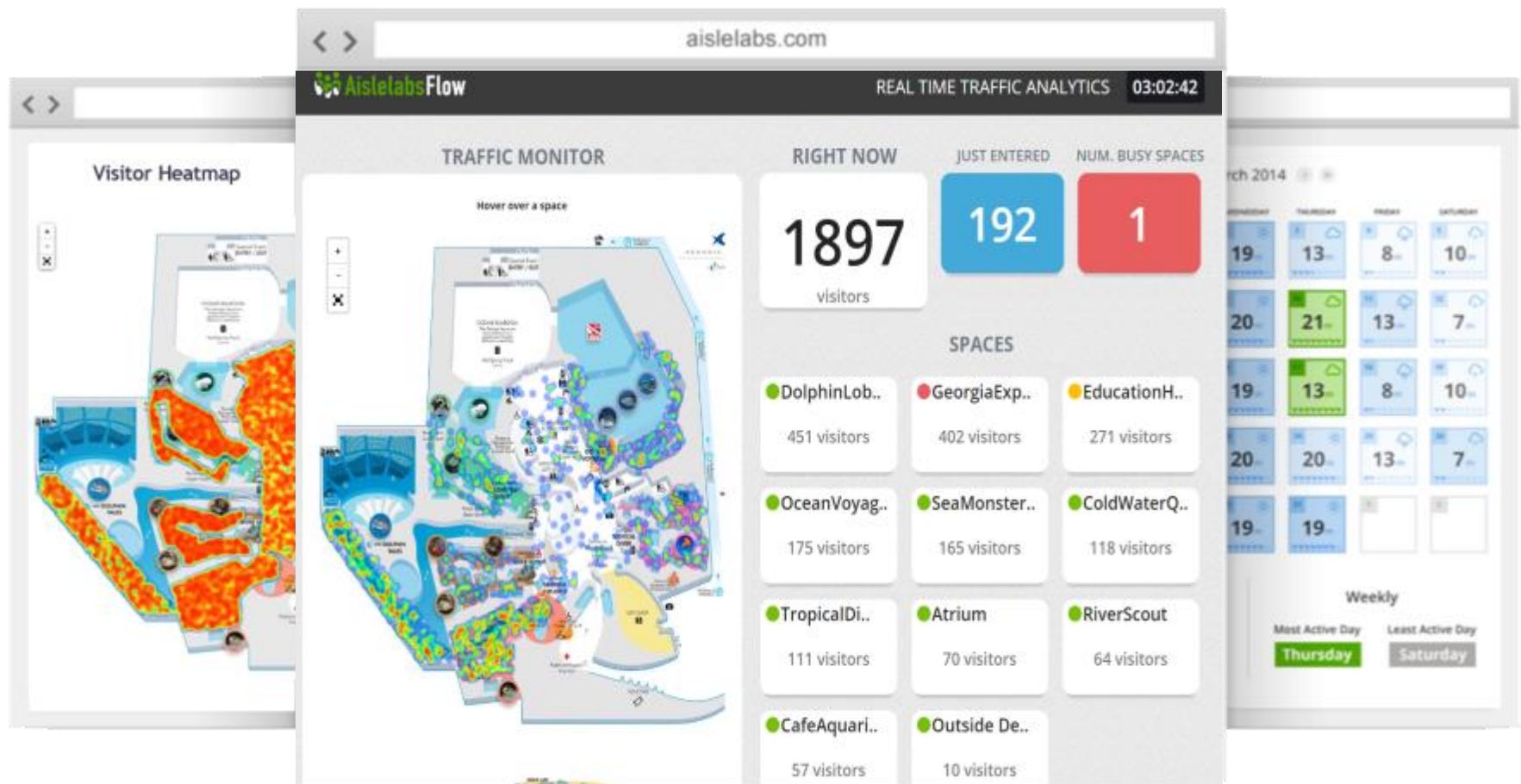
Understand Behavior

- Get deep analytics on guest visit patterns, walking paths, repeat frequency, animated heat-maps, and dwell times
- Improve guest retention and optimize operations

Top Paths

Flow: Real-Time Traffic Dashboard

Guest services team can view in real time guest flow and which areas are crowded.
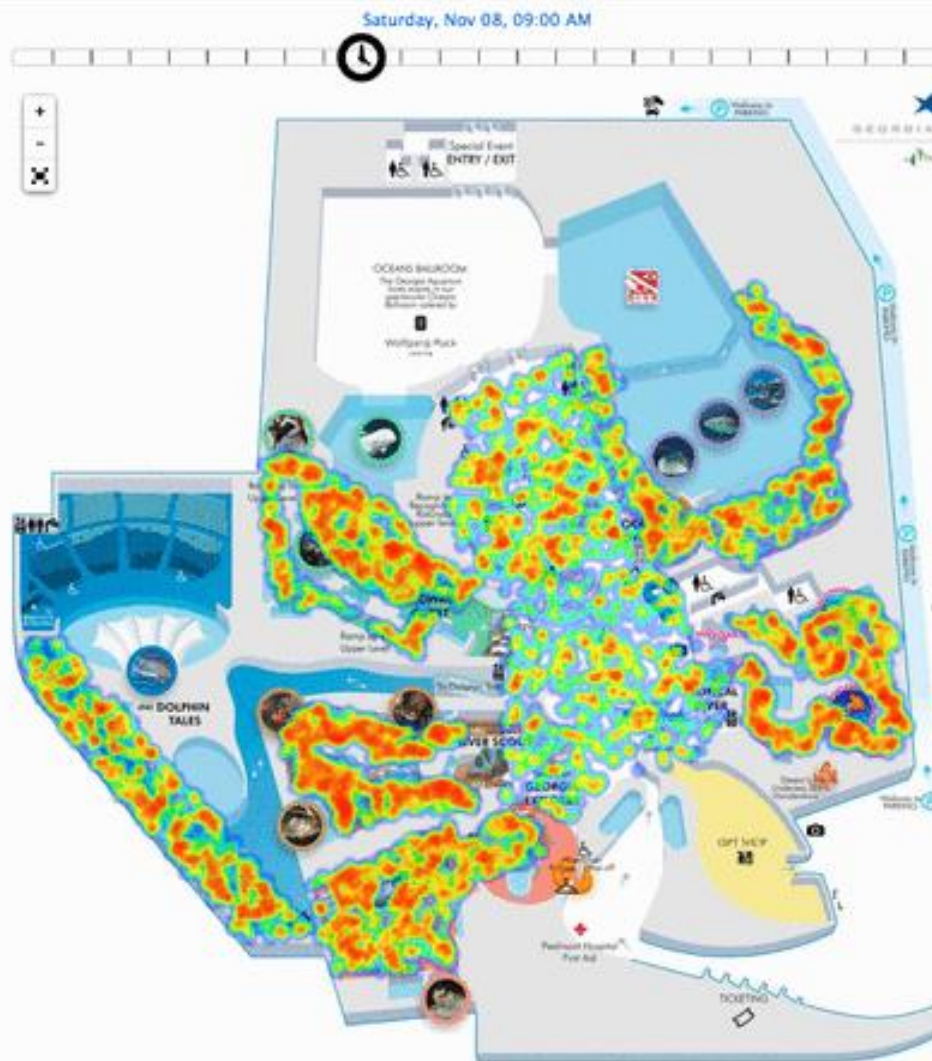
Live Animated Heat Map

Reports

Space Ranking

	Visited Here (% of all)	Dwell Time (avg in min)	Repeat (% of here)	Engaged (% of here)	Other Spaces (avg num)
Atrium	100.0%	12m	15.0%	32.8%	4.5
EducationHall	87.5%	27m	14.0%	35.3%	4.8
GeorgiaExplorer	73.2%	15m	14.4%	39.9%	5.3
OceanVoyager	72.3%	20m	13.0%	40.0%	5.5
SeaMonsterMuse...	71.9%	13m	12.4%	38.6%	5.3
TropicalDiver	70.9%	16m	12.9%	40.6%	5.6
RiverScout	70.0%	11m	12.7%	40.4%	5.6
ColdWaterQuest	66.0%	20m	12.5%	41.7%	5.6
CafeAquaria	63.9%	10m	14.5%	43.3%	5.7
DolphinLobby	54.1%	17m	12.2%	44.6%	5.4
Outside Deepos 3D	37.8%	2m	13.8%	47.7%	6.1

⬇ CSV

Reports

Cross Space Visitors

	Atrium	CafeAquaria	OceanVoyager	TropicalDiver	SeaMonsterMuseum	EducationHall	GeorgiaExplorer	RiverScout	ColdWaterQuest	Outside Deepos 3D	DolphinLobby
Atrium	--	63.9% ↕	72.3% ↕	70.9% ↕	71.9% ↕	87.5% ↕	73.2% ↕	70% ↕	66% ↕	37.8% ↕	54.1% ↕
CafeAquaria	100% ↕	--	95.5% ↕	92.6% ↕	86.2% ↕	95.1% ↕	88.2% ↕	90.9% ↕	86.9% ↕	53.3% ↕	63.2% ↕
OceanVoyager	100% ↕	84.5% ↕	--	89.6% ↕	85.1% ↕	94.2% ↕	85.3% ↕	87.4% ↕	82.9% ↕	49.5% ↕	61.7% ↕
TropicalDiver	100% ↕	83.5% ↕	91.4% ↕	--	87.1% ↕	94.3% ↕	87.8% ↕	89.9% ↕	84.4% ↕	50.7% ↕	63.4% ↕
SeaMonsterMuseum	100% ↕	76.6% ↕	85.6% ↕	86% ↕	--	92.3% ↕	84.5% ↕	84.6% ↕	79% ↕	47.9% ↕	61.9% ↕
EducationHall	100% ↕	69.5% ↕	77.9% ↕	76.5% ↕	75.8% ↕	--	74.3% ↕	75.3% ↕	71.3% ↕	42% ↕	54.3% ↕
GeorgiaExplorer	100% ↕	77.1% ↕	84.2% ↕	85.1% ↕	83.1% ↕	88.8% ↕	--	85.4% ↕	80.2% ↕	47.7% ↕	69.5% ↕
RiverScout	100% ↕	83% ↕	90.3% ↕	91.1% ↕	86.8% ↕	94% ↕	89.3% ↕	--	87.1% ↕	51.4% ↕	65.3% ↕
ColdWaterQuest	100% ↕	84.1% ↕	90.8% ↕	90.7% ↕	86% ↕	94.5% ↕	88.9% ↕	92.4% ↕	--	51.1% ↕	65.7% ↕
Outside Deepos 3D	100% ↕	90.2% ↕	94.7% ↕	95.3% ↕	91.2% ↕	97.4% ↕	92.5% ↕	95.2% ↕	89.4% ↕	--	69.1% ↕
DolphinLobby	100% ↕	74.7% ↕	82.4% ↕	83.1% ↕	82.3% ↕	87.7% ↕	94% ↕	84.5% ↕	80.1% ↕	48.2% ↕	--

Reports

Time of Day

Visited (%) ▼

	9	10	11	☀	1	2	3	4	5	6	7	8	9
Atrium	7.8	18.6	17.5	17.8	17.1	12.5	2.6	0.0	0.0	0.0	0.0	0.0	0.0
CafeAquaria	8.9	23.6	20.8	20.0	14.1	7.2	0.6	0.0	0.0	0.0	0.0	0.0	0.0
OceanVoyager	8.4	21.9	19.4	19.5	15.7	9.7	1.5	0.0	0.0	0.0	0.0	0.0	0.0
TropicalDiver	8.4	22.2	19.6	19.3	15.8	9.5	1.2	0.0	0.0	0.0	0.0	0.0	0.0
SeaMonsterMuseum	8.1	21.0	19.3	19.2	15.9	11.0	1.8	0.0	0.0	0.0	0.0	0.0	0.0
EducationHall	7.9	20.2	18.6	19.0	16.6	11.5	1.7	0.0	0.0	0.0	0.0	0.0	0.0
GeorgiaExplorer	8.8	21.1	19.1	18.2	16.9	9.5	1.1	0.0	0.0	0.0	0.0	0.0	0.0
RiverScout	8.0	21.8	18.5	19.4	16.8	10.3	0.8	0.0	0.0	0.0	0.0	0.0	0.0
ColdWaterQuest	8.3	22.8	20.2	19.8	15.2	8.9	0.4	0.0	0.0	0.0	0.0	0.0	0.0
Outside Deepos 3D	9.3	24.5	20.5	19.8	14.8	4.9	1.0	0.0	0.0	0.0	0.0	0.0	0.0
DolphinLobby	8.1	22.6	20.0	18.8	17.8	7.2	0.7	0.0	0.0	0.0	0.0	0.0	0.0

⬇ CSV

Indoor Navigation

Mobile App

- For iOS and Android, shows the guest's current location
- Shows a list of galleries and facilities in the aquarium
- Uses Bluetooth iBeacon technology
- Shows which galleries are too crowded

Personal Guide

Hyper-Local Information

- Example, if a guest is standing in front of the Japanese Spider Crabs exhibit, they will see details about Spider Crabs on their phone
- Multi-media rich information with images and videos
- Information can be for the entire space or a specific exhibit in the gallery

Case Study

Tech Museum's

Smart Museum

The Tech Museum of Innovation

- Opened in 1990 in San Jose, CA

- 400,000 annual visitors

- Over 100 interactive exhibits

- Domed IMAX theater

- Special exhibitions, educational labs, workshops, lectures

The Mission and Vision

Mission: **To inspire the innovator in everyone**

Vision: **To become a resource for innovation**

- We're in the experiential learning business

- Our niche is Design Challenge Learning that utilizes technology

Smart Museum

The Smart Museum is a technology-driven platform that…

| Identifies visitor attributes | Personalizes museum interaction | Measures engagement and learning |
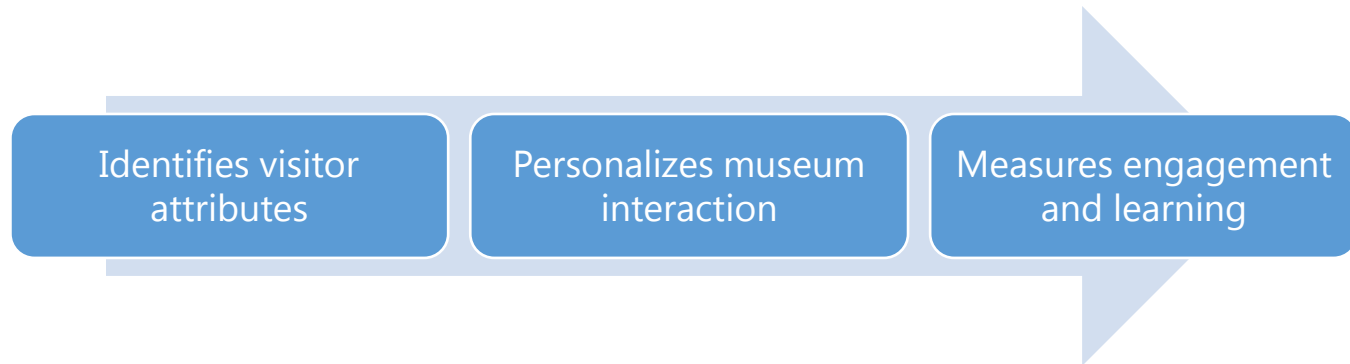
The Smart Museum is a resource for…

Enhancing the visitor experience

Increasing the impact of The Tech's mission

The Tech's Challenges for Location-Based Technologies

Museum experience must be available to everyone

- Cannot depend on personal devices

- Difficult for Operations to check out and collect devices

Technologies considered:

- Wi-Fi

- Passive RFID

- Active RFID

- Biometric

- Vision systems

Technology Chosen

- Visitors wear UHF RFID tags

- Passively read near exhibits and key areas for location data

- Scan at short range for individual interaction

Benefits

- Low cost

- Visitors can take them home

- Can be personalized

Case Study

Museum of Science, Boston

Lighting the Way--Indoor Location Services with LiFi

Marc E. Check

Director of Information and Interactive Technology
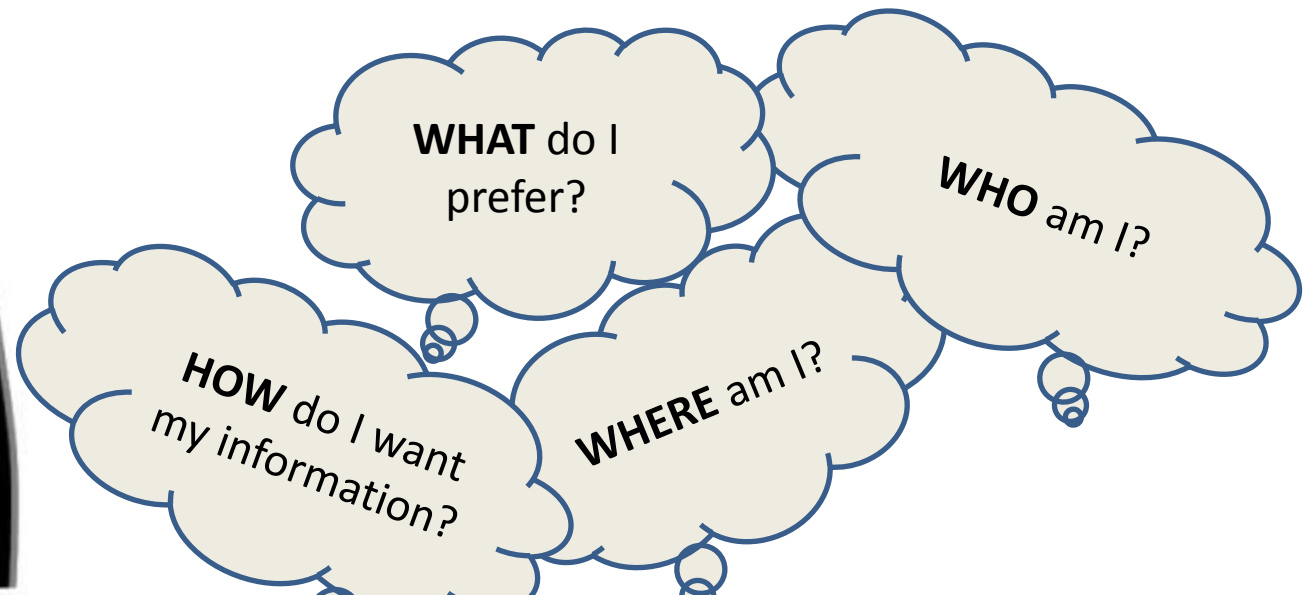*Museum of Science, Boston*
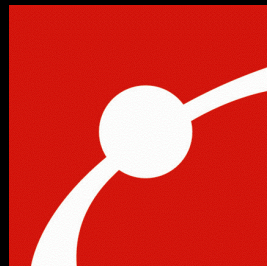
Solutions so far…

- **QR Codes**
- **NFC/Bluetooth**
- **RFID**
- **WiFi**
- **Sonification**

…but we needed something that is *not cumbersome* or *aesthetically distracting*, works at *short and long-range*, *affordable*, *accurate*, *platform agnostic*, requiring *minimal infrastructure*, *easy to manage*, and most of all…

SUSTAINABLE!

The Technology

- Modified LED bulbs serve as beacons, modulating faster than the human eye can detect, with each broadcasting a unique ID
- ByteLight technology is integrated directly into the power control mechanism of the bulb itself
- Because this is visible light it is detected on <u>ANY</u> mobile device's front and back-facing camera
- ByteLight software allows the device to associate or triangulate positioning down to a matter of *inches*

ByteLight Circuitry

Lighting Hardware
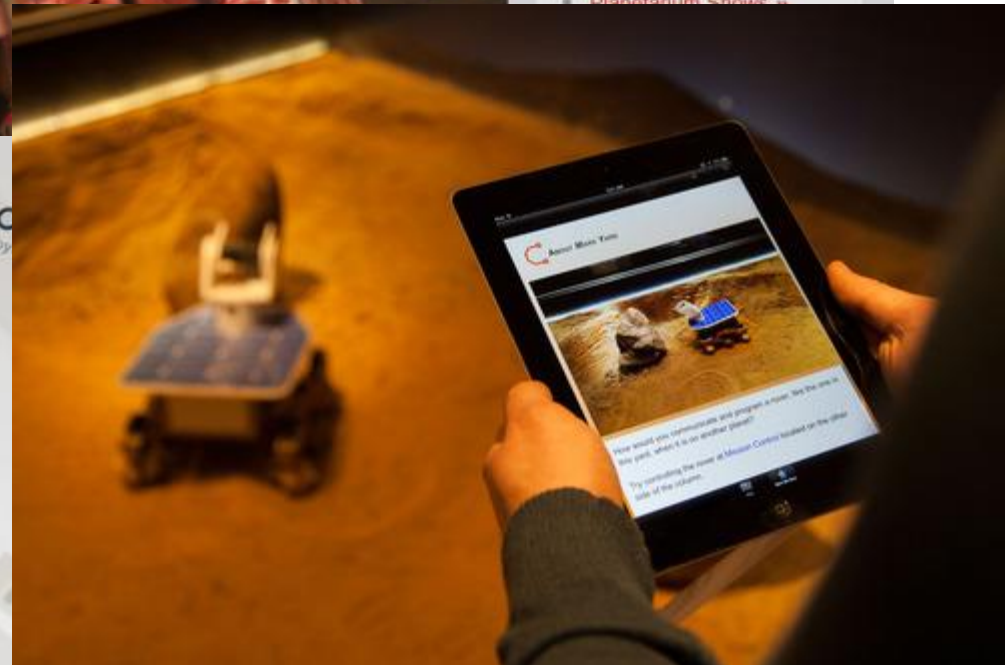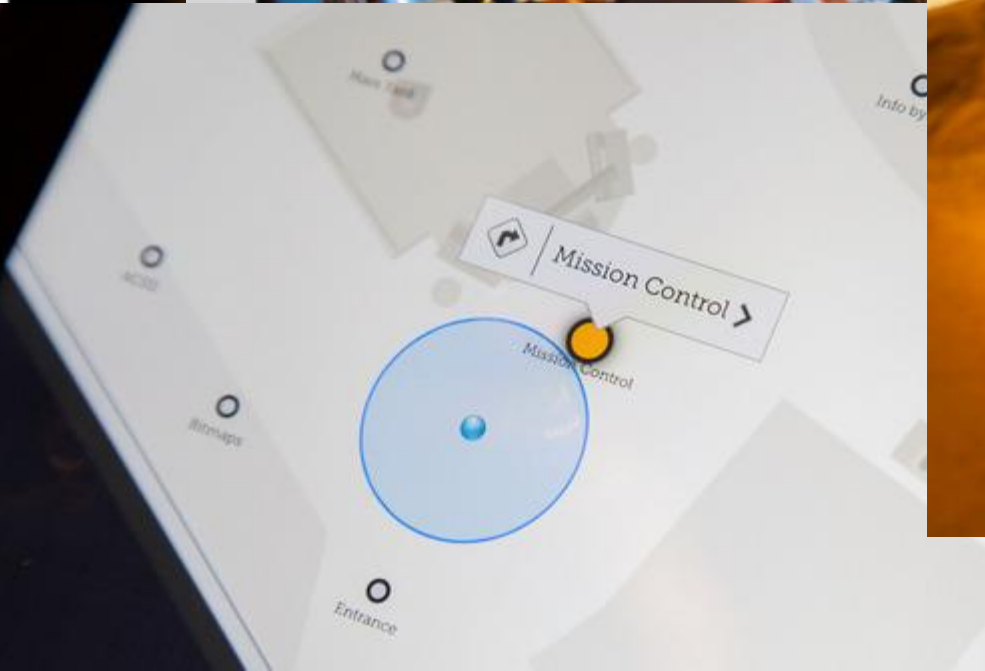
Next Steps

- Blue Wing Testing
- Formal Research & Evaluation
- High Ceilings, Three floors
- Combination of "LiFi" and Low Energy Bluetooth

Thank You!

Questions?

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