



TECHNOLOGIES OF THE FUTURE:

**HOW A PUBLIC-PRIVATE PARTNERSHIP IS UNLOCKING
CUSTOMER INSIGHT USING THE INTERNET OF THINGS**

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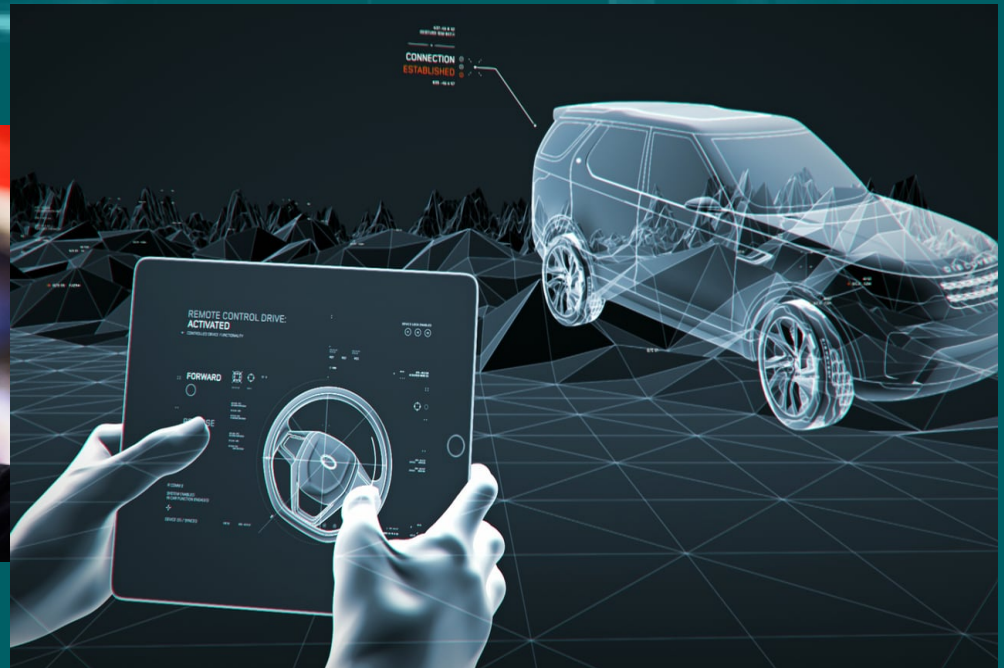
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LIBRARY OF: 2030? 2050? 22ND CENTURY



INTERNET OF THINGS

'IOT' FOR SHORT

The infrastructure of the information society.

(Global Standards Initiative on Internet of Things, 2013)

'SMART' EVERYTHING

Put the word 'smart' in front of any device these days and it can be said to be part of the IOT.

'IOT' EVERYWHERE

Smart - cars, phones, TVs etc..

Smart - Buildings, streets, lights, refrigerators, toothbrushes, coffee pots, toasters,

NEW PHASE OF COMPUTING

"IOT IS TRANSFORMING THE EVERYDAY PHYSICAL OBJECTS THAT SURROUND US INTO AN ECOSYSTEM OF INFORMATION THAT WILL ENRICH OUR LIVES. FROM REFRIGERATORS TO PARKING SPACES TO HOUSES, THE IOT IS BRINGING MORE AND MORE THINGS INTO THE DIGITAL FOLD EVERY DAY, WHICH WILL LIKELY MAKE THE IOT A MULTI-TRILLION DOLLAR INDUSTRY IN THE NEAR FUTURE."

— PRICEWATERHOUSECOOPERS REPORT,
'SENSING THE FUTURE OF THE INTERNET OF
THINGS'

1

Computers

2

Networking

3

Internet of Things

28 BILLION \$1.29 TRILLION

devices by 2020.

in spending on IOT projects and
initiatives by 2020.

60% of Global GDP

Equivalent amount of money that is likely to be spent on the development of
IOT over the next 15 years.

SIZE MATTERS

INTERNET OF THINGS EXPLOSIVE GROWTH

SOURCE(S):

CIA Worldfact book, Forbes, Zdnet, IDC.



THE INTERNET OF THINGS WILL THRIVE BY 2025 PEW RESEARCH CENTER, MAY 2014

- Over 1,600 responses
- Asking where the Internet of Things would stand by the year 2025
- Majority agreed that “the expanding networking of everything and everyone – the growth of the Internet of Things and embedded and wearable devices – will have widespread and beneficial effects by 2025”





Q: WHY SO MUCH \$\$\$?

A: Customers, clients, patrons, guests, vendors, suppliers, citizens, consumers, stakeholders etc...



ALL ABOUT THE CUSTOMER

USING ANALYTICS TO UNDERSTAND
THE CUSTOMER

CUSTOMERS

HOW ARE CUSTOMERS USING LIBRARY SPACE?



HOW DOES THAT USE
CHANGE OVER TIME ?



WHO USES THE SPACE?



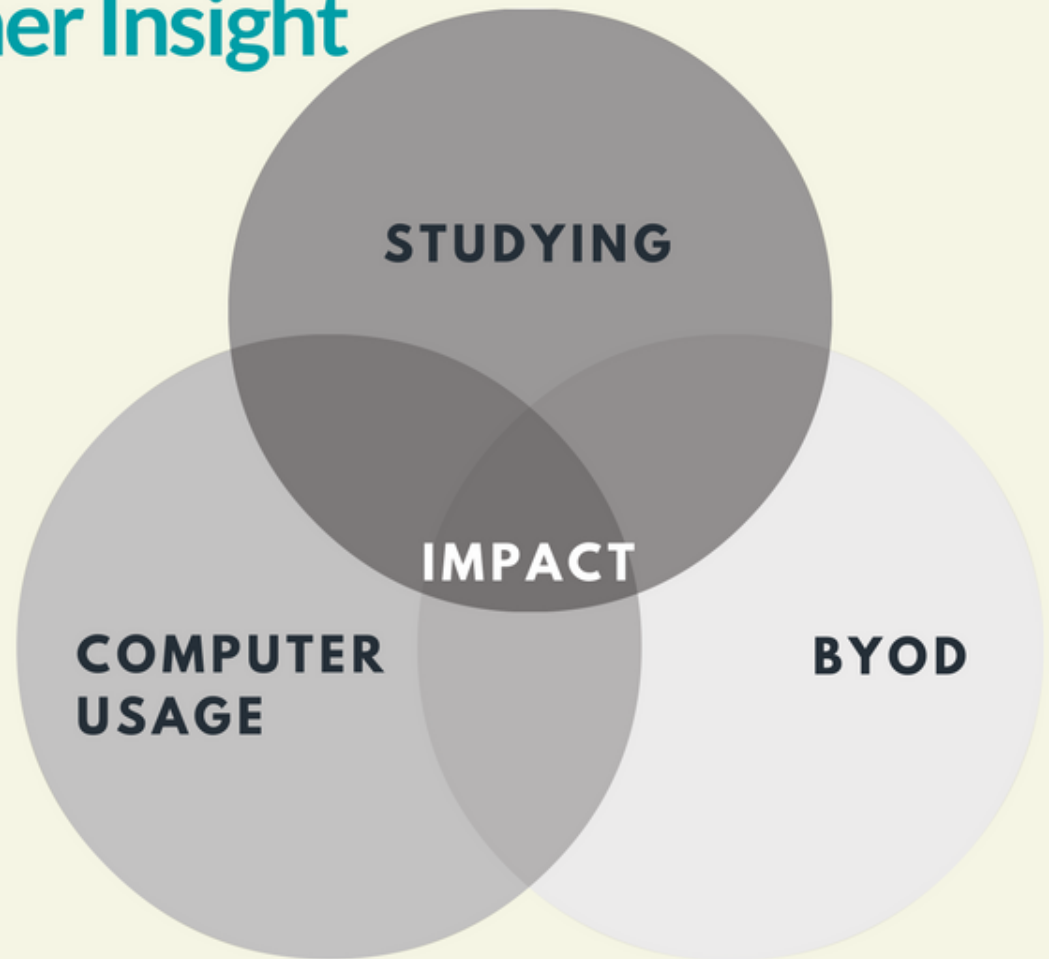
WHAT ABOUT MULTIPLE USES PER USER?



Customer Insight

**CUSTOMERS USE THE
LIBRARY SPACE FOR
PLURALITY OF REASONS**

A GOOD UNDERSTANDING OF HOW CUSTOMERS ARE USING THE LIBRARY SPACE AND HOW THAT USE IS CHANGING OVER TIME IS A PREREQUISITE FOR ACCURATE STRATEGIC PLANNING, POLICY DEVELOPMENT, DISPLAY OPTIMIZATION, NEW SERVICE OFFERINGS AND MORE.



PROS AND CONS SURVEYS VS. SENSORS

SURVEYS

- More Staff-Time
- Less Accurate
- Continuous Deployment (fatigue)
- Lower Responses
- Less Statistical Significance

SENSORS

- More Accurate
- Technically Dependent
 - Measurement Consistency
- Higher Sample Size
- More Confidence

Internet of Things & Customer Insight



Staff time



Accuracy



**Measurement
Consistency**



**Resource
Allocation**

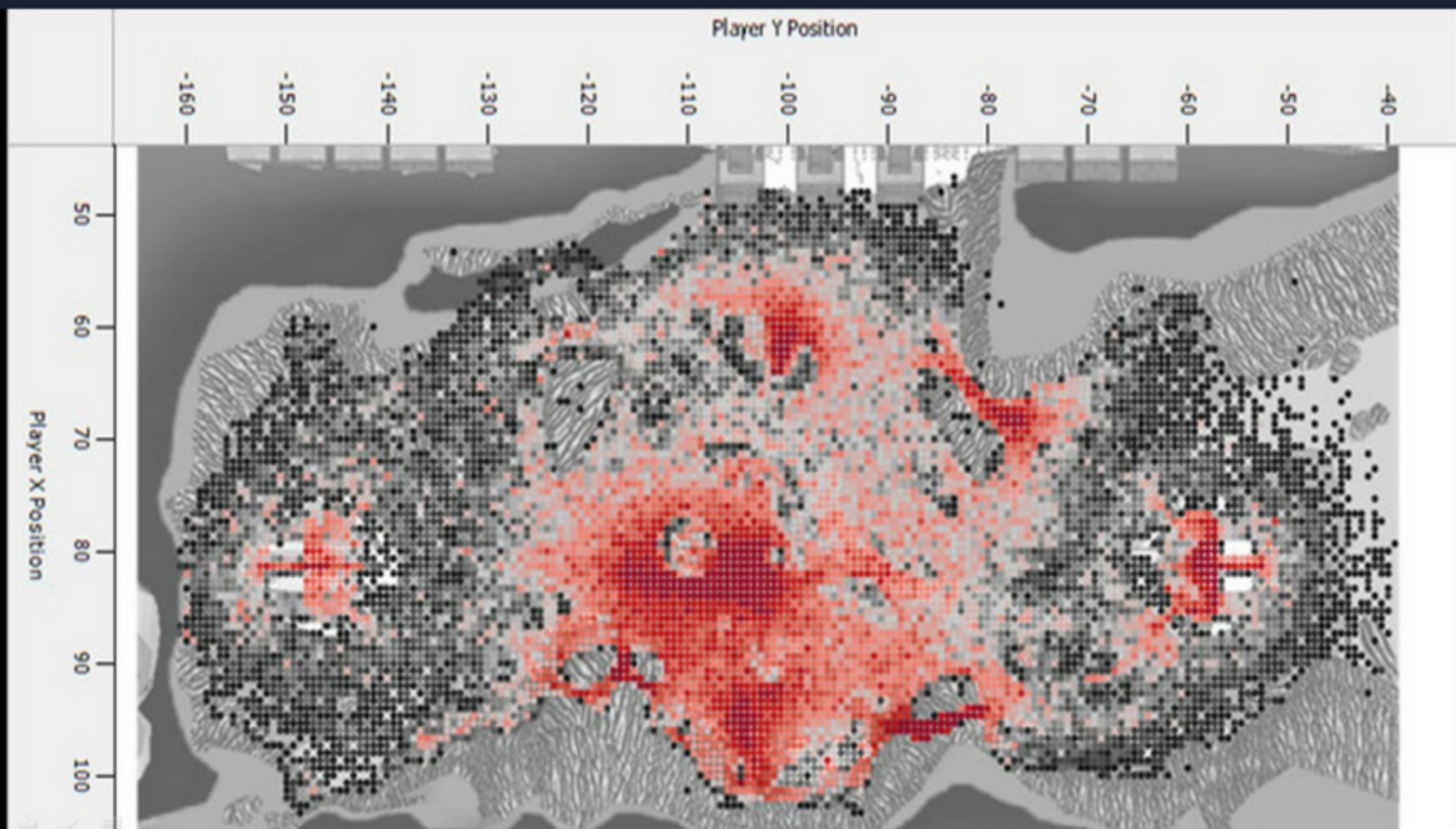


Ease of use



Planning

DATA VISUALIZATION



An aerial photograph of a city skyline, likely New York City, viewed from a high vantage point. The image is heavily overlaid with a teal color. In the foreground, a dense cluster of skyscrapers and buildings is visible, with a prominent circular structure on one of the roofs. A wide street with traffic runs through the middle ground. In the background, the city skyline extends to the horizon, with the Empire State Building being a notable landmark. The sky is filled with clouds. A dark horizontal band is positioned across the middle of the image, containing the text 'LIVEGAUGE' in white serif font.

LIVEGAUGE

HOW IT WORKS

SHARE

Data sent to
Livegauge
servers



LOG IN

See real-time
or historical
data.



SENSOR

Device data
collected via
sensor

ANYONOMOUS

Servers instantly
anonymize the
data


ANALYZE

Download,
analyze in web,
view dashboard.
Have fun!


DASHBOARD

LIVEGAUGE 

 Activations

 Reporting

 RealTime

Sign Out 

Reports

16,888 7,134 repeats
Engagements

25,876 10,027 repeats
Impressions

18.79 min
Average Visit



Report Highlights

Most Frequent Duration

2 Minutes
1678 Interactions

Average Hourly Interactions

January 1st 2016 - May 31st 2016
4.63 Interactions

Busiest Day

Saturday, January 23rd 2016
208 Engagements

Busiest Hour

4 p.m.
2,773 Engagements

Quietest Day

The background of the slide is a photograph of a modern public library building. The building has a prominent glass facade and a flat roof. A bicycle is parked on the sidewalk in front of the entrance. The entire image is covered with a semi-transparent teal overlay.

MARKHAM PUBLIC LIBRARY & LIVEGAUGE

AN INTERNET OF THINGS PILOT FOR PUBLIC
LIBRARIES

OBJECTIVES

SPACE USAGE

How are customers using the library's space?

TECH INSIGHT

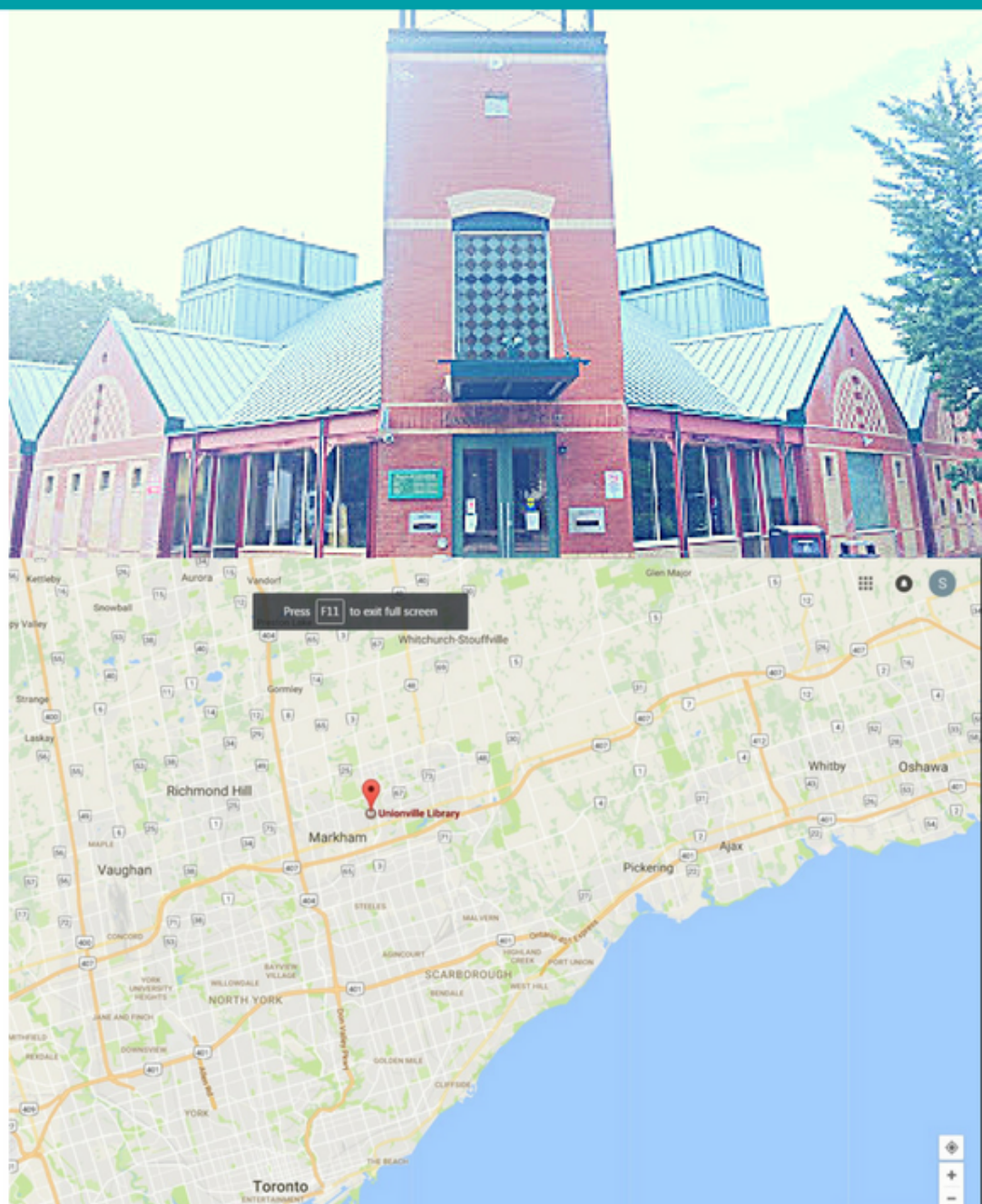
What types of devices are coming into the branch?

UNIQUE VIEW

Are there unique variables we missed?

UNIONVILLE

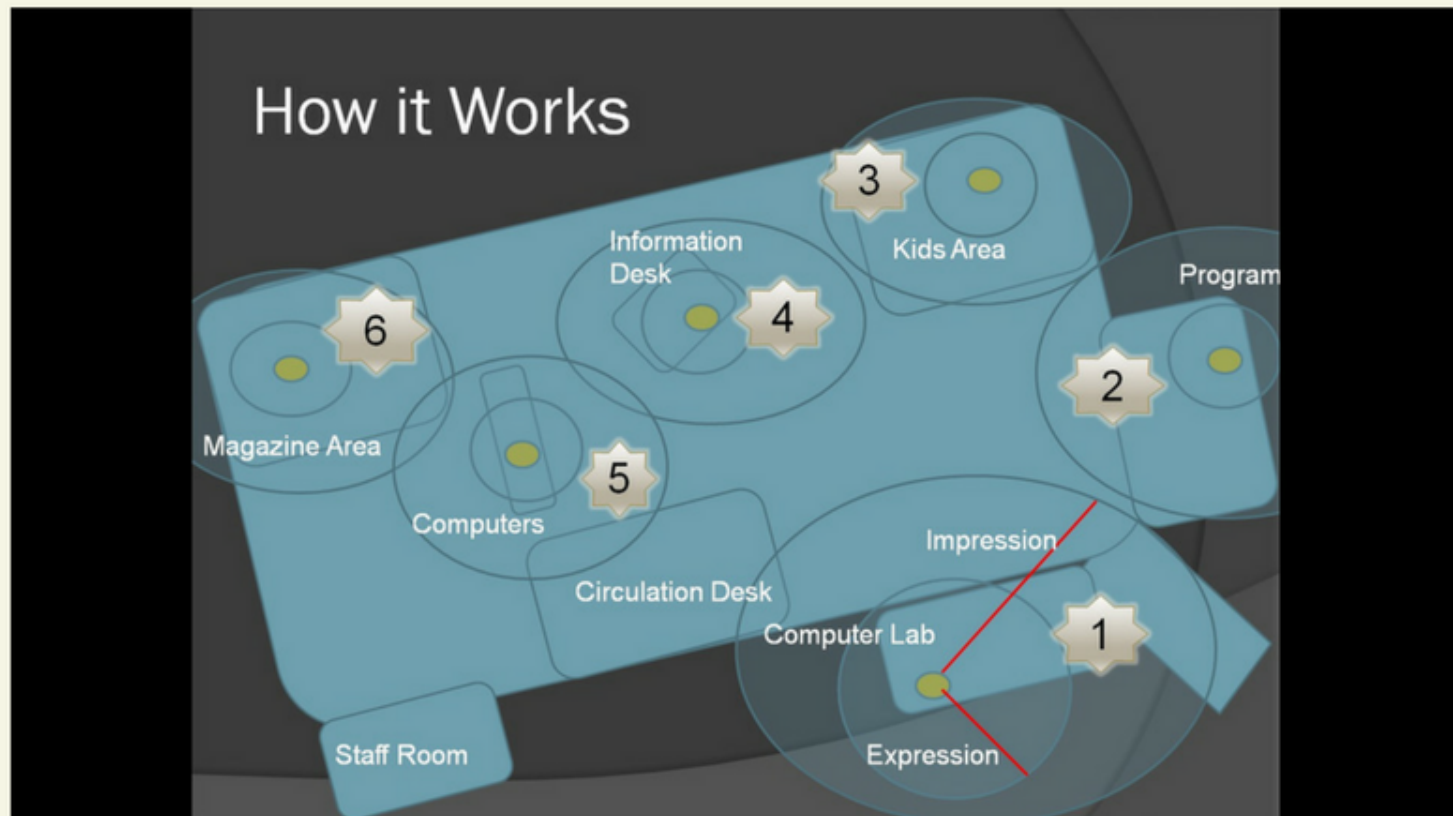
- **CONSISTENT PERFORMER**
- **EASE OF DEPLOYMENT**
- **TECHNICAL SETUP**
- **GEOGRAPHY**
- **ISOLATION- STAND ALONE**



HOW IT WORKS

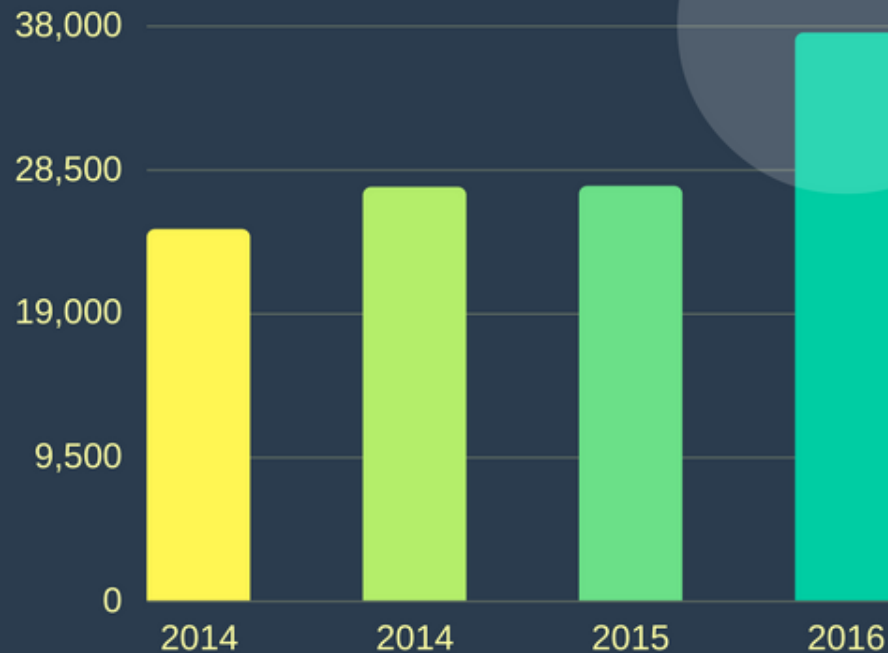
SENSOR LAYOUT

By allotting numbers to the sections where the sensors capture data, we can see where customers frequent the most.



1 PROBLEM, 1 SOLUTION

August
Visits at
Unionville
branch
2013-2016.



How to explain
this anomaly?

DOOR COUNTS + LIVEGAUGE+ MARKET RESEARCH

LIVEGAUGE 

Activations

Reporting

RealTime

Sign Out

68,675 31,122 repeats
Engagements

102,760 41,176 repeats
Impressions

18.15 min
Average Visit

Most Frequent Duration

2 Minutes
6748 Interactions

Average Hourly Interactions

January 1st 2016 - November 30th 2016
8.54 Interactions

Busiest Day

Monday, July 25th 2016
431 Engagements

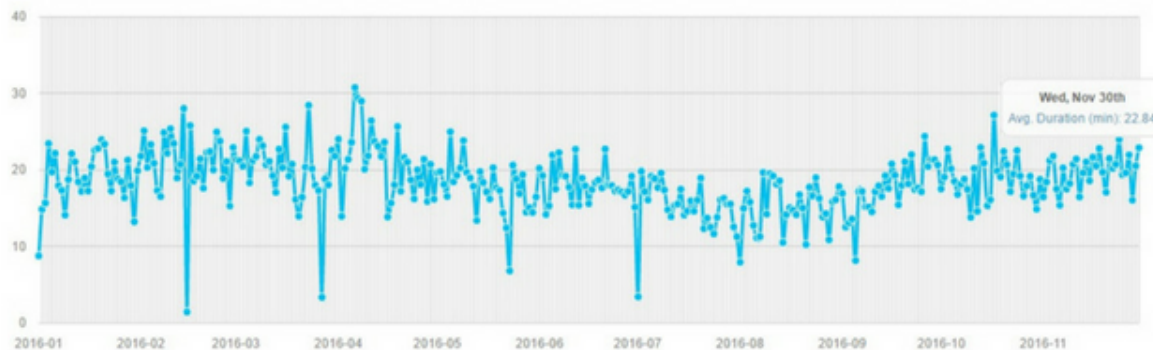
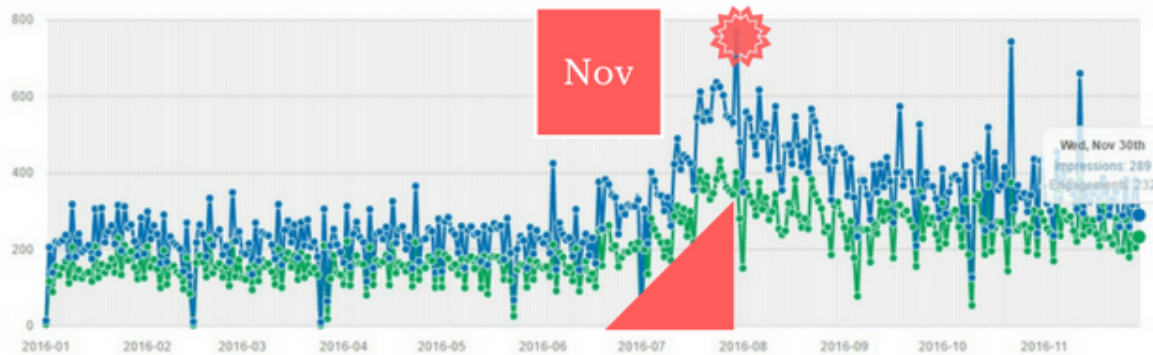
Busiest Hour

4 p.m.
10,744 Engagements

Quietest Day

Friday, March 25th 2016
2 Engagements

Quietest Hour



NEXT STEPS

- Sensor Versatility
- Library Objectives
- Mix and Match
- Expansion
- Big Data Analysis



BRAMPTON LIBRARY & LIVEGAUGE

Internet of Things

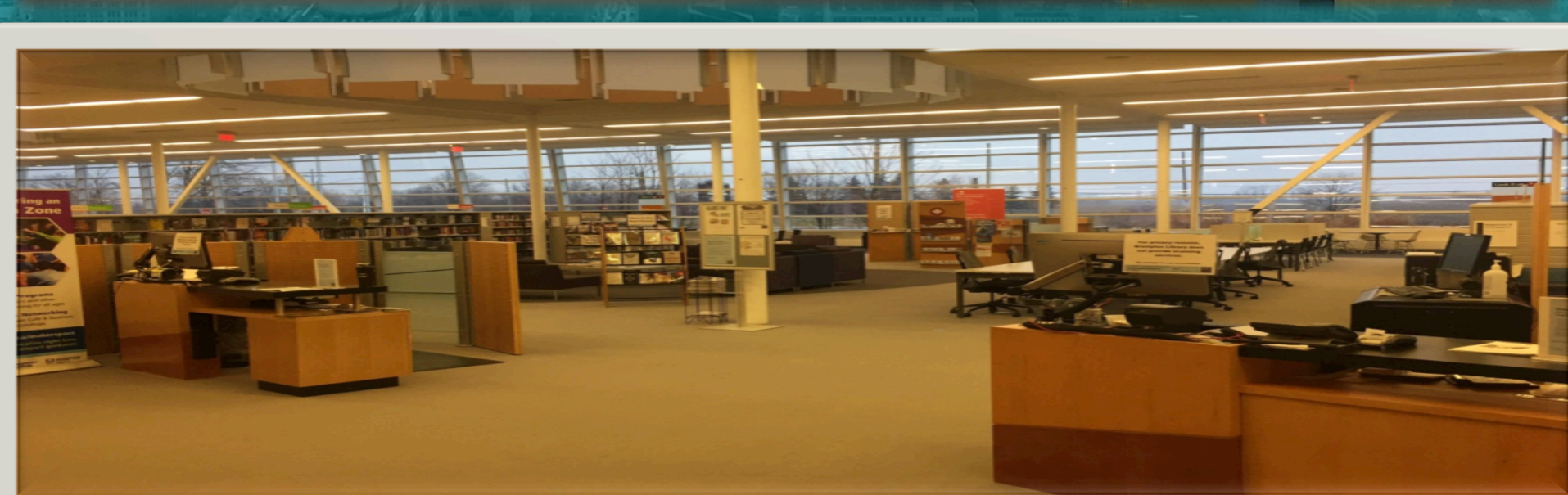
TECHNOLOGIES OF THE FUTURE

BRAMPTON GOALS FOR THE LIVEGAUGE PILOT:

- AUGMENT LIBRARY GATE COUNT
- BETTER UNDERSTAND CUSTOMER TRAFFIC PATTERNS
- UNDERSTAND CUSTOMER TECHNOLOGY USAGE
- CLARIFY SERVICE POINT USAGE
- TRACK AND IMPROVE CUSTOMER JOURNEY
- GAIN INSIGHTS INTO CUSTOMER USAGE OF SPECIFIC SPACES
- MEASURE SIGNAGE, MERCHANDISING AND MARKETING PERFORMANCE

Gore Meadows Branch





WOO HOO -
WE GOT A
CO-OP
STUDENT!!

LTY OF INFORMATION
iSCHOOL



Four Corners Branch






South Fletcher's Branch



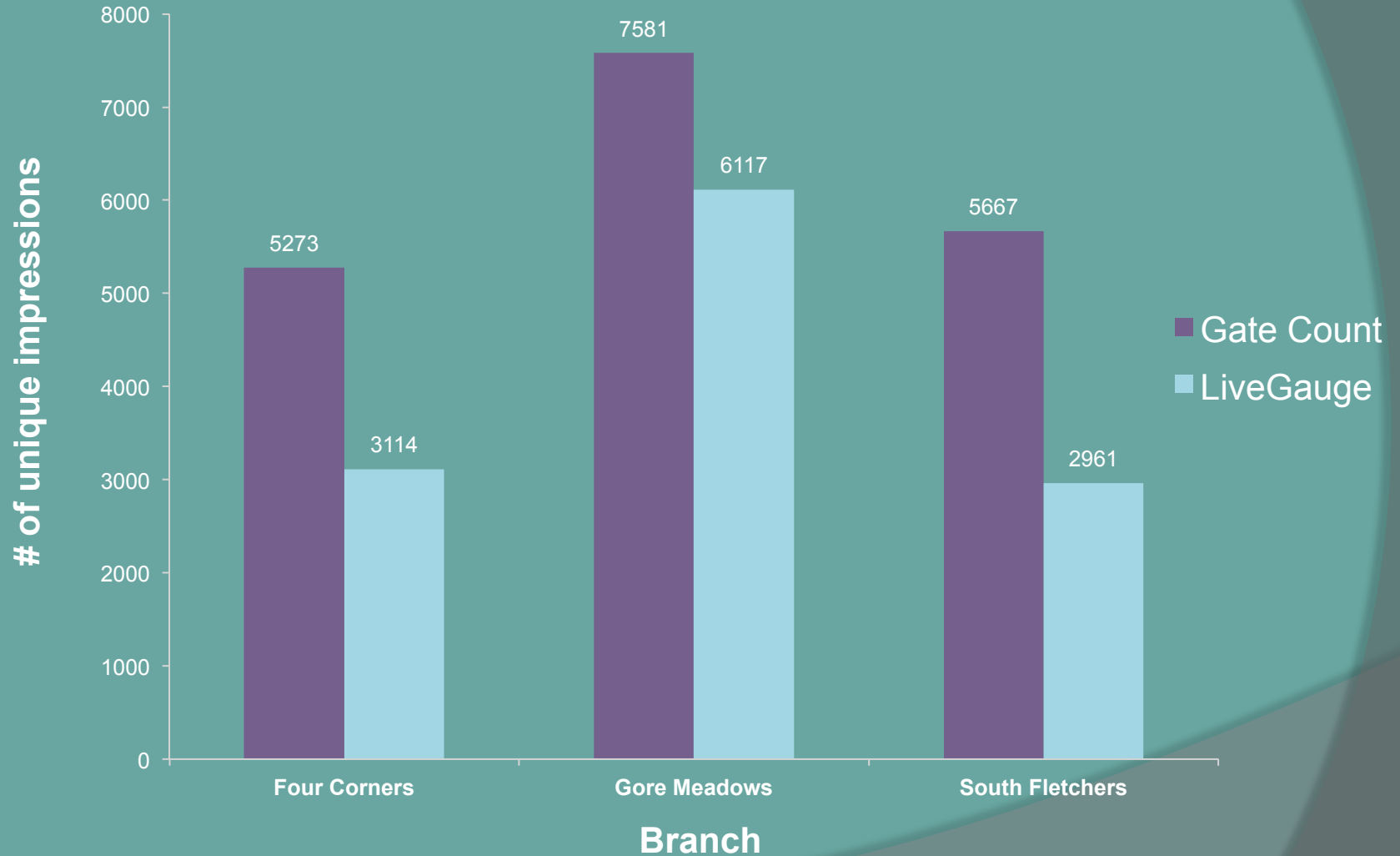




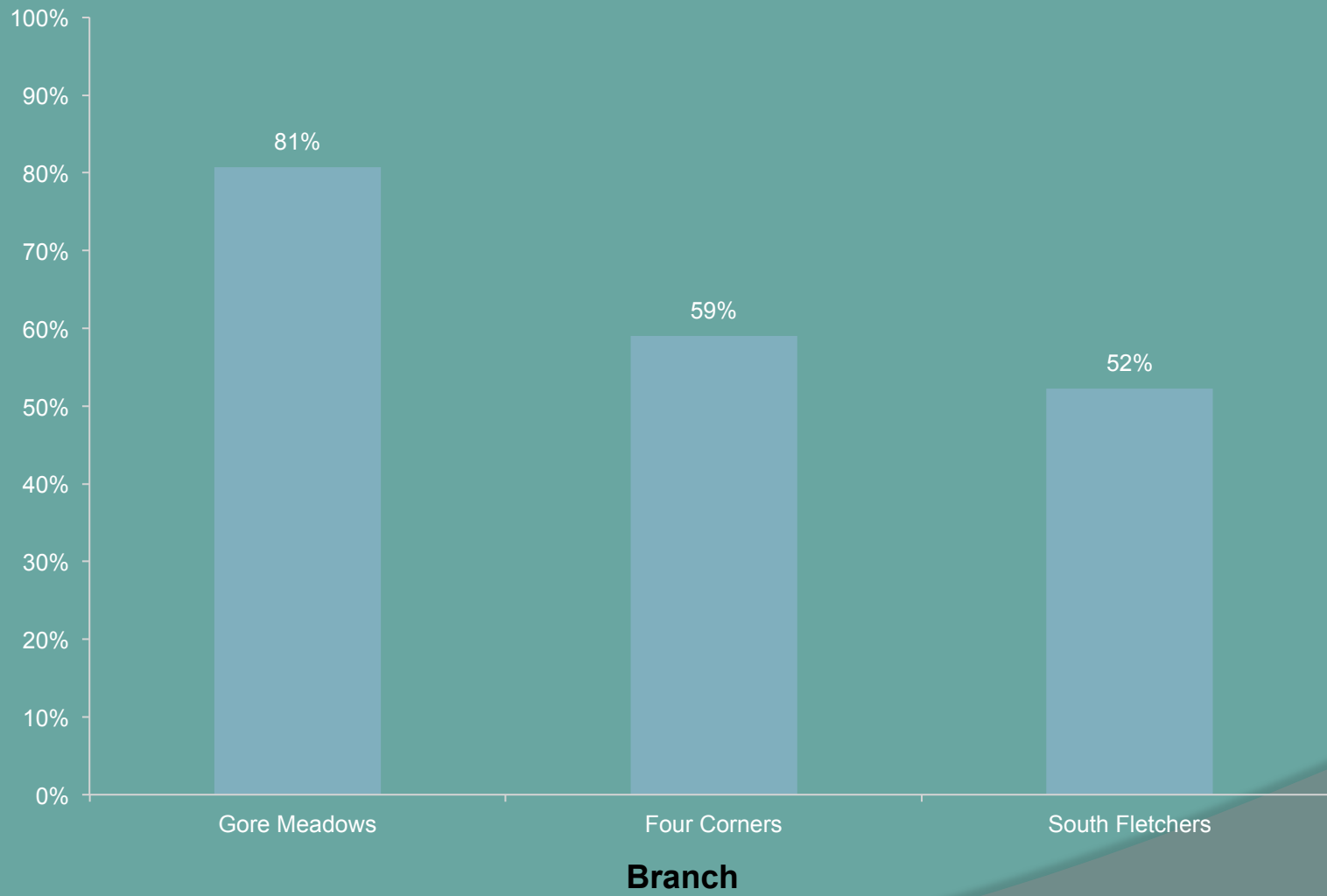
4 MAIN QUESTIONS:

1. WHAT PERCENTAGE OF BRAMPTON LIBRARY CUSTOMERS ENTERING THE BRANCH ARE CARRYING A WI-FI ENABLED DEVICE?
 2. HOW LONG DO CUSTOMERS SPEND ON AVERAGE INTERACTING WITH STAFF AT THE ENTRANCE SERVICE POINT AREA? WHAT IS THE TYPICAL NATURE OF THOSE INTERACTIONS?
 3. HOW ARE MERCHANDISING DISPLAYS ADDING TO THE DISCOVERABILITY OF LIBRARY MATERIALS?
 4. WHAT ARE THE OPTIONS FOR LIVEGAUGE SENSOR LOCATIONS, AND WHAT CUSTOMER BEHAVIOUR CAN THE SENSORS BE EXPECTED TO TRACK IN EACH LOCATION?
- 

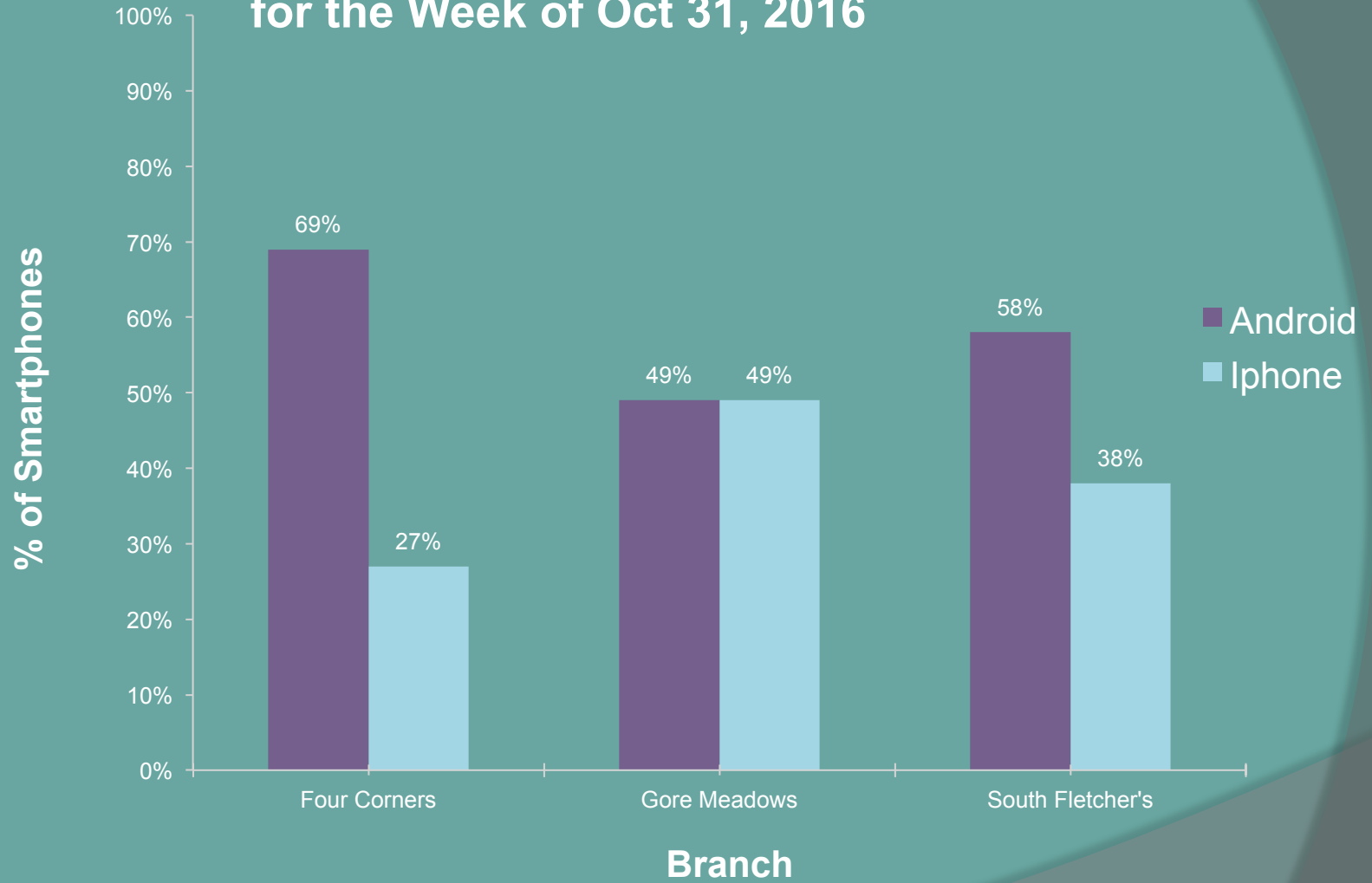
of Unique Impressions, Gate Count vs LiveGauge For the week of Oct 31, 2016



LiveGauge as a % of Gate Count Week of Oct 31, 2016



Android vs Iphone for the Week of Oct 31, 2016





Average Length of Dwell Time In Service Point Area

Gore Meadows

6:51 MINUTES

Four Corners

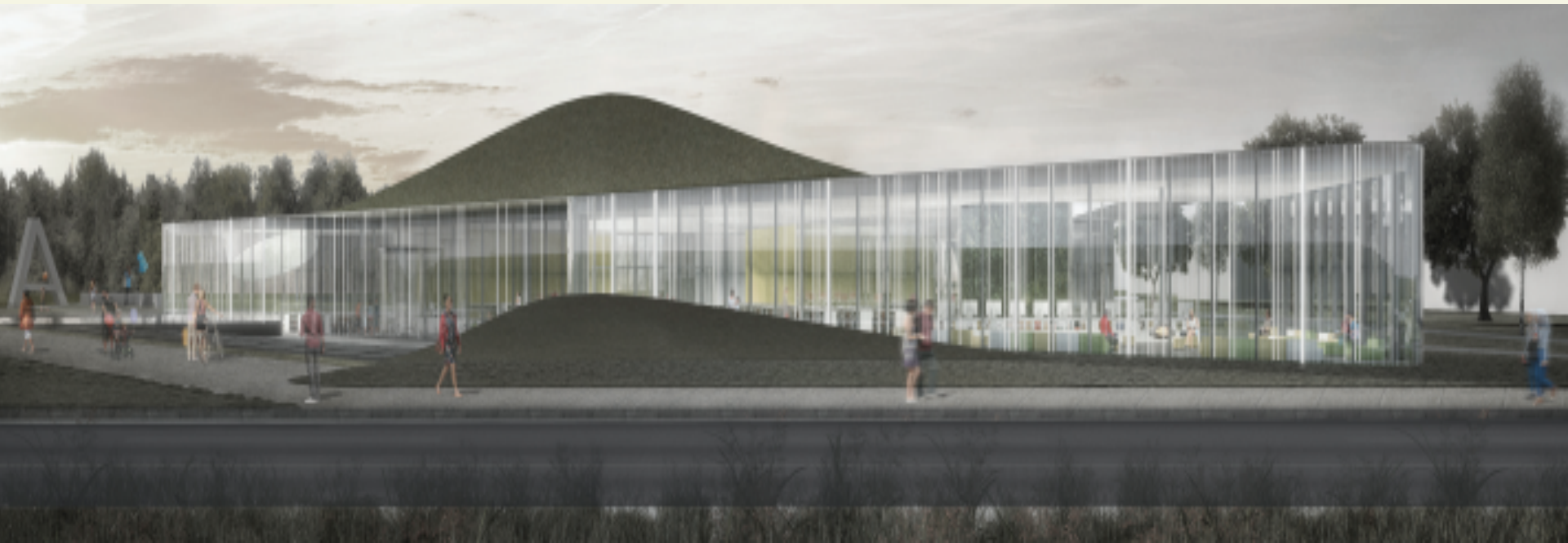
6:32 MINUTES

South Fletcher's

6:45 MINUTES

LESSONS LEARNED & NEXT STEPS:

- OBSERVATION AND SENSOR LOCATION
- STATUS OF PILOT GOALS
- ROTATE SENSORS THROUGH OTHER BRANCHES
- USE SENSORS FOR OUTREACH EVENTS





WHAT DOES THIS MEAN FOR LIBRARIES?

INTERNET OF THINGS IN PUBLIC LIBRARIES

WHAT'S PROMISING ABOUT IOT TECHNOLOGIES FOR LIBRARIES?

- *Inventory control*
- *Mobile payments, ticketing and event registration*
- *Access and authentication*
- *Climate and room configuration, accessibility and way-finding*
- *Mobile reference*
- *Resource availability for both content and physical plant (rooms, AV equipment)*
- *Smart books (features activated/enhanced by other IoT-enabled systems)*
- *Gaming and augmented reality*
- *Object-based learning*
- *Assistive technology*



Areas of Concern

The Internet of Things is still an evolving field of technology.

PRIVACY, SECURITY AND HACKING
(BY FAR THE LARGEST CONCERN)

THE EXPENSE OF PARTICIPATING IN
IOT TECHNOLOGIES

STAFF SUPPORT AND TRAINING

DECLINE IN USE OF LIBRARY
RESOURCES

WHAT STANDARDS ARE REQUIRED
AND WHO SETS THEM?

WHAT IOT MEANS FOR LIBRARIES

- 4th digital revolution
 - People – Serve and Learn
 - Place – Reconfigure and Repurpose
 - Platform – Community Resource



WHAT IS THE LIBRARY'S ROLE IN SUPPORTING USERS' ADOPTION OF IOT?

- General knowledge, training, demonstrations
- Education regarding privacy and security issues
- Providing accessibility, compatible devices and resources

“These are important issues for us in the profession, and we need to make sure that we are both educating our users about what’s happening in the wider world, and being good stewards of our own data.”

—

OCCLC, survey respondent

START



Questions?

"Creativity is
intelligence having fun"

ALBERT EINSTEIN

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