“0–60 in No Time”
Bill Weinstein
The John H. McFadden and Lisa D. Kabnick Director of
Information and Interpretive Technologies
Philadelphia Museum of Art

“Developing an Invisible Architecture for Exhibitions”
Brian Dawson
Chief Digital Officer
Canada Science and Technology Museum Corporation

ARTLENS “NEAR YOU NOW”
Jane Alexander
Chief Information Officer
The Cleveland Museum of Art
When is the backend done?

• Three Case Studies
  – Beginning
  – Implementation
  – Do-Over (2.0 – the nicer way of saying it)
0-60 in No Time

Bill Weinstein

The John H. McFadden and Lisa D. Kabnick Director of Information and Interpretive Technologies
Philadelphia Museum of Art
Prior To Strategic Plan

• Looping video in galleries.
• Rented audio players.
• Cell phone tours hosted on PBX.
• One–off special exhibit interactives.
engaging AUDIENCES

DRAMATICALLY INCREASE VISITATION AND STRENGTHEN PARTICIPATION, ON-SITE AS WELL AS THROUGH DIGITAL TECHNOLOGIES, WITH A SPECIAL EMPHASIS ON ENGAGING YOUNG AUDIENCES AND FAMILIES
enhancing THE VISITOR EXPERIENCE

BECOME PHILADELPHIA’S MOST ACCESSIBLE, ENGAGING, AND VIBRANT CULTURAL INSTITUTION
activating OUR COLLECTIONS

BRING THE COLLECTIONS TO THE HEART OF THE MUSEUM EXPERIENCE AS THE PRINCIPAL MEANS FOR INCREASING ON-SITE AND ONLINE PARTICIPATION
After Strategic Plan

• In-gallery interactives.
• Location aware mobile guide.
• Transparent touch displays.
• Immersive environments.
But....

NO

infrastructure to build, or support these projects.

process for application and content development and management.

dedicated staff build or support them.

budget.
What do we need – Infrastructure

• Additional Wifi bandwidth.
• Equipment standards.
• Media storage.
• Application servers.
• Management system.
What do we need – Content Development and Management

- CMS.
- Media production.
- Collection data production.
- Application development environment.
What do we need – Staff

• Developers.
• Support Staff.
• Media producers.
• Curators.
• Interpreters.
What do we need – Budget

• Increased operating budget.
• Increased special project budget.
• Endowment.
Developing an “Invisible Architecture” for Exhibitions

Brian Dawson
Chief Digital Officer
Canada Science and Technology Museums Corporation
Who we are...

CANADA SCIENCE AND TECHNOLOGY MUSEUMS CORPORATION

CANADA AGRICULTURE AND FOOD MUSEUM
CANADA AVIATION AND SPACE MUSEUM
CANADA SCIENCE AND TECHNOLOGY MUSEUM
Feds invest more than $80 million in Science and Tech Museum, keep it closed until 2017

The Government of Canada announced Monday it will spend more than $80 million on upgrades to the Canada Science and Technology Museum, work that will keep the facility closed until 2017.

Heritage Minister Shelly Glover said the money will go to repairing, refurbishing and renovating the closed building.

"When we celebrate the 150th anniversary of Confederation in 2017, the Canada Science and Technology Museum will showcase Canadian innovation and offer world-class exhibits and a fully digital experience to thousands of visitors every year," Ms. Glover said in a statement.

The museum, which opened as a centennial project in 1967, was shut down in September due to a mould issue.

Science and Technology Museum shuttered until 2017 for $80.5M upgrade

By Erin McCracken, Ottawa Citizen
Published: November 18, 2014
Updated: November 18, 2014 6:48 PM EDT

Science and Technology Museum in LeBreton Flats was closed Monday with the federal government's promise to.infuse $80.5 million to upgrade, repair and modernize the mould-and-asbestos-contaminated facility.

"For all intents and purposes, this will be a new facility by the time we're done with it," said Alex Benay, president and chief executive officer of the Canada Science and Technology Museums Corporation, which manages the national museum.

Science and Technology museum to reopen in 2017 after $80.5M overhaul

Ottawa South News
By Erin McCracken

Talk of opening a new Canada Science and Technology Museum at LeBreton Flats was mixed Monday with the federal government's promise to infuse $80.5 million to upgrade, repair and modernize the mould- and asbestos-contaminated facility.

"For all intents and purposes, this will be a new facility by the time we’re done with it," said Alex Benay, president and chief executive officer of the Canada Science and Technology Museums Corporation, which manages the national museum.

Canadian Heritage Minister Shelly Glover, who made the funding announcement at Library and Archives Canada, said the money will pay for a new roof, mould removal, modernizing the exterior façade, seismic and fire safety retrofits and expansion of the current exhibit space, which currently only showcases two per cent of the museum’s collection.

Construction is expected to begin in spring 2015 and the museum will reopen in the summer or fall of 2017.

"For all intents and purposes, this will be a new facility by the time we’re done with it."

"(I think the one thing when we were discussing what to do in going forward with this – no patch jobs, no Band-Aids," said Foreign Affairs Minister John Baird, speaking in his role as the minister responsible for the National Capital Region. "This needed a major revitalization."

The national museum, which has been at its present location on St. Laurent Boulevard since 1967, unexpectedly closed Sept. 11 and upwards of three dozen staff were evacuated after high levels of airborne mould caused by the leaky roof.

Developing an Invisible Architecture for Exhibitions
Brian Dawson, CSTMC
Invisible Architectures: Supporting Public-Facing Technologies
Renewing the Canada Science and Technology Museum

Developing an Invisible Architecture for Exhibitions
Brian Dawson, CSTMC
Invisible Architectures: Supporting Public-Facing Technologies
Digital “reboot” of the museum
Developing six major galleries in parallel

Artefact Alley

Technology In Our Lives

Creating and Using Knowledge

Children’s Innovation Space

Transforming Resources

Moving and Connecting
This is not a content management system
Exhibit Digital Platform

Content Management
System Management
Code Management

Git Repository

Exhibit Standard

Analytics
Exhibit Management System Architecture

[Diagram showing the architecture of an exhibit management system, including components such as Systems Control Server, Deficiency Ticketing System, Configuration Database, Source Repository, Media Repository, Continuous Integration Server, and Visitor-Facing Application.]
Exhibit Management System and Exhibit Content Management
Integration Toolkit (ITK)
Anticipated Benefits

• Standardized hardware and software
• Ownership of / access to source code
• Maintain code into the future
• Transparent development approach
• Floor continuously compiled on latest version of code
• Rapid rebuild/replacement of exhibit computers
• Means of (selected) content management for non-technical staff
• Integrated analytics platform
Risks

• Potentially limited pool of exhibit development firms willing to provide source code and develop transparently

• Developing platform in parallel with exhibitions

• Management of custom platform into the future
Thank you

Brian Dawson
Chief Digital Officer
Canada Science and Technology Museums Corporation

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ARTLENS

“NEAR YOU NOW”

2.0+

Jane Alexander, CIO, The Cleveland Museum of Art
The Red Kerchief, ca. 1868-1873
Claude Monet (French, 1840-1926)
Oil on fabric. Bequest of Leonard C. Hanna, Jr., 1956.39
LOCATION-AWARE RECOMMENDATIONS
PERSONALIZATION

FAVORITES
Create a tour out of your favorite artworks or share them with friends.
CONTEXTUAL HOTSPOTS

Fight between a Tiger and a Buffalo

Henri Rousseau, 1844-1910

ADD TO FAVORITES  SHARE

Jardin des Plantes

Les Revolvers in Prison

Desert and D deserts
Why we are using iBeacons for Near You Now function of ArtLens.

Is Near You Now Working?
The “Blue Dot” Problem

- How can we provide a good wayfinding experience for visitors?
- GPS – The golden standard?
  - Accurate to ~35ft, less accurate when indoors
  - Not Nearly Accurate enough
- What other options are there?
  - Wifi Triangulation?
  - iBeacon?
Initial Approach

- **Wi-Fi Triangulation!**
  - Had to use Trigger Finger API to force constant Wi-Fi communication
  - Mesh network of Wi-Fi hotspots

- **But...**
  - Trigger Finger API was a HUGE drain on battery life
    - Visitors do not like drained batteries
  - Overactive 2.4ghz Wi-Fi network caused congestion across the museum’s business related Wi-Fi.
    - Museum people do not like bad Wi-Fi

- Need something else...
BUT...What about iBeacon???
iBeacon is a proximity-based system that only allows for a very rough estimation of the nearness of a device (specifically far/near/immediate). So it can’t be used to determine absolute position, unlike a wifi trilateration system like Navizon.

Proximity-based wouldn’t necessarily be bad, it’s just a completely different paradigm for the application than what we’re doing now.

However -- it could be used in place of RFID to push notifications from the collection wall docks. If the device detects an “immediate” beacon, you’re docked. And you wouldn’t need to mess around with any peripheral stuff like RFID cards.

Also, iBeacon would work for android too!
OCTOBER 2014......Introducing iBeacon

- iBeacon uses Bluetooth low-energy (BLE) wireless technology
  - Minimal battery drain
- Army of beacons sending out constant signal
- Position calculated by signal strength from beacons
What does an iBeacon look like?
CMA’s implementation of iBeacon

- 250 iBeacon transmitters
- Navizon on the backend for triangulation
- Navizon is a multitool location awareness toolbox (beacons, wifi, compass, gyroscope, etc.)
How are iBeacons installed in the Museum?

iBeacons are easy to discreetly install

Powered through Light Track Fixtures & Gallery Cases

Battery Powered (estimated 1 year)
Where are they?
Where are they?
Once the beacons were installed a training process called “fingerprinting” was conducted throughout the Museum.

Fingerprints contain the signal strength of the iBeacons in various locations throughout the museum.

Fingerprint data is then uploaded to the Navizon ITS server for triangulation.
How are fingerprints collected?

When Navizon arrived onsite they had mapped out routes in advance throughout the Museum to ensure optimal accuracy.
What do the fingerprints look like?

The more fingerprints collected the better the results for the location tracking.
What is involved to integrate Navizon into an App?

- Navizon provides a Software Developer Kit (SDK) for both iOS and Android based mobile devices.

- Using this SDK an App can query the Navizon server for the mobile device’s current location.

- ArtLens matches the Navizon location to the Museum’s floorplan... mostly.
SO.....
Problem Solved?
Well…..Environmental Issues…

- **Building infrastructure impact on accuracy**
  - **Magnetic fields**
    - CMA’s Atrium has TONS of steel… so much steel that the magnetic field in the museum shifts by up to 180 degrees!
      - Unhappy Boy Scouts

- **Open Spaces (such as Atriums and Balconies)**
  - Location information will tend to “bounce” between levels in these areas.
  - Problematic when transitioning between levels using escalators.
Magnetic Fields Man...

We’re off by almost 180 degrees!
Challenges of providing reliable and accurate location information in spaces with no real physical boundaries.
Lessons Learned...

- **Mobile Device Hardware**
  - Orientation of how the device is held
    - Accuracy can be effected by how the device is held.
    - Especially apparent on tablets

- **Bluetooth Chipsets**
  - Must have LTE. This has required us to drop support for several of older model mobile devices (iPad 1 and iPhone 4).

- **Gyroscope/Accelerometer**
  - Used for path smoothing... not always uniform across devices
Lessons Learned...

- **Mobile Operating Systems**
  - Always changing
    - Major mobile OS upgrades/changes have unanticipated impact on ArtLens.

- **Security Permissions**
  - Need permissions for device location information without which the experience is degraded

- iOS more restrictive vs. Android more flexible
Lessons Learned...

- End User Experience
  - Visual cues as to location
    - If location awareness can’t always be perfect what other approaches can we use?
    - Radius of Confidence
      - Start large
        - You are in the Museum
      - And Narrow
        - You are in the armor court...
        - ...Looking at a crossbow
Lessons Learned… Radius of Confidence

Example of how the “Radius of Confidence” as shown at the initial location inquiry on the left and how the radius drastically shrinks after the user takes a few steps.
What’s Next?

- Visual based location tracking?
  - Augmented reality… maybe someday

- Magnetic Field Anomaly location tracking
  - Use the Museum’s (pesky) magnetic fingerprint

- Google Indoor

- Targeted Content
Questions

• How do you approach digital sustainability in your galleries?

• What are your main drivers?

• How do you manage specialized software for interactives?

• What mix of proprietary, open source, and custom?