3D and Spatial Analysis for Smart and Healthy Cities

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Abandon it.

- Frank Lloyd Wright, on being asked how he would go about improving Pittsburgh, Pennsylvania
“Abandon it!”

- Frank Lloyd Wright, on being asked how he would go about improving Pittsburgh
“Most Livable City”

“City of Bridges”

Pittsburgh Today
from Steel Town...
to Innovation Corridor
Herb Simon and Alan Newell “thinking machine” founders of artificial intelligence

1955

nations first Robotics Institute unmanned vehicles to clean up 3 mile island nuclear Island accident

1979

“Wireless Andrew” laid the foundation for Wi-Fi

1994

James Gosling “Father of Java” Java computer programming language

1994

Computer Science, Robotics, Technology
1914

U.S.’s first undergraduate degree in Drama

7 Academy Awards
114 Emmy Awards
41 Tony Awards

1940’s

Andy Warhol
student in the Department of Painting and Design. Pioneer in computer generated art

2005

Carnegie Mellon built the first green dormitory in the U.S.

2005

Collaborative Innovation Center only building in the world where Google, Intel, Apple, Microsoft lab under one roof

Fine Arts, Drama, Sustainability, Industry
RD&D  
Research and Development and Deployment
Traffic research with Pittsburgh as test bed

2009

2014

projects related to
City Operations
Built Infrastructure
Citizen Engagement
Water and Sewer Systems
Environment
Energy

2015

university-city partnerships
34 cities
3 counties
44 universities

Smart Cities Partnerships
What are Smart Cities?

- information and communication technologies
- sensors
- meters
- big data
- analytics
Smart Cities are far greater than an assembly of technologies and data.

- true **mobility**
- net zero **energy**
- clean **air** and **water**
- economic **prosperity**
- **safe** and **healthy** citizens

**Collaboration**  **Engagement**  **Transparency**
EMMISSIONS
20%

IDLE TIME
40%

TRAVEL TIME
25%

Safer, happier, and healthier citizens
Increasing safety & health - reduces energy and cost

SMART STREET LIGHTS
CITYWIDE NETWORK OF AIR EMISSIONS SENSORS

ENERGY USAGE
▼ 60%

TRAVEL TIME
▼ 25%

AIR EMISSIONS
▼ 20%
Smart Energy, Water, Transportation, Air Quality
childhood obesity

Smart green spaces for health and safety

pedestrian accidents
3D Visualization Project

City of Pittsburgh – CMU – Esri – SimCoach Games
Complete Streets

pedestrians, bicyclists, motorists, transit riders...

and autonomous cars!
Pittsburgh topography challenges
Re-Energize Smithfield Street
Smithfield Street Corridor Plan Objective

Site Survey + Systems Analysis

3 Perspectives

Design Principles

1. Walkable.
2. Safe.
4. Want to Return.
5. Create a Place.
6. Recreation.
8. Socially Equitable.

3 VISIONS

Re-Energize Smithfield Street

History + Preservation

Environment

Demographics + Data

Land + Building Uses

Infrastructure

Pedestrian Movement

Vehicular + Mass Transit

Complete Streets Details

Destination Street

Local Street

Connector Street
Building the model – LiDAR data
ArcGIS Pro, Sketch Up, and BIM
City Engine - solar studies
City Engine – complete streets analysis
Unity – Interactive Gaming Tool
Destination Street – 2 way bike and bus lane
Local Street – bus, car, bike lane and more sidewalks
Visualizing and quantifying changes
Citizen Engagement
The Pittsburgh Arena District Master Development Plan

Energy simulation results - Building A1

next steps...

Virtual Reality, Augmented Reality, 3D Scenes, Story Maps