Advancing the Spatially Enabled Smart Campus – 12/11/13
Agenda – Communication and Collaboration

- Introduction to UMASS
- Institutional Collaboration
- Early GIS Efforts
- Campus Master Plan
- Current Infrastructure and Efforts
- Communication & Collaboration
UMASS at a Glance

- 28,236 Students
- 1,217 Full Time Faculty
- 5,000+ Employees
- 12.5+ Million square feet
- 200+ Major Buildings (Main Campus)
- 1,450 Acre Campus
GIS Steering Committee

First Meeting – November 26, 2013

- Vice Chancellor of Facilities and Campus Services
- Director of Administration & Finance Systems
- Director of Office of Information Technology (CIO)
- Director of Campus Planning
- Director of Design and Construction Management
- Director of Physical Plant
- Chief of Police
- Director of Business Continuity and Emergency Management
- Associate Provost
- Dean of the College of Engineering
- Dean of the College of Natural Sciences
- Dean of the College of Social and Behavioral Sciences
Institutional Collaboration

First Flyover 1999

Orthophotography & Basemapping

- Town of Amherst - $525,000
- University of Massachusetts - $85,000
- Amherst College - $21,000
Institutional Collaboration

Second Flyover 2004
Orthophotography Only

- Town of Amherst - $70,000
- University of Massachusetts - $12,000
- Amherst College - $5,000
Institutional Collaboration

Last Flyover 2009

Orthophotography, Basemapping, & LiDAR

- Town of Amherst - $212,000
- University of Massachusetts - $50,000
- Amherst College - $20,000
Rich GIS Environment

GIS Basemapping Update
Flyover April 13, 2009:

- New 0.25’ Digital Orthophotos
- Color Infrared Photography
- LiDAR Data
- Digital Terrain Model
- 1’ Contour Data
- New Planimetric Data (ie. Roads, Hydrology, Building Footprints, Utility Poles, Fences, etc.)
Data InterOperability WorkBench

Support for more than 300 data formats

- Visual programming
- Visual debugging
- Log files

Sources (E)  Transformation (T)  Destinations (L)
Unique Campus Space ID & 3D representation of rooms

Spatial database is a collection of *rooms (spaces)*, which are registered in physical space and have unique “global” campus ID.

Connection to the enterprise DB
Campus Planning

A division of facilities and campus services
Web Based Survey “Likes”

People like good outdoor spaces with nice plantings and views.

People like the views from the campus core.
Web Based Survey
“Dislikes”

People comment on tired old buildings that need to be demolished and replaced.

People don’t like cars where only pedestrians should be and there are complaints about dangerous crosswalks and intersections.
Why is it important?

Having a strategic plan of long-term growth and development is crucial for any successful organization.

The Master Plan outlines major phases of long term development of our Campus, which will sustain and support the University's mission.
East Campus Pond Lawn

SubTitle: Protect and Enhance Open Space
Phase: 2
SiteDesc: The East Campus Pond Lawn is one of the largest and most visible of the Campus green spaces. It is also one of the most historic landscapes on campus, together with the west lawn, remnants of the “Central Park” or “Campus Green” shown in historic plans. The

Tags:
Campus Master Plan Tour
Rising to the Challenge

Tilson Farm as Campus Services Campus Electrical Substation
The “Vision” is to create a fully integrated knowledge and information management system that provides decision support for all of the different divisions that make up the enterprise that is the University of Massachusetts.

- Centralized Data Warehouse
- Workflows and Business Practices
- Easy to Use Web Based Tools
- 3D and Visualization Tools
- Right People, Right Access, Right Tools for Decision Support
Data & Analytical Workflows (WF)
3. Campus as Systems

3.1 Buildings
3.2 Open Space
3.3 Transportation/Transit
3.4 Utilities
3.5 Infrastructure

Educational Process
Research
Outreach
Campus as Systems: Buildings

3.1.1 External Shells
- Collada, Photos, Textures, BIM

3.1.2 Footprints [GIS/CAD]

3.1.3 Internal Spaces
- 3.1.3.1 Space Geometry [CAD]
- 3.1.3.2 Function
- 3.1.3.3 Type
- 3.1.3.4 Owner
- 3.1.3.5 Organizational Use
- 3.1.3.6 Scenarios [Excel]

3.1.4 External equipment (MEP, HVAC)

3.1.5 Internal Equipment

BIM, CAD, NavisWorks

3.1.6 Connections to external systems
- 3.1.6.1 Utilities
- 3.1.6.2 Loading Docs

CAD/GIS

Scheduling R25 HR Personnel
Campus as Systems: Open Space

3.2 Open Space
- 3.2.1 Trees, Brushes and Plants
  - TreeWorks - GIS/ CAD
- 3.2.2 Landscapes
  - CAD / GIS
- 3.2.3 Pictures

Educational Process
Maintenance
Student Life
Events
Public Safety
Campus as Systems: Transportation/

- 3.3.1 Roads
  - 3.3.1.1 Main Roads
  - 3.3.1.2 Secondary Roads
  - 3.3.1.3 Service Roads
- 3.3.2 Parking Lots [GIS/CAD]
- 3.3.3 Sidewalks
  - 3.3.3.1 Pedestrian Traffic
- 3.3.4 Driveways
- 3.3.5 Vehicles/Bikes/Pedestrians
- 3.3.6 Statistics: Traffic Counts, Parking Space Inventory
- 3.3.7 Bus Stops/Schedules

GIS: Condition Index

- Faculty/Staff & Student Parking
- Safety
- Origins/Destinations

EXCEL

GTFS; PVT; GIS
Campus as Systems: Utilities

3.4 Utilities

3.4.1 Steam
3.4.2 Water
3.4.3 Sewer and Drainage
3.4.4 Electrical

CAD, GIS in Dev

Maintenance
Upgrades to support other systems
Campus as Systems: Infrastructure

3.5 Infrastructure

- 3.5.1 Lightpoles
- 3.5.2 Utility poles
- 3.5.3 Street Furniture
- 3.5.4 Signs/Signage
- 3.5.5 Emergency Phones
- 3.5.6 Other

CAD/GIS/Hardcopy Maps

Aesthetics
Public Safety
FME Script Redirects Revit to CAFM Layers
**IFC Elements to GIS GeoDB Approach**

- **Complex elements (doors and windows)**
  - Create a DB of unique objects [ETL]
  - Generate assets (for every door/window type) [ETL]
  - Approximate every door/windows with ORIENTED 3D BOUNDING BOX + reference to assets and all BIM info.

Implemented with two FME workflows (Data Inter-Operability Ext)
ETL: FME: Creating GeoDB of “Simple” objects

ETL: IFC Spaces, StandardWalls, Doors and Windows to GIS Multipatch.
CityEngine: Combining everything together

- Importing from Geodatabase: Slabs, Windows-BB, Doors-BB, Spaces, Walls
- Implementing Procedural Rules (PR) to bring assets into Bounding Boxes
  - AssetNames are attributes of layers
UMASS AMHERST campus planning

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GIS@UMASS

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