University Geographic Information System
Introductions

Michelle Ellington  
GIS Coordinator

Andrew Blues  
Information Technology Manager
Presentation Topics

- University of Kentucky GIS (U-GIS)
- GIS & Facilities Management
- Custom GIS Facility Management System
- System Design
- System Demo
- Key Decisions
- Next Steps
One Map

Current Accurate Campus-wide Information
Why create a U-GIS?

- To provide “one” Facilities map & interior space interface
- To provide a graphical interface to diverse information sets
- To graphically analyze data for better decisions
- To fill the need for accessing data from many different platforms
- To allow users to manipulate & extract consolidated information
- To share information across units eliminating redundancies
Focus Areas for U-GIS

- **Data Collection**: Organize, verify and collect data
- **Consolidation**: Reorganizing resources to support system
- **eFacTS**: Facilities Archives (GIS, CAD, Archives, Utilities, Imagery)
- **eBARS**: Plant Assets (Space, Equipment, & Vehicle Inventory)
- **SAP**: UK’s ERP (including HR, FI, CM, MM, PM, other)
GIS & Facilities Management

- EXAMPLES -
GIS & Facilities Management
GIS & Facilities Management
GIS & Facilities Management
GIS & Facilities Management
UK Chandler Hospital

- 2 Bed Towers
- 16 Floors
- Total 1.2 million square feet
- State-of-the-art Level 1 Trauma Center
- System needed to support occupancy
System Design

- GIS License & Software
- Enterprise Servers
- ERP Naming Standard
- Graphical Interface
- Single Sign-On
- Flexible DB Design
- Service Architecture
- Stored Procedures
Postsecondary Site License

Some of the links on this site may resolve to non-governmental agencies. The information on these pages is not controlled by COT or the Commonwealth of Kentucky.

External links are identified with the following icon:

The Kentucky Division of Geographic Information provides support to the Kentucky Council on Postsecondary Education (CPE) which administers a statewide ESRI site license for institutions of higher education. In exchange for an annual fee to ESRI, colleges and universities have unlimited rights to use the majority of ESRI software products which can be used for research and instruction by faculty, registered students, and administrative staff.

Twelve postsecondary institutions and the Kentucky Virtual High School currently participate in the ESRI site license. In addition to receiving ESRI software, each of these sites also receives hardware keys and key codes which allow the software to be used by authorized users. Software documentation is available online.

ESRI technical support is obtained through the administrators and technical support contacts at each university/college (see Campus Contacts below). Online courses are offered through the ESRI Virtual Campus. ESRI administrators, technical support contacts, and ESRI Virtual Campus representatives are also listed on the Campus Contacts page.
System Design
Enterprise Servers

University of Kentucky
University - Geographic Information System
System Access Diagram

- GIS Desktop Applications
  - Editing
  - Publications
  - Analysis
- Web Mapping
  - Web Mapping Applications
    - Utilities
  - Web Maps
    - http://ULIS/Maps.uky.edu
  - ArcGIS Server
    - ArcGIS Server (9.3, 10.2, & 10.3)
  - Web Server
    - ArcGIS Server
    - ArcGIS Server (9.3, 10.2, & 10.3)
  - GIS Features
    - Tabular Data
    - DEM Files
    - Point Feature-DataSource
- GisFMS
  - Base Module (GIS)
  - PCEP Occupancy Module

Database Server
SQL Server 2005 Database Server
2-Node Windows Cluster

UGIS
Master Viewed GIS Database
(http://ULIS/Maps.uky.edu)

UGIS_ARCH
Master GIS Archive Database
(http://ULIS/Maps.uky.edu)

UKYGIS
UK Enterprise GIS Database
(http://ULIS/Maps.uky.edu)

Database Server
SQL Server 2005 Database Server
2-Node Windows Cluster

GisFMS_GEOD
GisFMS GIS Database
(http://GisFMS/Maps.uky.edu)

GisFMS_DATA
GisFMS Data Database
(http://GisFMS/Maps.uky.edu)

Version 3.0
Nov 1, 2009
System Design
ERP Naming Standard
System Design
Graphical Interface

ArcGIS Viewer for Flex

Overview:
- Ready to deploy GIS Web client mapping application for ArcGIS Server built on the ArcGIS API for Flex.
- Easily configurable to meet custom business needs and requirements - no programming skills required to deploy.
- Viewer functionality is defined by widgets - many core widgets are included.
- New functionality can be created with custom widgets developed using the ArcGIS API for Flex.

The ArcGIS Viewer for Flex is a ready to deploy configurable client application built on the ArcGIS API for Flex. It is a solution for creating customized GIS enabled Web mapping applications, without requiring programming. It is designed to work with ArcGIS Server and ArcGIS Online Web services. It supports the new capabilities offered at ArcGIS Server 10.2 (e.g., Web editing, support for time aware data) and is built with the latest Adobe Flash Builder 4 best practices and technology.

With the ArcGIS Viewer for Flex, users can quickly create and deploy a custom GIS Web mapping application that supports: data display, interactive querying, Web editing, data extraction, geocoding, and printing. Functionality in the viewer is based on an extensible widget programming model. Widgets are portable code blocks that provide functionality in the viewer in a modular fashion; they can be easily added to or removed from the viewer as needed. Many widgets are included with ArcGIS Viewer for Flex. New widgets (and therefore, new custom functionality) can be developed using the ArcGIS API for Flex.

After downloading the Viewer application and placing its component files into the appropriate location (see Getting Started with the ArcGIS Viewer for Flex help topic), the viewer can be used immediately. It enables users to easily set-up, configure, and deploy a Web client mapping application that works with their own ArcGIS Server Web services and data content from ArcGIS Online. It is designed with the "non-developer" in mind; in other words, no programming skills are required to set-up and build a Web client application. The viewer application is conceptually like a site starter template; users edit XML configuration files to customize the appearance, functionality, and data contents of the viewer.

The ArcGIS Viewer for Flex also enables users with developer skills to extend the core Viewer functionality by creating new widgets via development with the ArcGIS API for Flex. Organizations and Web application designers are able to quickly and easily deploy custom business solution applications.
System Design
Single Sign-On

The University of Kentucky Information Technology created the term "link blue" to define a directory account (user ID and password) which can be used when connecting to many campus-wide systems.

Anywhere you see the link blue phrase or logo you can login with the same user ID and password, just as you know anywhere you see a VISA® or MasterCard® logo you know those cards are accepted.

Your link blue account is created within a business day of when, as a student you are accepted, or as an employee you are entered into payroll. For further information regarding link blue accounts, visit the Account Services Site.

Before you can use your account to login to any services, your account must be activated. New students and employees can read detailed instructions on activating your link blue account on the Activating Your Account wiki page.
System Design
Flexible DB Design
System Design
Flexible DB Design
A stored procedure is a subroutine available to applications accessing a relational database system. Stored procedures (sometimes called a proc, sproc, StoPro, StoredProc, or SP) are actually stored in the database data dictionary.

Typical uses for stored procedures include data validation (integrated into the database) or access control mechanisms. Furthermore, stored procedures are used to consolidate and centralize logic that was originally implemented in applications. Extensive or complex processing that requires the execution of several SQL statements is moved into stored procedures, and all applications call the procedures. One can use nested stored procedures, by executing one stored procedure from within another.
## System Design

### Stored Procedures

<table>
<thead>
<tr>
<th>Table Name</th>
<th>Stored Procedure Name</th>
<th>Total Procedures</th>
<th>Select Procedures</th>
<th>AD Roles (Checkmark = Execute Permission)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FMS_BldgNameHist</td>
<td>No</td>
<td>N/A</td>
<td>64</td>
<td></td>
</tr>
<tr>
<td>FMS_CampusCode</td>
<td>No</td>
<td>pFMS_CampusCode_SEL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FMS_Department</td>
<td>No</td>
<td>pFMS_Department_SEL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FMS_DepartmentSecurity</td>
<td>No</td>
<td>pFMS_DepartmentSecurity_SEL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FMS_FunctionalArea</td>
<td>No</td>
<td>pFMS_FunctionalArea_SEL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FMS_FunctionalName</td>
<td>No</td>
<td>pFMS_FunctionalName_SEL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FMS_HyperLinks</td>
<td>No</td>
<td>pFMS_HyperLinks_SEL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FMS_LastLogin</td>
<td>No</td>
<td>N/A</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>FMS_RoomPressureType</td>
<td>No</td>
<td>pFMS_RoomPressureType_SEL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FMS_RoomUsage</td>
<td>No</td>
<td>pFMS_RoomUsage_SEL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FMS_RoomUse</td>
<td>No</td>
<td>pFMS_RoomUse_SEL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FMS_SubFunctionalName</td>
<td>No</td>
<td>pFMS_SubFunctionalName_SEL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Occ_Accessories</td>
<td>Yes</td>
<td>pOcc_Accessories_SEL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Occ_AccessoriesCode</td>
<td>No</td>
<td>pOcc_AccessoriesCode_SEL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RoomPressureType</td>
<td>No</td>
<td>pRoomPressureType_SEL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RoomUsage</td>
<td>No</td>
<td>pRoomUsage_SEL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RoomUse</td>
<td>No</td>
<td>pRoomUse_SEL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SubFunctionalName</td>
<td>No</td>
<td>pSubFunctionalName_SEL</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## System Design

### Stored Procedures

<table>
<thead>
<tr>
<th>Table Name</th>
<th>Includes Additional Departmental Security</th>
<th>Stored Procedure Name</th>
<th>AD Roles (Checkmark = Execute Permission)</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>FMS_BuildingNameHist</td>
<td>No</td>
<td>No Insert Procedures</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FMS_CampusCode</td>
<td>No</td>
<td>pFMS_CampusCode_Ins</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>FMS_Department</td>
<td>No</td>
<td>pFMS_Department_Ins</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>FMS_DepartmentalSecurity</td>
<td>No</td>
<td>pFMS_DepartmentalSecurity_Ins</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>FMS_FunctionalArea</td>
<td>No</td>
<td>pFMS_FunctionalArea_Ins</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>FMS_FunctionalName</td>
<td>No</td>
<td>pFMS_FunctionalName_Ins</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>FMS_HyperLinks</td>
<td>No</td>
<td>pFMS_HyperLinks_Ins</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>FMS_LastLogin</td>
<td>No</td>
<td>N/A</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>FMS_RoomPressureType</td>
<td>No</td>
<td>pFMS_RoomPressureType_Ins</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>FMS_RoomUsage</td>
<td>No</td>
<td>pFMS_RoomUsage_Ins</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>FMS_RoomUse</td>
<td>No</td>
<td>pFMS_RoomUse_Ins</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>FMS_SubFunctionalName</td>
<td>No</td>
<td>pFMS_SubFunctionalName_Ins</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Occ_Asset</td>
<td>Yes</td>
<td>pOcc_Asset_Ins</td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>

**Total Procedures**: 36

**Insert Procedures**: 36

**AD Roles**:
- Checkmark = Execute Permission

**Count**:
- 0
- 1
## System Design

### Stored Procedures

<table>
<thead>
<tr>
<th>Table Name</th>
<th>Includes Additional Departmental Security</th>
<th>Stored Procedure Name</th>
<th>gFanMgmt_GISFMS_Archive</th>
<th>gFanMgmt_GISFMS_Asset_Viewer</th>
<th>gFanMgmt_GISFMS_Equipment_Editor</th>
<th>gFanMgmt_GISFMS_OpenClosedStatus_Editor</th>
<th>Total Procedures</th>
<th>Update Procedures</th>
</tr>
</thead>
<tbody>
<tr>
<td>FMS_BldgNameList</td>
<td>No</td>
<td>N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>41</td>
<td>0</td>
</tr>
<tr>
<td>FMS_CampusCode</td>
<td>No</td>
<td>pFMS_CampusCode_Upd</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>FMS_Department</td>
<td>No</td>
<td>pFMS_Department_Upd</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>FMS_DepartmentalSecurity</td>
<td>No</td>
<td>pFMS_DepartmentalSecurity_Upd</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>FMS_FunctionalArea</td>
<td>No</td>
<td>pFMS_FunctionalArea_Upd</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>FMS_FunctionalName</td>
<td>No</td>
<td>pFMS_FunctionalName_Upd</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>FMS_HyperLinks</td>
<td>No</td>
<td>pFMS_HyperLinks_Upd</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>FMS_LastLogin</td>
<td>No</td>
<td>N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>FMS_RoomPressureType</td>
<td>No</td>
<td>pFMS_RoomPressureType_Upd</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>FMS_RoomUsage</td>
<td>No</td>
<td>pFMS_RoomUsage_Upd</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>FMS_RoomUse</td>
<td>No</td>
<td>pFMS_RoomUse_Upd</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>FMS_SubFunctionalName</td>
<td>No</td>
<td>pFMS_SubFunctionalName_Upd</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>
## System Design

### Stored Procedures

<table>
<thead>
<tr>
<th>Table Name</th>
<th>Includes Additional Department Security</th>
<th>Stored Procedure Name</th>
<th>Delete Procedures</th>
<th>AD Roles (Checkmark = Execute Permission)</th>
<th>Total Procedures</th>
<th>Adult Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>FMS_BldgNameHist</td>
<td>No</td>
<td>N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FMS_CampusCode</td>
<td>No</td>
<td>pFMS_CampusCode_Del</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FMS_Department</td>
<td>No</td>
<td>pFMS_Department_Del</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FMS_DepartmentalSecurity</td>
<td>No</td>
<td>pFMS_DepartmentalSecurity_Del</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FMS_FunctionalArea</td>
<td>No</td>
<td>pFMS_FunctionalArea_Del</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FMS_FunctionalName</td>
<td>No</td>
<td>pFMS_FunctionalName_Del</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FMS_HyperLinks</td>
<td>No</td>
<td>pFMS_HyperLinks_Del</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FMS_LastLogin</td>
<td>No</td>
<td>N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FMS_RoomPressureType</td>
<td>No</td>
<td>pFMS_RoomPressureType_Del</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FMS_RoomUsage</td>
<td>No</td>
<td>pFMS_RoomUsage_Del</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FMS_RoomUse</td>
<td>No</td>
<td>pFMS_RoomUse_Del</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FMS_SubFunctionalName</td>
<td>No</td>
<td>pFMS_SubFunctionalName_Del</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Occ_Accessories</td>
<td>Yes</td>
<td>Occ_Accessories_Del</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Occ_AccessoriesCode</td>
<td>Yes</td>
<td>Occ_AccessoriesCode_Del</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note: The table includes a column for Delete Procedures with checkmarks indicating which AD roles have execute permission.*
- SYSTEM DEMO -
Key Decisions

- Finding a contractor w/ expertise & flexibility (39 Degrees North)
- Choosing Flex for the user interface
- Integrating UK’s existing CAD floorplan library
- Editing tabular data within the same site
- Integrating UK’s existing single sign-on IDs & security
- Implementing role & departmental system permissions
- Designing database in-house with stored procedures
Next Steps...

- **Support next phases of Hospital occupancy** - Ground floor
  Emergency Department completed Spring 2010, Public Space on Ground and First floors & 6th & 7th floors completed Spring 2011, future occupancy scheduled for Fall/Winter 2011/2012

- **Begin scoping efforts for Facility Management Module** - Integrate other UK systems (SAP, eBARS, Space Inventory), incorporate construction pictures, documents, and Facilities-wide archive documents

- **Pursue leveraging and integrating other technologies** - Mobile devices, RFID, BIM, wayfinding, video, ...
Questions & Comments

Michelle Ellington
GIS Coordinator
michelle.ellington@uky.edu
859-257-3703

Andrew Blues
Information Technology Manager
andrew.blues@uky.edu
859-257-4292