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Smart Campus – My Experiences and Perspective

Submitted by: Zhaohui Jennifer Fu, Head of GIS Center, Florida International University

As a founding director of FIU's GIS center, I applied the geo-spatial web to provide solutions to local communities. This is reflected in a number of urban, transportation planning as well as campus wide projects including the most recent "Mapping FIU's Faculty Residence" (see also: <http://maps.fiu.edu/fiufacultyresidence/>), a library Digital Signage, which includes an in-door navigation map and directory on touch screens, and a Library Resources Locator, which guide students to books, journals, and other resources in the library. I am the Principal Investigator (PI) of "Transportation Outreach Planner" (see also: <http://mpotransportationoutreachplanner.org/>), PI of a bicycle trip planning project (BiKE) (see also: <http://maps.fiu.edu/mpobike/>) and PI of a Walk to School Safe Route Planner (See also: <http://maps.fiu.edu/srts/>). We also developed mobile application for the BiKE project (<http://digir.fiu.edu/mpobike/Broward.html>). All of these projects were funded by perspective Metropolitan Planning Organizations (MPOs) of Palm Beach, Broward and Miami Dade Counties. These projects gave me insights of what some of the most urgent campus and community needs are and how geo-spatial web technology can provide solutions.

From my perspective, a smart campus is one that is efficient, intelligent, and environmentally sustainable. If geo-spatial solutions can be integrated with various campus information systems including student information, course catalog, course materials and syllabi, faculty research and publications, and library catalogs and research databases (e-books, and journals), it would greatly enhance its usability. The biggest challenge lies in the history of various existing information systems, which are not necessarily interoperable with each other. Integrating them in a single or a series of smart campus databases could be a very difficult task if not impossible. The solutions might lay in APIs and web services that can be published, or central indexed for retrieval.

Moving students around with efficiency and guiding them to locate campus resources can save both energy and students' time of navigation to campus and on campus. The following are low hanging fruits where geo-spatial solutions can play key roles and be integrated later to the Smart Campus solutions.

- 1) A Multi-Modal Route Planner (to Campus and on Campus): The route planner is most useful if multiple travel modes are included: Transit+Bike; Transit+Walk; Bike+Walk; Bike Only. Google Route planner already includes Transit +Walk. However, on-campus navigation or route planner, along with integration of cycling are missing;
- 2) Resource Locator and Navigator (all campus buildings, classrooms, library resources, and so on): Students needs to find where they can park their bikes, where they can find a vacant computer station or a study space, and where the classrooms are (typically at beginning of the semester). Most of the space and resource related information exist in

either CAD files or facilities databases of the campus facilities management department. However, few campuses automated the facilities maps for public consumption.

- 3) Volunteered Geographic Information (VGI) and Other Crowd-sourcing tools can be best applied in areas of reporting infrastructural problems such as a road/path is flooded, campus security related issues, usability studies, and evaluations of Smart Campus applications;
- 4) Car-sharing programs for commuting students: This is relatively easy to implement, as we only need addresses from students (privacy is a concern, and should be carefully implemented) and social networking tools. There are several vendor products and state or local government web services that serve this purpose.
- 5) Using GIS to map out student and faculty residence clusters: Such mapping efforts can assist the administrators to make better decisions on where to place shuttle bus routes and stations.

A large aspect of Smart Campus solutions requires an intelligent academic information system. The emphasis is on the word "Intelligent." It shouldn't be only limited to browse, search, or discovery functions with query expansions. This system should be able to "know" who the client is and make intelligent recommendations accordingly. For instance, after basic demographic and academic interest and progress data is collected on a student, (s)he could enter the student ID, such a system should be able to recommend options of study area, relevant courses and professors, supporting services, technological and literary trainings and tutoring, and library research materials, etc., which cover all aspects of a student's academic life. This intelligent information system combined with spatial visualization tools, can then pin-point where some of these services and resources are available and route them there on a mobile device. Similar to what amazon.com presents to shoppers, this system should provide an exhaustive searchable listing of academic curriculum, services, technology, supporting structure, and with "map it" and "router planner" options.