Academic Quality Improvement Program (AQIP)

Comprehensive University Space Inventory Process

Action Project, Final Report

May 12, 2008

Michigan Technological University
Houghton, MI 49931

Walter Milligan, Office of Information Technology, Chair
David Chard, Educational Technology Services
Kelly Dube, Accounting Services
Richard Elenich, Institutional Analysis
Brenda Helminen, Telecommunications Engineering
Michael Hendricks, Accounting Services
Patricia Muller, Facilities Management
Kathleen Pintar, Office of Student Records and Registration

Executive Summary

The ability to maintain and easily obtain accurate data on space is critical to the mission of the University. For example, since Michigan Tech conducts federally-funded research, the indirect cost recovery rate (overhead) must be based on the fractions of office space and laboratory space that are dedicated to research. This requires integrated, dynamic data on space, research awards and expenditures, laboratory activities, and personnel. Accurate space data is also required for public safety, classroom scheduling, facilities and maintenance, energy conservation, computer networking and telephony, and many other applications.

This topic was selected as an AQIP Action Project because the critical space data was in a state of chaos. Major issues identified by the AQIP Committee included the following:

- There are at least 12 major space databases or data repositories on campus.

  o The data in the different databases is not consistent.
  o In many cases, the data is not consistent with physical reality.
  o It is not always clear which database is authoritative. When one database is updated, others do not usually receive the updated data.
  o The databases are not user-friendly. Accurate data is hard to obtain, and data entry from data custodians in the different areas of campus is awkward, inconvenient, and often inaccurate. In most cases, data entry occurs via data custodians e-mailing information to Accounting and having a data entry clerk type in the data.

- Engineering drawings have not always been updated as buildings are modified. There are two major sets of drawings (Facilities and Telcom) that are not well coordinated. There is not a data custodian in Facilities to maintain the drawings.

Based on the studies and recommendations of the AQIP Committee, three significant improvements have been made *without additional University resources:*

- A custom-written, web-based tool was developed that allows data custodians and Accounting personnel to access, update, and easily maintain most of the key space data in an authoritative database.

- Facilities re-assigned one of their engineers so that her primary responsibility is to upgrade, maintain, and distribute engineering drawings and other space data.

- Procedures have been developed to coordinate and dynamically update data in different databases for consistency, and to identify errors and inconsistencies in data.

These three outcomes have vastly improved the situation. Several other improvements are in progress and will be completed shortly.

Two major recommendations for further progress are included in this report. First, a Space Database Committee should be established to facilitate progress and communication. Second, a detailed list of recommended actions for the new Committee is proposed. Adoption of these

recommendations will result in improved accuracy and efficiency of University operations, and will help to ensure that the University remains in compliance with federal and state requirements.

Starting Point – Space Data, January 2007

The AQIP Action Project Committee first met on January 23, 2007. The first task was to assess the situation and identify critical issues that needed to be rectified. It became clear immediately that a major issue was the number of databases existing on campus and the lack of integration and coordination between the databases. Table I summarizes the major databases in existence that contain space data or rely on space data.

Table I – Known databases regarding space (as of January 23, 2007)

#	*Name*	*Description*
1	FZAROOM	Database view for Banner tables. Used by Accounting, Telcom, Institutional Analysis
2	FTMLOCN	Banner fixed-assets database. Does not necessarily match with room numbers in Banner student module. Used by Accounting.
3	SLARDEF	Banner student module used by Office of Student Records and Registration.
4	Facilities CAD drawings	Updates have been inconsistent.
5	Telcom CAD drawings	Updates have been inconsistent.
6	Telephone directory	Paper telephone directory
7	Electronic phone database	Based on IT user database (LDAP), derived from HR data.
8	Telcom database	Running on Oracle ***but not in Banner***. 911, network jacks, telephone locations, etc.
9	University Space Committee	Paper in filing cabinets, minutes, e-mail records, oral commitments, etc.
10	HR – Effort reporting	Banner - % funded research for a faculty or staff member's time, for example
11	KITS Techfinder	Separate database used by Research Services, Corporate Services, etc. Used to track research proposals, intellectual property, and to market/price shared user research facilities.
12	Energy Management	Paper in file cabinets; electronic control system for heating and cooling, fans, vents, etc.

It should be noted that, in addition to FAZROOM, SLARDEF and FTMLOCN, there are other Banner/Oracle database views and Oracle Reports that may be used to obtain space data.

In addition to the issue of having independent databases or database reports for the same data, the Committee found that the different databases have different naming conventions for the exact same rooms and buildings. Further, space is dynamic. As an example, an academic department may take a laboratory space of 2,000 square feet and build some interior walls to subdivide that space into 3 separate physical rooms. So, for example, Room 110 (2,000 square feet) may become Rooms 110 (1,000 square feet), Room 110A (500 square feet) and Room 110B (500 square feet.) The Facilities engineering drawings and Banner databases are rarely updated when this happens. If there are network connections or telephone jacks, the Telcom database is usually updated because Telcom needs to keep track of their connections.

Major issues that have nothing to do with databases include communication, organizational structure, and data stewardship. The Committee identified many other issues that will not be discussed here in the interest of brevity. Some of the issues have been rectified, and others are addressed in the recommendations at the end of this report.

Outcome 1 – Development of a "Space Software Tool"

Many of the issues identified above could be rectified by developing or buying a software product having the following attributes:

- User-friendly and web-based.

- Ability for data custodians both to access their data and to easily update it as needed.

- Ability to integrate data based on space, room occupants, efforts of occupants (e.g. fraction of time spent on research vs. teaching,) research sponsors and expenditures of room occupants, etc.

- Ability to run error reports that discover inconsistencies and exceptions in space data coming from various sources, and that facilitate correcting the inconsistencies.

- Ability for administrators to interrogate the system concerning space utilization (e.g. research expenditures per square foot by department.)

- Ability to integrate with equipment inventory database, for example, to see what equipment is in which labs.

- Ability for Accounting Services to utilize the space data for auditing and executive management for planning purposes.

Clearly, this software product would need to integrate seamlessly with Banner. A cursory review of available products quickly revealed that there was no commercially-available product that would be of use in this task.

AQIP Committee Member Mike Hendricks began to work with Chuck Schaefer, who is a programmer in the Administrative Information Services (AIS) group of the Office of Information Technology. Based on the needs identified by the AQIP committee and Chuck's talent for

custom programming, a home-written tool has been developed (and is in continuing development), and this tool is solving some of the most important problems identified above.

The tool has been dubbed "ASPIRE", which is an acronym for Accounting for Space, People, Indexes, Research and Equipment. A screen capture of the main menu, which gives a feel for the capability of the tool, is shown below,
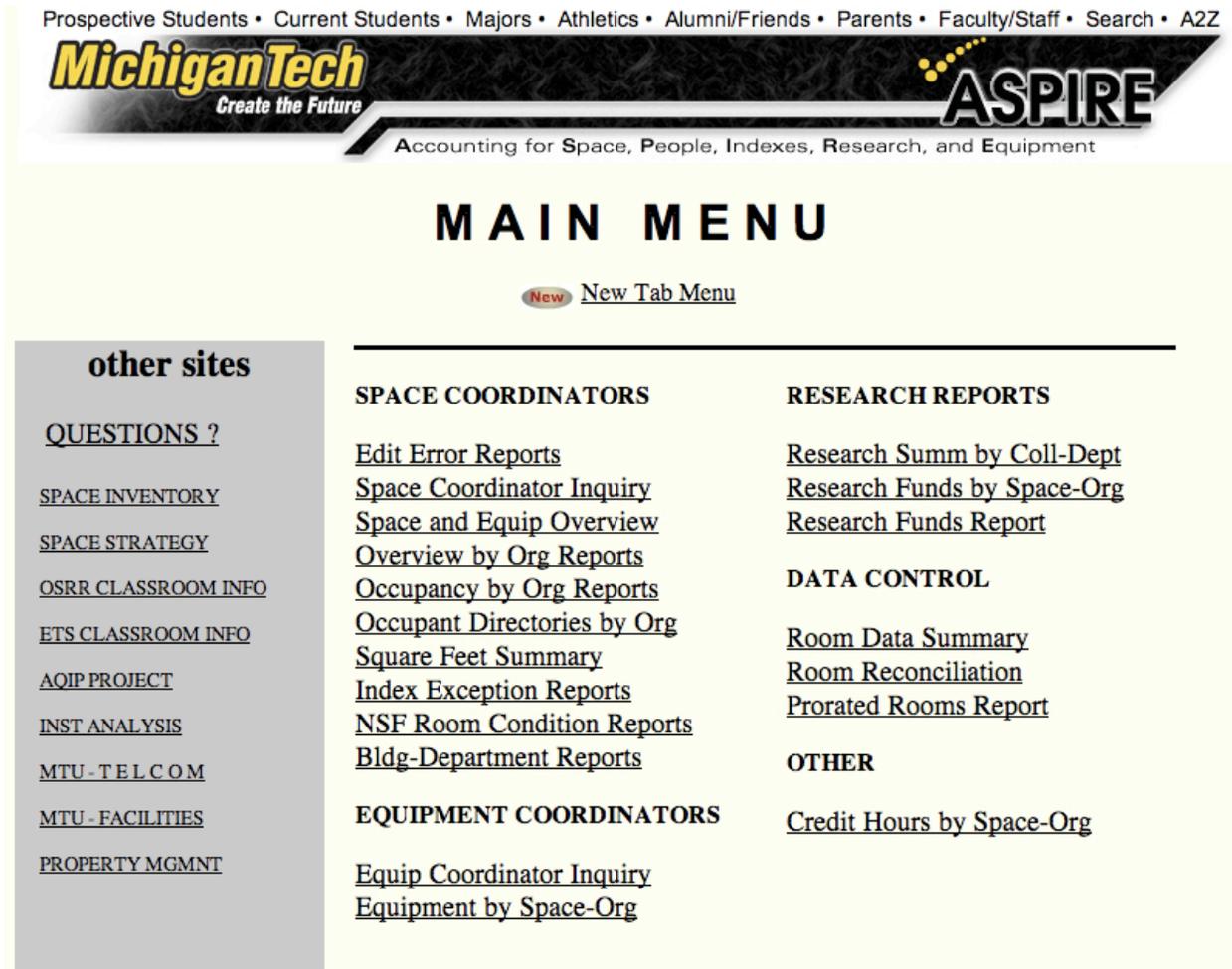
A full description of the utility and power of this tool is far beyond the scope of this report. In a nutshell, it is a simple, web-based interface that allows users not only to interrogate and analyze the space data, but also to easily update it. The tool uses only the authoritative databases and links to engineering drawings and floor maps. It accomplishes every goal listed on the previous page and more. A few simple examples are given below.

A departmental Space Coordinator may click on the "Overview by Org Reports" link above, and run a query displaying all the rooms in a particular department. It can be displayed in graphical format and can link to a map. The Coordinator may click on a room number, and view the existing data concerning occupants, square footage, room usage (including fractions devoted to

teaching, research, administration, etc.), and accounting indexes supporting the occupants. Any of the data that the Coordinators are authorized to change may be easily changed in the web-based interface. So, for example, if a professor receives a new research grant and hires a new graduate student who is put in an existing office, the space coordinator can delete the old occupant, add the new occupant and the new account number, and change the fraction of usage for the office to reflect an increase in research activity.

An administrator may run a query to determine how many assignable square feet exist in an academic department, and the space may be classified as research, instruction, etc. Then the administrator can determine efficiency ratings such as research expenditures per square foot or student credit hours per square foot. These types of queries are valuable for strategic planning and space allocation decisions.

The tool also allows users to check different data sources for consistency, and generate exception and error reports that require personal attention.

The development of this tool has been a huge leap forward in the space data realm.

Outcome 2 – Space Coordinator Position in Facilities Management

The AQIP committee concluded that a key weakness existed in Facilities Management, which is the group that maintains the engineering drawings and floor plans, among other key assets. No one was assigned to maintaining the data. For example, if a building is modified or remodeled, the CAD drawings are not always updated. Further, many of the older buildings on campus had drawings in a very old version of the CAD software that are very difficult to maintain and that have incomplete data. Finally, many buildings, particularly those off the central campus, have no drawings at all.

In addition to these shortcomings, no one in Facilities Management had the primary responsibility of communicating with the rest of campus regarding space data issues.

Based on the findings of this AQIP Committee, Facilities conducted a reorganization. One of the Facilities Engineers (Pat Muller) now has a primary responsibility of maintaining and updating the Engineering drawings and space data. She is also responsible for communicating with other campus personnel regarding space and drawings issues. This change in responsibilities will go a long way towards improving the integrity of the space databases.

Outcome 3 – Database Coordination and Validation Procedures

In cases where important space data resides in different locations, developing "cross-walk" tables can better coordinate the data. For example, a common column can be added two different database tables. When one of the tables is updated, this common column and cross-walk table facilitate updating the second table. Exception reports can also be generated that alert people to inconsistent or incomplete data. Cross-walk tables and exception reports have been developed,

and continue to be developed and refined in response to the AQIP Committee's work and recommendations.

Work in Progress

The following enhancements are currently in progress and will be completed shortly.

1. **Online training resources**

    Comments: We substituted large group training sessions for all space coordinators with one-on-one training sessions with individual academic departments. The results have been very satisfactory. We would now like to prepare online training that could be used as a resource for the academic departments, as well as the actual training for the administrative and auxiliary departments.

    Departments involved: AIS, Accounting Services, Institutional Analysis, Telcom, ETS

2. **New Exceptions Reports**

    Comments: The space and equipment inventory process is a learning process for everyone. The more that we (in central administration) work with the survey results, the more relationships we see between the different data elements. The more we see, the more "genius checks" we can build into the system.

    Departments involved: AIS, Accounting Services, Surveyed departments

3. **Updates and enhancements to ASPIRE based on user feedback**

    Comments: As departments are surveyed, their comments and recommendations are duly noted. Their insights and suggestions have been greatly appreciated and changes have already been incorporated into ASPIRE.

    Departments involved: AIS, Accounting Services, Surveyed departments

4. **Linking ImageNow scanned documents to ASPIRE**

    Comments: The first application to link will be photographs of our equipment inventory. We already have a test department and test equipment: MTRI. Later this summer, we intend to have Accounting Services' student summer employees take more digital photos of equipment. Other scanned document types will be added as we proceed with ASPIRE and ImageNow.

    Departments involved: AIS, Accounting Services

5. **Updates, corrections, and consistency checks between Facilities CAD drawings and Banner**

    Comments: Facilities Management is now going over every building floor plan and comparing that data to the Banner data. Corrections are being made and consistency is being ensured. They are also calculating Gross Square Feet from building floor plans.

    Departments involved: Facilities Management, Accounting Services

Recommendations

The following recommendations will require actions beyond those currently planned or in progress, and will add significant value to the University.

1. **Establish a Space Database Committee that meets quarterly to communicate, coordinate upgrades, and track progress**

   Comment: The AQIP Committee succeeded in identifying the issues and launching some improvements. To keep this project on track and to foster collaboration and communication, a group of interested parties at the operational level is needed. This committee will not duplicate the functions of the University Space Committee. In fact, it can be used by the University Space Committee as a resource for decision-making.

   Departments involved: AIS, Accounting Services, Facilities, Telcom, Institutional Analysis

2. **The Space Database Committee should consider the following actions:**

   a. **Complete the Facilities CAD drawings of all buildings**

      Comment: Most of the missing buildings are not on the central campus, for example, in Daniell Heights and the Ford Forestry Center.

      Departments involved: Facilities, Telcom

   b. **Compare the ASPIRE net assignable square feet (nasf) to the Facilities CAD drawings net assignable square feet. Recalculate net assignable square feet as necessary**

      Comment: Accounting Services has an exceptions list that could be used for this confirmation process.

      Departments involved: Facilities, AIS, Accounting Services

   c. **Create a numbering scheme for hallways, bathrooms, and common areas**

      Comment: Accounting only has net assignable square feet. We should have gross square feet for our insurance information as well as various surveys. Gross square feet may be calculated from CAD drawing floor plans, but a more complete description of the unassigned areas would be useful. This would allow credibility checks on building floor-to-floor square feet comparisons. For example, if the rule of thumb is that approximately 60% of total square feet is usable and 40% is common area, then we should be able to see that from our space data. Presently, only the mechanical, electrical, and telcom rooms are considered common or excludable space, so we have nothing to compare to the 'rule of thumb.'

      Departments involved: Facilities, Telcom, AIS, Accounting Services

d. Resolve inconsistencies in the building numbering schemes

Comment: We need to resolve the use of a third digit for numbering buildings re: equipment locations. Secondly, we need to resolve a numbering scheme for the Ford Forestry Center and Daniell Heights. Both have only one building number even though they consist of multiple buildings. Finally, we need a consistent numbering scheme for buildings used but not owned by the University. Telcom has its own numbering scheme, which does not match ASPIRE.

Departments involved: Facilities, Telcom, AIS, Plant Fund accounting

e. Improve the University's telephone directory data and associated processes.

Comment: Currently, we are updating the ASPIRE system as room occupant changes occur. The Campus Directory is only printed once a year. The electronic directory is updated when individuals send change information to HR. Telecommunications Services is the authority on what phone number is located at what location. Telcom also maintains the data in the campus 'Speak@Ease' system. These systems should have the same information, and currently none of them are integrated or checked against each other. On a separate issue, but we need to integrate ASPIRE with the proposed campus notification system.

Departments involved: HR, AIS, Telcom, Marketing and Communications

f. Tie the University's Effort Reporting System to ASPIRE

Comment: Currently we are collecting payroll distribution % by room occupants and using this information for the functional room utilization % that is used in the A-21 overhead study. We need to be able to drill down from the ASPIRE occupant's payroll distribution to the Effort Reporting System.

Departments involved: HR, Research and Sponsored Programs (RSP), AIS

g. Complete the Metrics section of ASPIRE

Comment: The University Space Committee is looking at space allotment based on the needs and justification for space. Although we have completed the first draft of the research $/Organized Research nasf and student credit hours/Instructional nasf, we have not met to confirm that this is exactly what the University Space Committee needs or wants.

We also need to address the assignment of room conditions. Although we have completed our first survey of the Research room conditions per the NSF survey, executive management has not approved the "OR" room condition assignment. Likewise, we need to assign room conditions for classrooms and learning centers. See also AQIP Learning Space Enhancement Action Project.

Departments involved: University Space Committee, RSP, Provost, AIS, Accounting Services, Research Accounting

h. Create a new section of ASPIRE called Risk/Value Assessment

Comment: We need to create the central University repository of historical cost of building and contents, as well as valuations used for insurance coverage, and other surveys. This central repository would be the source used for all future requests and we would eliminate using other legacy databases. The recent Hazard Mitigation Report exposed what happens when you continue to inflate legacy system values over time without ever reviewing them.

Departments involved: Facilities, Risk Management, AIS, Accounting Services

i. Develop a long term plan for using the already available features of ASPIRE

    a. ASPIRE integrated with KITS Techfinder?

    b. ASPIRE used for room scheduling?

    c. ASPIRE used for Facilities' maintenance programs?

    d. ASPIRE used by Public Safety for key program, etc?

    e. ASPIRE used by OSHS for identifying the 4 levels of hazardous wastes that are in rooms

    f. ASPIRE reconciled to SLARDEF, the Banner Student space and room module?

j. Review the system's current codes, attributes, etc for instructional facilities to insure that they meet all needs.

Comment: Many surveys and assessments that campus responds to each year request information about technology or attributes of classrooms and labs. This data is still somewhat difficult to get out of ASPIRE. This area should be reviewed to see if any improvements could be made.

Departments involved: Institutional Analysis, Telcom, OSRR, AIS

k. Review functionality for supporting time-based differences in use.

Comment: Currently, in ASPIRE, time-based differences in use are translated to subdividing the square footage of the room into different use codes. This is most common in rooms that are used as classrooms during the day and as labs in the evenings. It should be evaluated whether more accurate time vs. sq. ft features should be incorporated into ASPIRE.

Departments involved: Institutional Analysis, OSRR, AIS, Telcom

l. Consider assigning a unique database indicator to each room on campus.

Comment: A unique number, referred to as the PIDM, identifies people in our database systems. If they change names, roles, titles, addresses, or anything else, the PIDM remains constant. Each building also presently has a PIDM. It could be very useful to do the same thing for rooms.

Departments involved: AIS, Telcom

Conclusions

It is critical that the University maintains and continuously updates accurate data on space. The space data is integrally related to personnel, equipment, instruction, research, infrastructure, heat/power, and indirect costs. It is also critical that this data be easily available and updatable in a user-friendly fashion.

This AQIP project succeeded in several ways:

- The chaotic nature of the space data situation was clearly documented.

- The chaos was significantly reduced within the last year by implementing several key recommendations of the Committee.

- Adoption and implementation of the recommendations in this report will result in increased efficiency, and will help ensure that the University in compliance with federal and state regulations.