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Postsecondary Education Facilities Inventory and Classification Manual (FICM): 2006 Edition

May 2006

National Working Group on
Postsecondary Facilities
Kreon L. Cyros
Chair

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Project Officer
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Foreword

The National Center for Education Statistics (NCES) is pleased to publish an updated edition of the Postsecondary Education Facilities Inventory and Classification Manual (FICM). The FICM was first published in 1973 and was last revised in 1994. In the years between the publication of the 1994 FICM and the present time, postsecondary education has changed substantially in terms of the students it serves, the technologies that are available to it, and the innovations institutions have begun to embrace. All of these changes underscored the importance of examining the 1994 FICM to determine what modifications, updates, and additions might be needed to provide a better, more useful industry-wide standard for facilities management and administration.

To provide community input into the 2006 revision of the FICM, NCES, with the assistance of Kreon Cyros of INSITE and Lander Medlin of the Association for Higher Education Facilities Officers, assembled a working group of facilities experts who represented various types of postsecondary institutions, postsecondary associations, state agencies, federal agencies, and private sector companies specializing in postsecondary institution facilities. This group guided the entire process of updating the FICM.

This edition of the FICM differs from the previous editions more in its intent and organization than in its content. It is designed to be useful to both specialized staff and generalists and to be applicable to institutions with sophisticated information needs as well as to those with more basic facilities information needs. It reflects the perspective that along with human resources and financial assets, space is one of the primary resources of an educational institution. In fact, for some institutions, the dollar value (initial cost, replacement cost, and market value) of the institution's buildings frequently exceeds the institution's annual operating budget and endowment.

The FICM is a tool that can help institutions initiate, conduct, report, and maintain an institutional space inventory that can provide answers to such basic questions as how much space is available, what kind of space is it, to whom is it assigned, and how efficiently is it being used and maintained. This information permits institutions to assess the adequacy of their current space and allows them to begin planning for future space needs.

NCES has a continuing commitment to the education community to provide technical assistance and support that will facilitate the collection, reporting, and use of high quality education data. This third edition of the FICM is just one example of that commitment. The two previous editions of the FICM became standards for collecting and reporting data on postsecondary institution facilities. We are confident that this edition will have the same value and utility as its predecessors.

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Acknowledgments

This project reflects the voluntary cooperation and genuine collaboration among many individuals and organizations.

First, every member of the National Working Group on Postsecondary Facilities for this edition of the FICM deserves an enormous thank-you. Their contributions and dedication made this project possible. At the outset, the group was given the choice of hiring a single consultant to do the revisions or undertaking the task themselves. The group chose the latter. Each member of the Working Group made unique and important original contributions to this edition of the manual and reviewed every revision that was suggested.

Special acknowledgment and thanks must also be given to Kreon L. Cyros, who chaired the Working Group. Mr. Cyros not only expertly presided over the several meetings of the Working Group, but he organized the work so that revisions could be undertaken efficiently and effectively. He cajoled the members to complete their "assignments" in a timely manner, and he ensured that any changes made to the manual were necessary and improved it. He also responded to each of the comments that resulted from the extensive field review of the draft manual and worked on the organization and final structure of the manual.

Lawrence W. Vanderburgh of the BOMI Institute became involved in the project because of his professional interest in facilities data and information. He assumed responsibility for assembling the materials provided by members of the Working Group, writing the introduction and other sections of the manual, and implementing the recommendations of the Working Group with regard to the final structure and layout.

Additionally, many practitioners throughout the country reviewed the draft of this edition of the manual as part of the field review process. All of their comments, suggestions, and ideas were considered and discussed. We would like to thank everyone who made the effort to gain access to and review the draft manual.

Finally, we would like to acknowledge the work of Baiming Liu of Westat and the other Westat staff who were involved in this project—Denise Glover, Carol Litman, and Sylvie Warren. Ms. Liu kept the whole project on as much of a schedule as possible, given the number of individuals involved. She served as the point person for the hundreds of e-mails that went back and forth among members of the Working Group and made sure that nothing was lost in transmission. Dr. Glover oversaw the project for Westat, Ms. Litman edited the final document, and Ms. Warren prepared the final document for publication.

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Introduction

Along with its human resources, financial assets, and intellectual cache, space is a primary resource of an educational institution. Indeed, the land value (initial cost, replacement cost, or market value) of a postsecondary education institution's holdings sometimes exceeds its annual operating budget and endowment. Without information on how much and what type of resources it has, an institution cannot assess whether sufficient resources are available to fulfill its mission. Answering some basic questions about space, including how much space is available, what kind of space it is, to whom is the space assigned, and how efficiently the space is being used, requires gathering facilities' inventory data and developing and maintaining a facilities' inventory database.

This manual describes standard practices for initiating, conducting, reporting, and maintaining an institutional facilities inventory. Once completed, a facilities inventory will enable an institution to measure the ability of its space to meet its current programs, assess the current operation costs of its facilities (maintenance, utilities, cleaning), and then begin to plan for future space needs.

A facilities inventory database can serve an additional number of important specific functions:

- Directory. The database can serve as a directory that identifies and inventories the location of space by building, room, and space number, by which department occupies the space, and by the size and type of each space. From these data, patterns in the overall occupancy of space can be tracked.

- Space Utilization. The database can assist in the measurement and analysis of the use of space. This function allows an institution to minimize space operating costs by maximizing the use of existing space. For example, sophisticated research space is costly to construct and operate. Accordingly, use of such space for more mundane uses is not cost-effective. If laboratory space is being used for storage, and more instructional or research laboratories are needed, clearly it would be less costly to construct storage space and use the expensive laboratory space for its original purpose as long as other factors—such as proximity, access, and control of space—make it practical. Similarly, most other space could be evaluated for suitability of use and fit.

- Future Planning. The database provides the capability for planning for future needs. Planning occurs on many levels. For example, developing facilities to support a specific educational program often entails long lead times and far-reaching effects beyond the scope of that program. Without the right information, planning may be flawed and the program may not be launched or supported appropriately. On another level, data on

existing space use and cost can provide an accurate basis for long-term projections and capital funding requests.

- Decisionmaking. The database can provide vital support to decisionmaking. Effective action requires knowledge; knowledge requires information; and information requires data. Neither program nor facilities decisions are made in isolation. Facilities data are almost always used in conjunction with financial, academic, human resource, and program data. As a result, the linking of facilities data to other databases is increasing. Linkages might occur, for example, to operations and maintenance systems, a land/property inventory, an equipment inventory, financial systems, human resource systems, or a research accounting and indirect cost recovery system.

- Reporting. The database can help an institution meet its reporting requirements. Many institutions receive substantial reimbursement for support costs (including those of facilities) incurred in the performance of programs and projects sponsored by federal or state agencies. Many of these agencies have made Facilities Inventory and Classification Manual (FICM) the standard reference for reporting costs allocated on the basis of area measurement. Particularly when public funding is involved, extensive reporting is required to ensure accountability for the use of funds. A common task in this regard is providing documentation to support the recovery of indirect costs that would enable an institution to negotiate overhead rates.

- Institutional Comparisons. A facilities inventory database based on the FICM can provide a set of standard terms and measurements that facilitate appropriate comparisons among postsecondary education institutions. Increased pressure on all resources, especially financial, has contributed to the need for extensive comparisons among similar institutions to identify best-in-class performers, best practices, and possible improvements and efficiencies.

National projections call for significant growth in postsecondary enrollment over the next 10 to 20 years. However, great variations in growth among states and even regions within a single state might be expected. Planning requirements also differ depending upon the perspective of the individual who is doing the planning and the organizational situation being studied. These differences are magnified when the focus is on a single institution or a building on a campus. This manual is designed to assist planners and analysts at both the state and institution levels.

The perspective of planners and analysts at the state level may be especially helpful in understanding the importance of information about postsecondary institutional facilities and the availability of comparable information. State agencies, with both governing and coordinating functions, have the responsibility to recommend the most efficient and effective use of scarce state and institutional resources, as well as to minimize the cost burden on students and their parents. These seemingly conflicting roles can only be balanced with adequate information and appropriate analytic tools.

Student enrollment and institutional mission changes as well as technological advances bring new challenges and requirements to the design and use of facilities. The availability of standardized and commonly accepted data elements describing space usage and characteristics is critical to governing boards (both public and private), state-level postsecondary education administrators, and campus administrators. Understanding facilities needs, both for new construction and for renovation, through comparative analysis of internal institutional data and external data from peer institutions across the country helps establish baseline requirements for future capital funding. With standardized data, it becomes possible for the state-level postsecondary education administrator to know how institutions compare on a host of indicators and to set priorities for limited resources. It is also helpful to understand fully how a local situation differs from statewide, regional, or national conditions.

Changes Since the Last Revision

Following is a summary of significant changes made for this 2006 edition of the FICM since the last revision in 1994.

Organization

- The entire document has been redesigned for greater use as a reference tool. Material concerning database design and organization, data collection, and reporting and analysis has been reorganized to make the manual easier for a first-time reader to understand.

- The question-and-answer chapter has been broken into separate sets of questions placed with the chapter to which the questions pertain. While that has led to some redundancy in the questions, it does enable a reader to see how a standard is applied in practice without additional searching.

- Some of the appendix material has been incorporated into the body of chapter text. For example, floor plans illustrating different area classifications are now included on the same pages as the textual definitions.

Area Measurement

- Area definitions have been clarified. The minimum floor to ceiling height required to include any covered floor area in an institution's space inventory was lowered from 7'6" to 3'0". This change was precipitated by the appearance of new building designs with vertically curved exterior walls and maximizing the use of sloped roof attic spaces as assignable areas through the use of 3'0" knee walls. Also, a detailed breakdown of the nonassignable major use category has been created. It contains three space use subcategories and their definitions: mechanical, building service, and circulation area.

- A crosswalk table showing the relationship between the National Association for College and University Business Officers (NACUBO) and U.S. Office of Management and Budget (OMB) Circular A-21 functional categories has been added in appendix B.

Data Elements

- Data elements have been grouped into required and optional categories; descriptions for the data elements have been updated.

- Some new categories, such as room condition, have been added. Existing categories, such as building condition, room suitability, ownership status, and architectural features, have been clarified and updated to reflect new market conditions, financing arrangements, and additional services now provided in many buildings.

- The term space has been used to define the smallest discrete spatial data element. The use of this term allows breaking a room with multiple functions into individual areas that can be classified separately for more accurate tracking and reporting.

Room/Space Use Codes

- Room use codes are now described in chapter 4. The existing coding structure has been kept almost entirely intact. The only significant additions are for unit storage, hazardous materials storage, and hazardous waste storage.

- Definitions for classroom, laboratory, studio, arts, clinics, animal facilities, and health care facilities have been refined and cross-referenced more closely with area definitions, especially nonassignable space.

- References to computer hardware, software, and other technology in various room use codes have been updated to reflect current terminology.

Emerging Issues

- A chapter on emerging issues (chapter 6) has been added to address significant changes in practice facing institutional planners, such as expanded reporting requirements and increased emphasis on maintenance.

- Suggested categories for physical infrastructure assets have been added to provide guidance for tracking and managing physical assets, such as roads, storm and sanitary sewers, utility lines, and site features, which represent substantial capital investment but do not fall within a building and thus are not tracked in a space database.

Chapter 1. Getting Started

1.1 How This Manual Is Organized

This manual is organized to serve two different audiences:

- Newcomers who need a thorough introduction to the classification system, how it is built, how to use and apply it properly, and how to enhance an institution's management of its facilities by using this system.
- Experienced users who already know the facilities classification system and are interested in using this document primarily as a reference tool.

Newcomers should read this document thoroughly before embarking on any efforts to classify their space inventories. Experienced users are likely to be most interested in the section describing changes since the last edition; chapter 4, Space Use Codes, the core of the system; and chapter 6, Emerging Issues. For a quick start to this new edition, refer to the Changes Since the Last Revision section of the Introduction.

This document is organized as follows: chapter 1 covers getting started/orientation; chapter 2, basic database principles; chapter 3, area measurement; chapter 4, room and space use codes; chapter 5, data analysis and reporting; and chapter 6, emerging issues. Chapters 4, 3, and 5 contain a set of questions and answers that relate to the content of the particular chapter. It should be noted that some of the questions and answers appear in more than one chapter. This was done deliberately if a question pertained to the content of more than one chapter so that relevant questions and answers would be available in the appropriate chapters.

The topic chapters are followed by several appendixes. The appendixes provide more detail than was warranted in the main body of the manual. In particular, appendix A provides guidance in using the FICM for data reporting and for institutional data exchange; appendix B provides additional detail on the NACUBO and OMB functional categories; appendix C provides additional detail on the Classification of Instructional Program codes for academic disciplines; appendix D provides a suggested method for classifying infrastructure; appendix E provides a suggested method for describing the maintenance level of facilities; appendix F provides an integrated numbering structure that encompasses assignable and nonassignable space and infrastructure classifications; and appendix G contains a glossary.

Many institutions already maintain sophisticated facilities inventories; others may not have collected facilities data or may find their inventories so out of date that they will wish to start over. Chapter 1 is provided primarily for those who are unfamiliar with facilities inventory methods or with the FICM system.

1.2 Designing the Database

According to the basic principles underlying the organization and use of the FICM classification system, some items of information are described as required (e.g., a unique space identifier, the square-foot area of the space, the organizational unit to which it is assigned, and the space use category), while others are optional (e.g., physical characteristics of the space, legal ownership, age, condition). In designing the facilities database, it is good practice to provide fields for both the required and the optional data elements, even though not all types of data may be collected at the outset. Even if some fields are ultimately not used, it is usually more cost-effective to program extra space than to add fields after the database is already in use.

Individual Spaces Are the Building Blocks of the Facilities Inventory. The most basic discrete spatial unit to be measured, inventoried, and tracked is an individual space. While the terms room and space are commonly used interchangeably, they are individually defined for purposes of this manual. A space is an area bounded by walls and/or an imaginary boundary line (a “phantom wall”) that accommodates a single use. A room is defined as a contiguous area enclosed by walls on all sides; it may consist of one or more spaces. As discussed in chapter 3, where clear distinctions between the two terms are made, some rooms may be subdivided into several discrete spaces because they accommodate multiple uses.

For purposes of this manual, the term space will be used wherever both terms could be used interchangeably, primarily regarding the use codes defined in chapter 4.

Database Technology. Database software has become much more user-friendly, inexpensive, powerful, and customizable in recent years, making data storage, maintenance, analysis, and reporting of inventory data far more practical and cost-effective, even for the smallest institutions. Software to support inventories is available and can be modified for particular institutional uses. Decentralization of computing resources through departmental, campus, regional, and national networks has become a common and effective means of making inventory information widely available.

The facilities inventory information for virtually any institution can usually be stored in a desktop computer, using commercially available database software. Some software vendors have designed interfaces that enable exchange between computer-aided design (CAD) drawings and computer-aided facilities management (CAFM) system databases.

1.3 Data Collection

Walking the Campus. An essential step in an inventory is to field check the configuration and use of each space. This task should be performed by a qualified individual, usually someone with the institution's central administration, who thoroughly understands the FICM definitions and the importance of consistently applying them. As there may be discrepancies between the floor plans and the actual spaces, this step provides an opportunity to update floor plan drawings. Furthermore, required and optional space data (e.g., the space use category, academic discipline category, number of stations, suitability for current use) should be obtained or verified by inspection.

Updating facilities inventory data is also essential. This task is especially important when organizational moves or space renovations take place. While overall building dimensions may not change frequently, space use, assignments, and geometry are more likely to do so with greater frequency.

Working From Drawings. On most campuses, a department of facilities planning or management will have access to architectural drawings of most buildings, whether or not they have responsibility for maintaining those drawings. An initial set of building, floor, and space data can be compiled from these drawings as a basis for creating an initial space inventory or for maintaining an existing one. Four data elements are required for each space in a basic space inventory: unique identifiers for each building, floor, and space; organizational assignment(s); actual space use(s); and confirmed locations of walls to accurately determine the area and other basic building features such as door, window, and column locations within each space.

Many institutions also use electronic technology to collect their facilities data. Options include developing and using machine-readable data collection forms, entering the data directly using hand-held devices while conducting the physical inventory, and recreating scaled floor plans.

A growing number of institutions are setting up and maintaining building drawings in CAD systems and digitizing existing drawings to set up electronic space inventory files. In electronic form,

these drawings can be kept current with subsequent renovations. These electronic files can be linked with the inventory files so that both files can be updated simultaneously.

Accuracy of Drawings and Measurements. Scaling of drawings is not recommended as a method for determining the area of a space or a building. Drawings are frequently out of scale; if they are drawn to a small scale (e.g., 1/16" = 1'0" or smaller), significant errors can result from manual measurements taken directly from drawings. A word of caution: If there is no alternative but to determine space areas from drawings (i.e., it is impossible to measure the actual space), remember that photocopies of drawings may alter their scale. A sample of actual spaces should be physically measured to ensure the drawings are accurate to scale.

Computer-Generated Area Calculations. Computer-generated calculation of spaces or building areas from electronic "as-built" record plans of a building is the most accurate method for calculating area. This assumes, however, that the building was actually constructed as shown on the plan documents. Field verification of building and space dimensions is advisable, as very few organizations track all the minor alterations made to their buildings and many of these changes go unreported to the campus facilities department.

Physical Measurements. Even if field dimensions are taken to verify building and space dimensions or to establish the base drawing data, there may be a difference between the field measurements and the actual drawing; however, such differences are typically marginal within an overall building inventory.

Acceptable Margin of Error. When taking physical measurements to update or verify drawing data, a 2 percent margin of error is acceptable for the purposes of facilities data values.

Partial Inventories. An incomplete building and space inventory is better than no inventory, provided it is accurate. Institutions beginning the inventory process may be wise to plan initially on collecting less information and increasing the scope of the inventory in subsequent updates to facilitate successful implementation.

There are several logical approaches:

1. Collect only the required data—space identifiers (building/floor/space number), space use categories, organizational assignments, and area in the first inventory—leaving other (optional) elements for a later survey.

2. Collect data by class of facility, perhaps starting with academic and research buildings, then administrative ones, then auxiliary and residential facilities.

3. Plan an ongoing program that will inventory or update a portion of all facilities each year, especially the academic and research facilities, in which changes can have significant impacts on educational and research programs.

Combining the Inventory With a Facilities Condition Audit. For some institutions, it may be cost-effective and advisable to combine the initial facilities inventory, and certainly any subsequent updates, with an audit of the condition of the facilities. The standard procedures for a facilities condition audit[1] closely follow those suggested in this manual and are intended to collect related information. Many of the building condition codes and space suitability codes suggested in this manual relate closely to facilities condition audit information.

1.4 Practical Tips

1. Compile the building information first, even though some variables or elements (such as assignable area) will not be available until the space inventory is completed.

2. Inventory all spaces in a particular building at one time. Interrupting the inventory process, even for short breaks, increases the chances of omitting spaces.

3. Try to schedule the space inventory shortly after the beginning of the term or some other time when space uses have stabilized.

4. In counting the number of stations in a space, remember that the intent is to count the appropriate number of occupants who can be accommodated in the space.

- The number of stations in a laboratory is not determined by the fixed equipment in the space, such as sinks and counter space, or fume hoods. Where a station is designed to accommodate two or three students rather than just one, count the number of students who could be served.

- For classrooms with movable seating, the number of stations is determined by the design intent, not by the number of chairs that happen to be in the space at the moment the inventory is taken. For instance, a space may be designed to hold 15 student stations but currently has only 12 chairs; the number of stations would be 15. Conversely, if current

[1] See, for instance, H.H. Kaiser, Facilities Audit Workbook (Alexandria, VA: Association of Higher Education Facilities Officers (APPA), 1987).

safety codes limit occupancy to 15 and there are 20 chairs, the station count should be 15.

5. In conducting and maintaining the facilities inventory, remember that the intent is to provide the best information possible with a reasonable expenditure of effort. A modest level of error is tolerable (indeed, inevitable) as uses and assignments change over time. A regular process for updating the inventory can keep its information current enough to be continuously useful.

6. Wherever possible, use the building and space identifiers to link the facilities file to other data files, such as those for fixed and movable assets, classroom scheduling, financial accounting, insurance tracking, and maintenance scheduling. (For information, please refer to section 2.4, Links to Other Systems.)

1.5 The Facilities Database and Institutional Management

Once a database has been designed and building and space information has been collected, a variety of reports can be provided for institutional use and, where appropriate, for inter-institutional, systemwide, or national surveys. The database also can support a variety of ad hoc inquiries to support space management and facilities management activities. For many purposes, graphical presentations can convey the intended message more effectively than tabular arrays of data. (A detailed discussion of data analysis and reporting is provided in chapter 5.)

Chapter 2. Basic Database Principles and Applications

This chapter provides an overview of the central concepts and components of an inventory and facilities classification system for postsecondary education facilities. It is intended as an aid to understand how the key components fit together. Additional explanatory detail, technical definitions, and procedures are provided in subsequent chapters and the appendixes.

The central concepts and components outlined in this chapter include

- basic database principles underlying the intended uses of this manual;
- external and internal database applications (reporting and analysis); and
- what to include in a building inventory.

This manual is designed primarily for institutional use. A comprehensive, reliable, and up-to-date facilities inventory is an important tool for the planning and management at a postsecondary institution. Accordingly, the database model described below is designed primarily for use at the institution or campus level.

2.1 Basic Database Principles

Facilities Inventory Systems Contain Data About Buildings and About Spaces Within Buildings. A facilities inventory may incorporate data about many types of structures and physical assets, the most important of which are buildings and spaces. Building information includes such items as gross area, assignable area, and replacement cost. Space information includes such items as space area, space use, and number of stations. Required and optional data elements for both buildings and spaces are defined below and in chapter 5.

Each Building and Space Needs a Unique Identifier. The initial step in a facilities inventory is to assign each building and space a unique code to identify a “record” or set of data fields within the inventory. These identifiers are then used to link spaces to buildings and to link the facilities inventory records to other institutional information such as plant asset records, the registrar’s course schedule, and equipment inventories.

Each Building and Space Record Has Several Fields of Data. Each building or space requires a separate data "field" for each type of element of information. For a given space, its unique space identification (building, floor, and space number), space use category, organizational assignment, and area are required types of data. (See chapter 5 for a full discussion of required and optional data.) Some examples of optional inventory items that may be important to an institution's space management and utilization study needs are the number of occupants a space can accommodate, architectural features, suitability for specific uses, and the identification of "disparate use" of a space (e.g., a space designed as a laboratory but used as an office must be recorded as an office). Each of these pieces of information is recorded in a separate field within the space record. Merging of different kinds of information into a single field should be avoided in all cases. For example, marrying the space use "office" with the rank of the occupant, "professor," to create a space use of "professor's office" makes analyzing office space of people other than professors difficult. Keeping "office" and "professor" separate enables greater analytic flexibility.

This Manual Provides Basic Coding Structures to Which Institutions Can Add. The required data described in this manual constitute the lowest common denominator, i.e., a set of definitions and codes that is as simple as possible while still covering the range of building and space information essential to any facilities inventory database.

2.2 Database Applications

Facilities Inventory Data Should Be Capable of Uniform Aggregation. Facilities information is important for interinstitutional comparison, for planning and management of the institution or institutional systems, and perhaps for development of national policy. The information gathered in the inventory should be structured to make valid comparisons and summaries possible. (Please refer to chapter 5 for a full discussion of aggregating and reporting facilities inventory data.)

External Applications. From the basic coding structure described above, most inter-institutional comparisons, system reports, and national surveys can be satisfactorily developed by adding additional fields (see section 5.3, Optional Data Elements). Institutions should build from this conceptual framework to enhance the inventory's usefulness for individual campus management. Appendix A provides guidance in using the FICM for data reporting and interinstitutional data exchange.

Use of Standard Functional Categories. In addition to space use categories and organizational unit assignment, facilities inventory systems most commonly contain a set of categories or codes

to allocate space across functional categories (e.g., instruction, research, public service, academic support). The functional categories are used primarily to link space allocations to financial data for indirect cost accounting and to institutional missions (e.g., the proportion of space used for public service) or to analyze and compare space allocations across institutions according to commonly used functional categories.

The functional categories recommended for this purpose are adapted from standard financial reporting categories. Appendix B provides the definitions for these categories as adapted from standard financial reporting guidelines of the National Association of College and University Business Officers (NACUBO) and Office of Management and Budget (OMB) Circular A-21. Coding for function requires identification of the prorated functional use of each space.

Internal Applications. The following are illustrative of internal database applications.

- Institutions may wish to add additional detail to the space use coding structures for internal purposes. For example, a college or university might add subcodes to the space use code 255 of Research/Nonclass Laboratory Space to keep track of cold rooms, hot rooms, dark rooms, laboratory stock rooms, and similar spaces.

- Some institutions may wish to differentiate between classrooms assigned to individual departments and those centrally controlled by the registrar or dean's office by sorting classrooms by their organizational assignment.

- Institutions may wish to identify study rooms or labs with specialized equipment for moderated instruction or study by linking data from a movable or fixed equipment data file to the appropriate spaces in the inventory file.

Some Kinds of Spaces Can Have Many Stations. The concept of “stations” is important for classrooms, laboratories, and other similar spaces, since it can help determine the number of occupants the space is designed to accommodate. This information is vital for comparing designed capacity to actual use, and in assigning or scheduling the space.

Distinctive Architectural and Other Characteristics Can Be Noted. Optional data elements with specific codes may be used to identify unique architectural characteristics, special utility services, replacement cost, age, condition, suitability, building ownership. This information is used for a variety of purposes, including scheduling and maintenance planning, financial analysis, and campus planning. These characteristics are also important for understanding cost differences in initial construction, renovations, repairs, and operations.

While this coding can sometimes be determined from up-to-date drawings or the general knowledge of the facilities planning or management staff, all these characteristics may be difficult to identify from original designs or original as-built drawings and may require actual inspection of some facilities.

Some Data Elements Are Important for Campus Use But Are of Limited Use in Multi-Institutional Summaries. The list of data elements includes some items that are important for campus use but lose their meaning in interinstitutional, state, or national summaries. For instance, identifiers such as names for particular buildings and spaces are useful for campus use but not in a state summary. Similarly, organizational unit identifiers (e.g., departments) are important on a particular campus but become less meaningful when summarized across institutions because of differences in organizational structures.

2.3 What to Include in a Building Inventory

Definition of Building. A building is defined as a roofed structure for permanent or temporary shelter of persons, animals, plants, materials, or equipment. The building inventory may encompass many different types of structures, including marine and space structures (whether staffed or not); research vessels; aquarium structures; and trailers that are not on wheels and are used for offices, residences, or storage (see technical definitions in chapter 3).

Buildings to Be Included. The inventory should include buildings that are under the jurisdiction or control of the institution's governing board, regardless of their location. Where the institution occupies space in buildings not owned by the institution or that is shared with other tenants, include in the inventory only that portion of the building leased or controlled by the institution and its pro rata share of gross area, assignable area, and assignable area (see definitions in chapter 3).

Institutions will normally exclude various minor structures from their inventory based on various criteria. As a guideline, separate, minor structures should be included in the inventory if all of the following criteria are met:

- They are attached to a foundation.
- They are roofed.
- They are serviced by a utility, exclusive of lighting.

- They require significant maintenance and repair activities as determined by the institution.

Following these guidelines, an example of a minor structure to be included in a building inventory is a traffic control or information booth that is roofed, attached to a concrete pad, with lights and at least one other utility service such as a phone, and on a regular maintenance schedule. An example of a separate structure not meeting the above criteria is a bus shelter, which is roofed and attached to the concrete sidewalk, but which has only lights as a utility service.

Institutions may choose to include parking structures and field buildings that do not meet all of the above criteria in their inventories because of requirements to manage and maintain such facilities. The inclusion of such facilities permits the space to be assigned to specific functions, disciplines, and organizational units. Additional clarification and examples are provided in chapter 3.

Buildings to Be Excluded. The following types of buildings may be excluded from the inventory if they do not house functions considered part of the institution's academic mission:

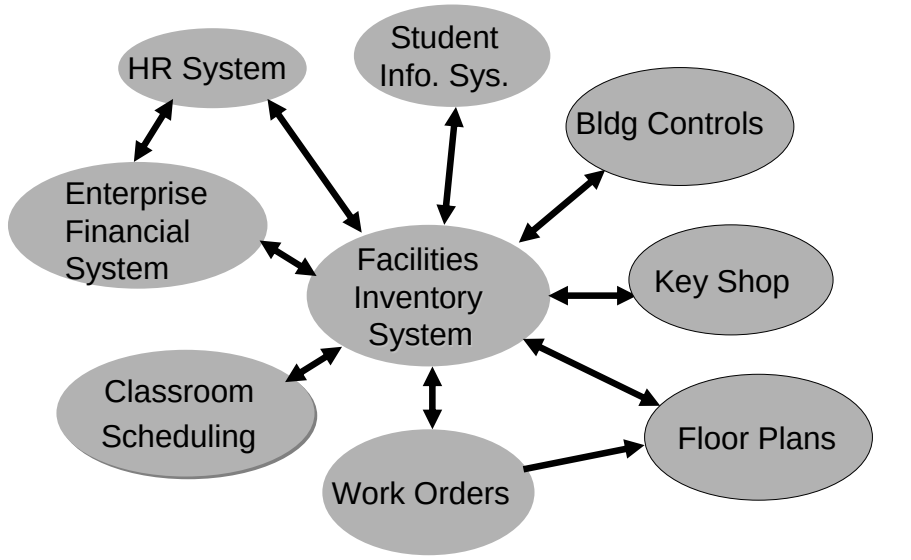
- Investment properties that are buildings used only for revenue generation and not for institutional purposes;
- Hospitals not owned by the institution, except for any space in the hospital used, leased, or controlled by the institution;
- Public schools not owned by the institution but used for practice teaching; and
- Federal contract research centers identified by the Office of Management and Budget.

Other Plant Assets. For management purposes, institutions are encouraged to inventory all other physical infrastructure elements (physical plant assets). Examples of such infrastructure elements (assets) not encompassed in the definition of building include uncovered swimming pools, athletic tracks, bleachers, and additional playing fields that otherwise do not qualify as gross areas. Institutions are also encouraged to itemize the infrastructure components. Examples include utility distribution systems (heating, cooling, power, water, and waste disposal) and support facilities that provide access or safety-related services (roads, campus lighting, etc.). Additionally, institutions may wish to maintain inventory data on land holdings, capital equipment, and movable equipment. A suggested approach for tracking infrastructure assets is presented in chapter 6.

2.4 Links to Other Systems

Neither program nor facilities decisions are made in isolation. Facilities data are almost always used in conjunction with financial, academic, human resource, and program data. As a result, linking facilities data to other databases is increasingly prevalent. The diagram below illustrates some of the more common systems to which facilities databases commonly link.

Figure 2-1. Example of facilities inventory data links with other systems



Courtesy of INSITE

Chapter 3. Building Area Measurement

This chapter provides the technical definitions, measurement procedures, and coding structures for building area data elements. The relationships between the components of building area are illustrated by the conceptual framework in figure 3-1. Definitions of what constitutes a building are found in chapter 2. The technical definitions and codes for the space use categories are found in chapter 4. An understanding of the FICM system begins with an overview of measurement terms.

3.1 Overview of Building Measurement Terms

In a building inventory, it is important to be able to determine the amount of space that can be assigned to people or programs. However, buildings necessarily contain other types of space as well. Technical definitions and examples of types of space are provided in chapter 4.

The amount of space that can be used for people or programs is known as the Net Assignable Area.[2] The area of an Assignable space is the area measured within its interior walls. The Net Assignable Area of a building (or all buildings in an inventory) is the sum of the space allocated to the 10 major assignable space use categories: classrooms, laboratories, offices, study areas, special use space, general use areas, support rooms, health care, residential, and unclassified space. These categories are further described below.

Net Assignable Area = Sum of the 10 Major Space Use Categories of Assignable Space

The amount of space within a building that is essential to the operation of the building but not assigned directly to people or programs is known as the Nonassignable Area. The area of a Nonassignable space is the area measured within its interior walls. The Nonassignable Area of a building (or all buildings in an inventory) is the sum of the space allocated to the three major nonassignable space use categories: building service area, circulation area, and mechanical area. These categories are further described below.

Nonassignable Area = Sum of the 3 Major Space Use Categories of Nonassignable Space

[2] This is also conventionally referred to as Net Assignable Square Feet (NASF).

Figure 3-1. Conceptual framework for analyzing building space

Gross Area (chapter 3)

Net Usable Area (chapter 3)

Net Assignable Area (chapter 3)

Nonassignable Area consists of:

1. Building Service Area
2. Circulation Area
3. Mechanical Area

Structural Area is:

Gross Area Less Net Usable Area

Classified By: 1. Space Use Category (chapter 4)

Class-room	Labora-tory	Office	Study	Special Use	General Use	Support	Health Care	Residen-tial	Unclas-sified

2. Academic Discipline, Institutional Unit Assignment, or Program

Categories Determined by Institution
(For external data sharing and reporting, a crosswalk to the NCES Classification of Instructional Programs is recommended—chapter 5 and appendix C.)

3. Standard Functional Categories (chapter 5 and appendix B)

Instruc-tion	Research	Public Service	Academic Support	Student Services	Institu-tional Support	Physical Plant O&M	Auxiliary Enter-prises	Indepen-dent Opera-tions	Hospitals

O&M = operations and maintenance.

The aggregate interior area of a building, known as the Net Usable Area[3], is the sum of Assignable Area and Nonassignable Area.

Net Usable Area = Assignable Area + Nonassignable Area

It is also important to know that the Gross Area[4] of a building is the floor area of a structure within the outside faces of the exterior walls. This value is either physically measured or scaled from as-built drawings. Figures illustrating all of the areas are provided later in the chapter.

The difference between the exterior or Gross Area and the interior or Net Usable Area is the Structural Area, the floor area upon which the exterior and interior walls sit and the unusable areas in attics and excavated basements. Structural Area is calculated as the difference between the Gross Area of a building and the Net Usable Area of that building.

Structural Area = Gross Area – Net Usable Area

3.2 Definitions of Building Areas

The definitions[5] and procedures provided in this chapter are intended to clarify and provide guidelines for the most commonly used types of data about buildings that would be collected and compiled. These guidelines are based on the definitions and standards established during the 1960s for the Federal Construction Council and published by the National Academy of Sciences. The Federal Construction Council standards were intended for use by federal agencies, but they have been widely adopted and used by postsecondary institutions.

The definitions and guidelines in this chapter attempt to clarify and update some of the earlier standards by providing additional guidance on how to interpret and apply measurement procedures. The guidelines also are intended to establish a common standard for the minimum amount of data to be included in a building inventory to provide a database that is usable for both intrainstitutional and interinstitutional purposes. Institutions are not precluded by these guidelines from collecting additional building data or from including other types of structures in their facilities inventory.

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[3] This is also conventionally referred to as Net Usable Square Feet (NUSF).

[4] This is also conventionally referred to as Gross Square Feet (GSF).

[5] The source is the National Academy of Sciences, Building Research Advisory Board, Classification of Building Areas, Federal Construction Council Technical Report No. 50 (Publication 1235) (Washington, DC: National Academy of Sciences).

3.2.1 Gross Area (Gross Square Feet—GSF) (See figure 3-2)

A. Definition. The sum of all areas on all floors of a building included within the outside faces of its exterior walls, including all vertical penetration areas, for circulation and shaft areas that connect one floor to another.

B. Basis for Measurement. Gross Area is computed by physically measuring or scaling measurements from the outside faces of exterior walls, disregarding cornices, pilasters, buttresses, etc., that extend beyond the wall faces. Exclude areas having less than a 3-foot clear ceiling height unless the criteria of a separate structure are met. (See section 2.3, What to Include in a Building Inventory.)

Measured in terms of Gross Square Feet (GSF),

GSF = Net Usable Area + Structural Space

C. Description. In addition to all the internal floored spaces obviously covered above, Gross Area should include the following: excavated basement areas; interstitial space (i.e., mechanical floor or walkways), mezzanines, penthouses, and attics; garages; covered porches, whether walled or not; inner or outer balconies to the extent of a drip line from a roof or balcony immediately above, whether walled or not, if they are utilized for operational functions; and corridor or walkways, whether walled or not, provided they are either within the outside face lines of the building to the extent of the roof drip line or, if covered, to the extent of their cover's drip line. The footprints of stairways, elevator shafts, and vertical duct shafts are to be counted as gross area on each floor through which they pass.

D. Limitations. Exclude open areas such as parking lots, playing fields, pools, courts, light wells, and portions of upper floors eliminated by spaces or lobbies that rise above single-floor ceiling height. Exclude unexcavated basement areas.

E. Exception. Include top, unroofed floor of parking structures where parking is available. (See the section on Parking Structures after figure 3-8.)

Figure 3-2. Gross Area of a building by floor

3.2.2 Net Assignable Area (Net Assignable Square Feet—NASF) (see figure 3-3)

A. Definition. The sum of all areas on all floors of a building assigned to, or available for assignment to, an occupant or specific use.

B. Basis for Measurement. Net Assignable Area is computed by physically measuring or scaling measurements from the inside faces of surfaces that form the boundaries of the designated areas. Exclude areas having less than a 3-foot clear ceiling height unless the criteria of a separate structure are met. (See section 2.3, What to Include in a Building Inventory.)

Measured in terms of Net Assignable Square Feet (NASF),

NASF = Sum of Areas Designated by the 10 Assignable Major Space Use Categories

C. Description. Included should be space subdivision of the 10 major space use categories for assignable space—classrooms, labs, offices, study facilities, special use, general use, support, health care, residential, and unclassified—that are used to accomplish the institution's mission.

D. Limitations. Deductions should not be made for necessary building columns and projections. These small areas are excluded as they represent an insignificant percentage of the total area of an average sized space. Capturing their area would be unduly burdensome relative to the very small contribution they would make toward precision. Areas defined as building service, circulation, mechanical, and structural should not be included.

Figure 3-3. Net Assignable Area of a building by floor