Appendix. Additional Information on Hospital Facility Management

Introduction: Typical Facility Management for Hospitals

The typical facility management process for existing hospital buildings consists of seven phases of activities: Acquisition, Current Building Use, Accreditation, Planning, Maintenance & Rehabilitation Budgeting, Maintenance & Rehabilitation Funding, Maintenance & Rehabilitation Implementation, as diagrammed in Figure 1. This process is sequential, progressing from left to right in any given building. A healthcare organization that has a large inventory of buildings is likely to have ongoing activities in all of these phases.

This process is generic and, while local variations may occur, it is generally followed by healthcare organizations, either explicitly or implicitly.

Figure 1: Typical Management Process

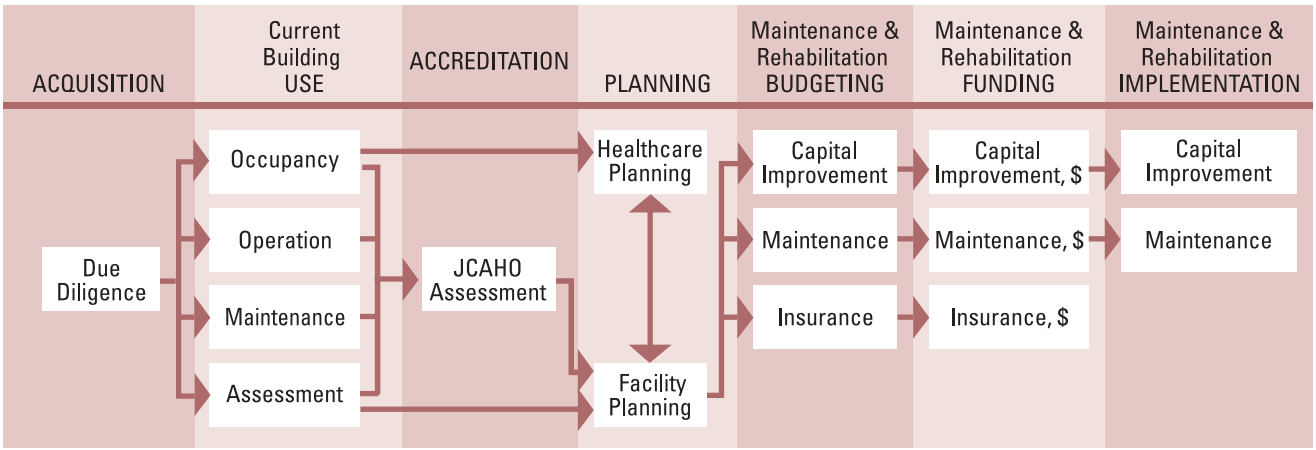
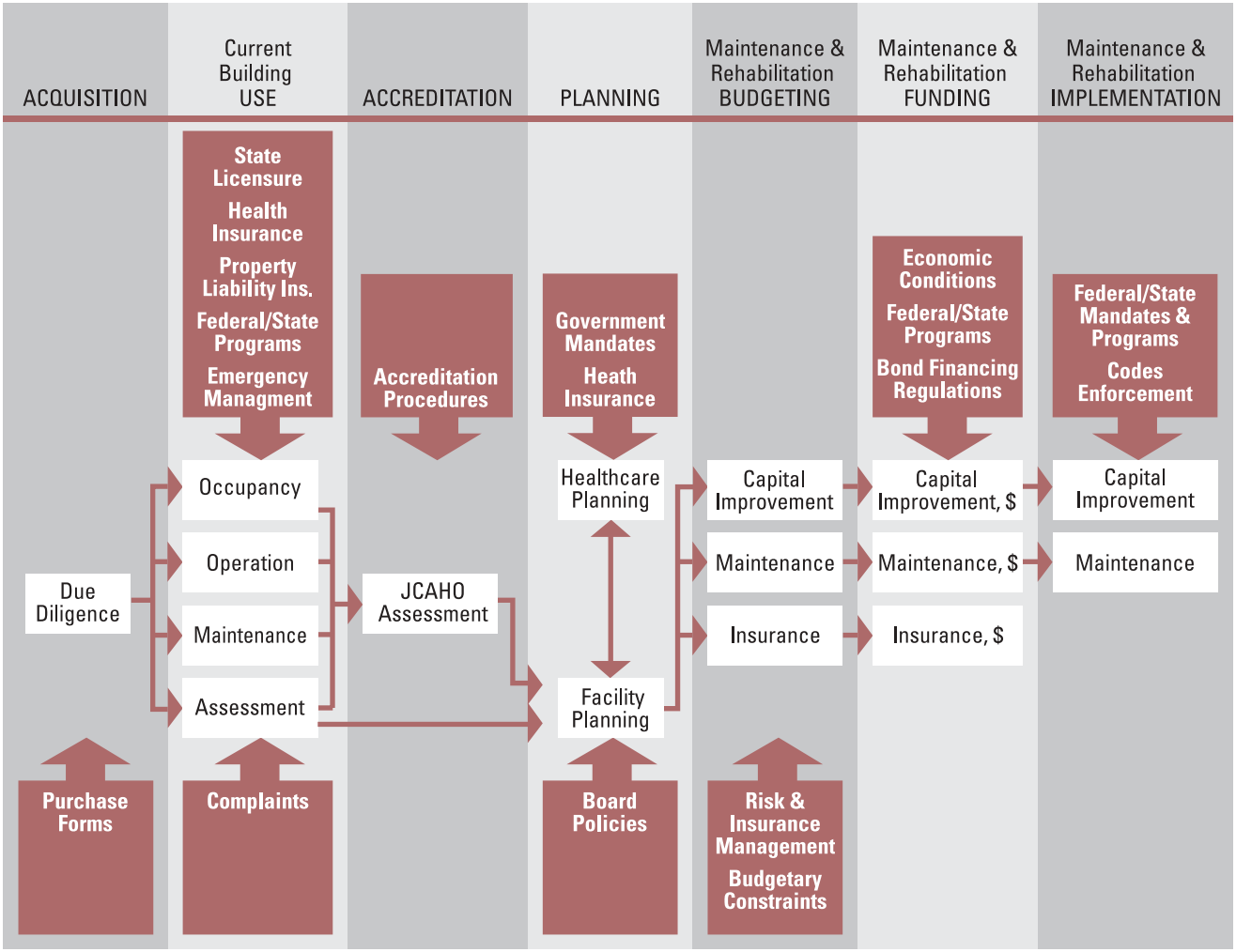


Figure 2: Management Process Influences

Both internal and external factors typically influence the hospital facility management process in its various phases. Internal factors (represented by up arrows in Figure 2) are generated within the healthcare organization and its administration. External factors (down arrows) are imposed on healthcare organizations by outside entities.

This Appendix describes the activities and influences within each phase.



1. The ACQUISITION Phase of Hospital Facility Management

Typical Process

Hospital acquisitions are a frequent feature of the healthcare delivery system in the United States. Hospital buildings and their professional staffs will be acquired as part of a single transaction. The due diligence process that precedes an acquisition is intended to identify, and quantify if possible, all the liabilities or potential liabilities related to the asset being acquired.

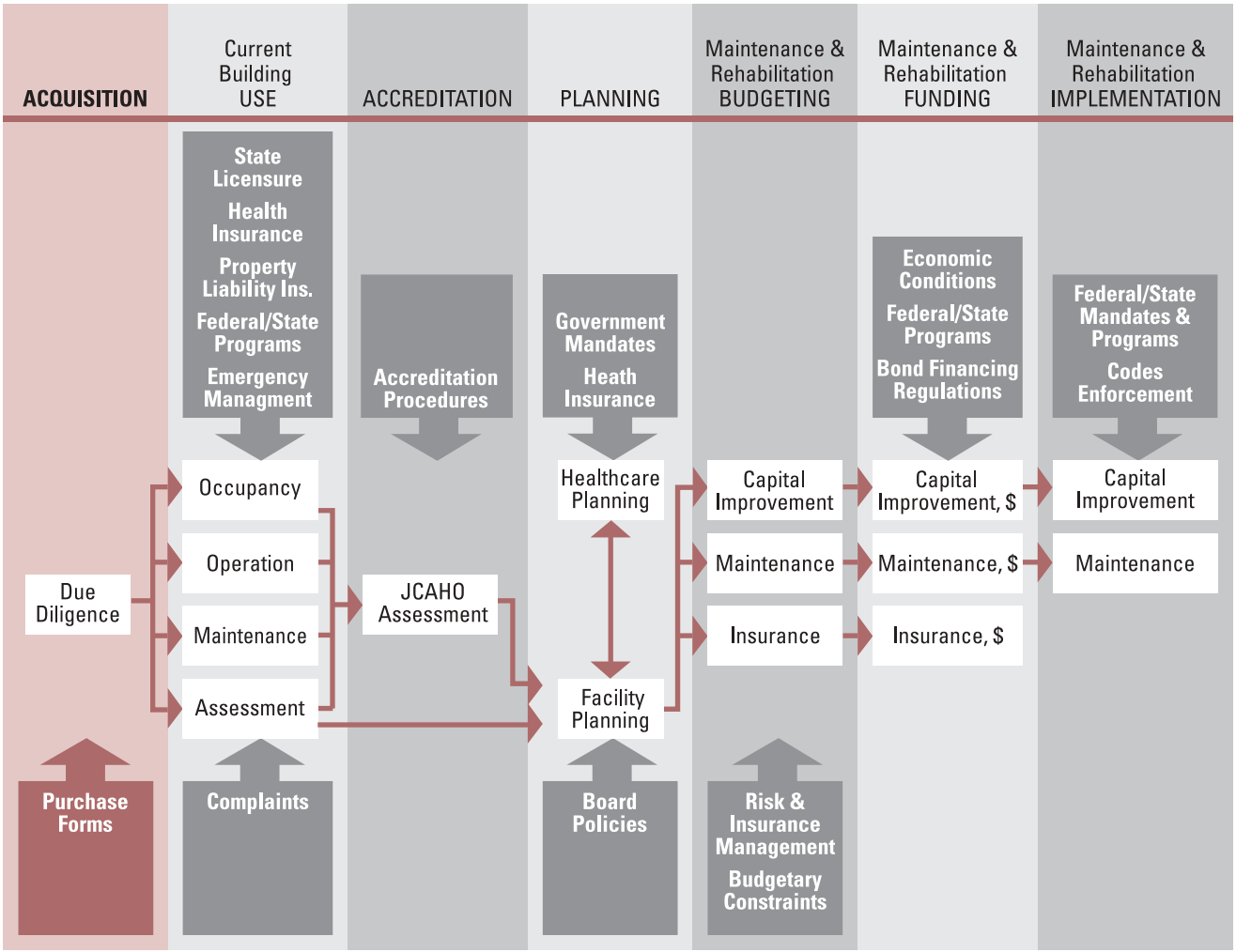
A multi-discipline team that includes legal, risk management, and engineering carries out the due diligence. Because of the potential professional liabilities, legal questions are often the driving force in the process. The due diligence process also involves a walk-through of the building. Environmen-

tal risks, such as the presence of asbestos, are identified in the due diligence process.

Influences and Related Seismic Considerations

As indicated in Figure 3, one internal factor (up arrow) influences acquisition phase decision making.

Figure 3: Acquisition



Purchase Forms: Some healthcare organizations use internally generated hospital purchase forms to guide their purchase decisions and related due diligence. These forms are eclectic and developed over time. The forms may focus on the facility age, equipment, and risk management history over a 5- to 10-year period.

Seismic Consideration

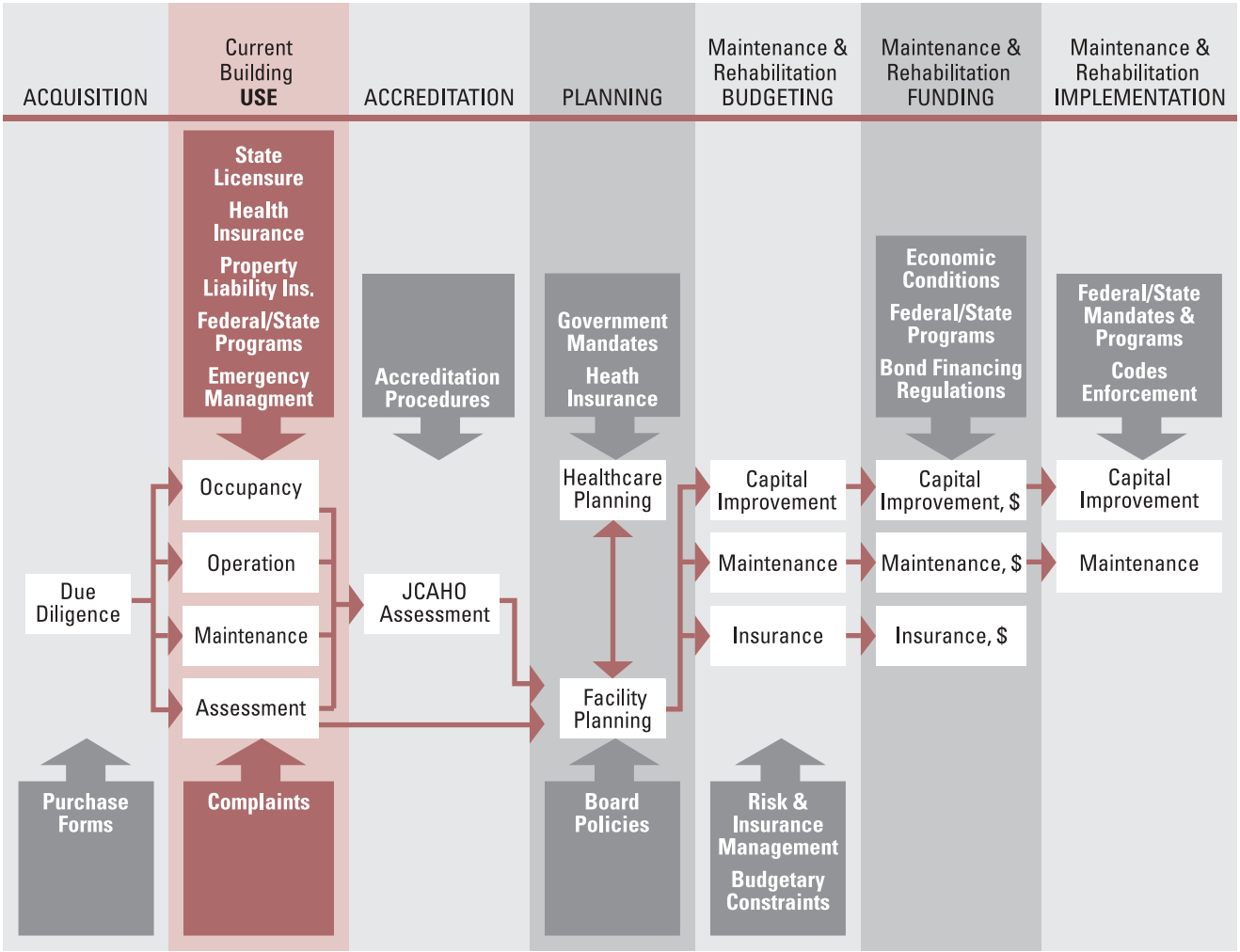
A 5- to 10-year risk management history is unlikely to cover earthquake risks outside of California. In California, healthcare systems are subject to Senate Bill (SB) 1953 that requires all California hospitals to upgrade their facilities to allow their functioning after a large earthquake. The cost of compliance with SB1953 is likely to be the most important factor in the purchase of existing hospital buildings and the related due diligence.

2. The Current Building USE Phase of Hospital Facility Management

Typical Process

The current building use phase of the typical hospital facility management process consists of four categories of activities and is influenced by significant internal and external pressures, as depicted in Figure 4.

Figure 4: Use



Occupancy: This category of activity consists of all the functions that the hospital is intended to shelter and to support. These include healthcare delivery, support, and ancillary functions. The healthcare delivery functions are determined by demographic, sociological, anthropological, and other factors. Support functions are administrative, and ancillary functions may be educational and community support.

These functions are carried out in each facility under the authority of the hospital director by the hospital staff. Each of these functions is subject to seismic risk and can be disrupted by seismic damage.

Hospitals are often characterized by the level of care provided therein. Tertiary care is considered the highest level of care, and includes the full range of technological and specialty care (such as open heart surgery and cancer) in

addition to a Level 1 Trauma Center with a list of medical disciplines on site 24 hours per day. Secondary care is provided by a facility such as a 20-bed rural hospital. Primary care is healthcare that can be provided by "your primary care physician," involving the lowest level of technology (for example, a long-term care facility). A regional hospital system will often include one tertiary care facility and several hospitals providing secondary and primary care.

Operation: Facility operation consists of all the activities and functions that the facility and its components must perform in order to support the occupancy. Examples are the mechanical functions (heating, cooling, ventilation, and medical support functions), electrical functions (lighting, communications, alarm, and medical support functions), and plumbing functions.

Operation functions may be carried out by custodial staff of the healthcare organization or the individual facilities and/or by contractors. Each of these functions is subject to seismic risk and can be disrupted by seismic damage.

Maintenance: Maintenance includes all the activities required to enable the occupancy and operation of the building to be carried out continuously over time. They can be broken down into custodial maintenance, routine maintenance, and repair.

Maintenance functions may be carried out by custodial staff of the individual facilities, by healthcare organization staff, and/or by contractors.

Facility Assessment: Facility assessment consists of the survey or inspection of the hospital facilities on a scheduled basis. It may also include a review of documents, such as archival building plans, for retrieving specific information. The purpose of the surveys or inspections is to determine facility conditions in relation to one or more of the following categories:

- user complaints
- maintenance needs
- preventive maintenance needs
- specific environmental hazards
  - asbestos
  - lead paint
  - lead
  - radon
- structural hazards
- fire/life safety
- environmental quality
- energy use/conservation
- accessibility
- other

These surveys are carried out by the individual hospital facility staff, with possible participation by central healthcare organization staff. In some cases surveys are carried out by a state or local fire marshal, an insurance company, or other outside entity. The surveys may or may not be coordinated as to schedule, content, personnel, etc. Healthcare organizations may or may not use prepared inspection forms or checklists. Finally, healthcare organizations may vary as to the extent and specific nature of their record keeping and reporting.

Influences and Related Seismic Considerations

As indicated in Figure 4, five external factors (down arrow) and one internal factor (up arrow) influence current building use phase decision making.

State Licensure: External state licensure regulations establish requirements affecting the building use phase, which have implications for facilities. The Rules and Regulations for Licensure of Hospitals in Virginia, for example, require a licensure survey of hospital buildings every 18 to 24 months.

Seismic Consideration

Currently there are no seismic rehabilitation mandates or implications in any state programs related to hospitals outside of California. In California, healthcare systems are subject to SB1953 that has established three interim milestone dates (January 1, 2002; January 1, 2008; and January 1, 2030) for progressively bringing all hospital buildings into full compliance with the seismic requirements of California Building Codes by January 1, 2030.

Health Insurance: External private health insurance programs establish requirements for healthcare delivery. These requirements may have facility management implications.

Seismic Consideration

Private health insurance requirements are unlikely to impose any seismic considerations on hospitals.

Property and Liability Insurance: External private property and liability insurance companies often require surveys or inspections of hospital facilities on an annual or other scheduled basis.

Seismic Consideration

Property insurers are unlikely to recommend extensive seismic improvements outside of California. In Utah, for example, they have recommended seismic bracing of sprinklers as part of the life safety systems, but no other improvements.

Federal and State Programs: Various external programs may establish requirements affecting use of a healthcare organization's facilities (e.g., Americans with Disabilities Act [ADA] and Occupational Safety and Health Administration [OSHA] requirements). Additionally, governmental funding programs may impose facility requirements (e.g., Medicare reimbursements and energy conservation).

Seismic Consideration

Currently, there are no seismic rehabilitation mandates or implications in any federal or state programs related to hospitals, with the exception of California.

Specific surveys or inspections may be mandated by external federal, state, or local laws/programs. In Virginia, for example, fire marshal surveys of hospitals are carried out annually. These surveys/inspections may be carried out by a variety of entities:

- Federal personnel (e.g., from OSHA, Environmental Protection Agency [EPA])
- State/city/county personnel (e.g., fire marshal, code enforcement, environmental, health)
- Healthcare organization personnel (e.g., custodial or facility managers)
- Hospital building contracted personnel (e.g., asbestos inspectors)
- Consultants

Seismic Consideration

Currently, there are no seismic survey or inspection mandates or implications in any federal or state programs related to hospitals, with the exception of California.

Emergency Management: External state or local emergency management agencies may assign specific roles that hospitals must perform in case of natural disasters, including earthquakes. This may affect the occupancy phase by requiring periodic exercises involving building occupants.

Seismic Consideration

Local emergency management plans related to the role of hospitals in a disaster may be general and broad, or detailed and specific. In some cases, specific hospitals are assigned a specific function they are to perform in the post-disaster environment. In such cases a legitimate question is "In what condition will the building in question be following an earthquake?" Answering this question requires some form of seismic inspection, evaluation, and possible mitigation.

Complaints by Occupants: Internal complaints by occupants (patients and staff) are a potentially significant pressure on the facility management process.

Seismic Consideration

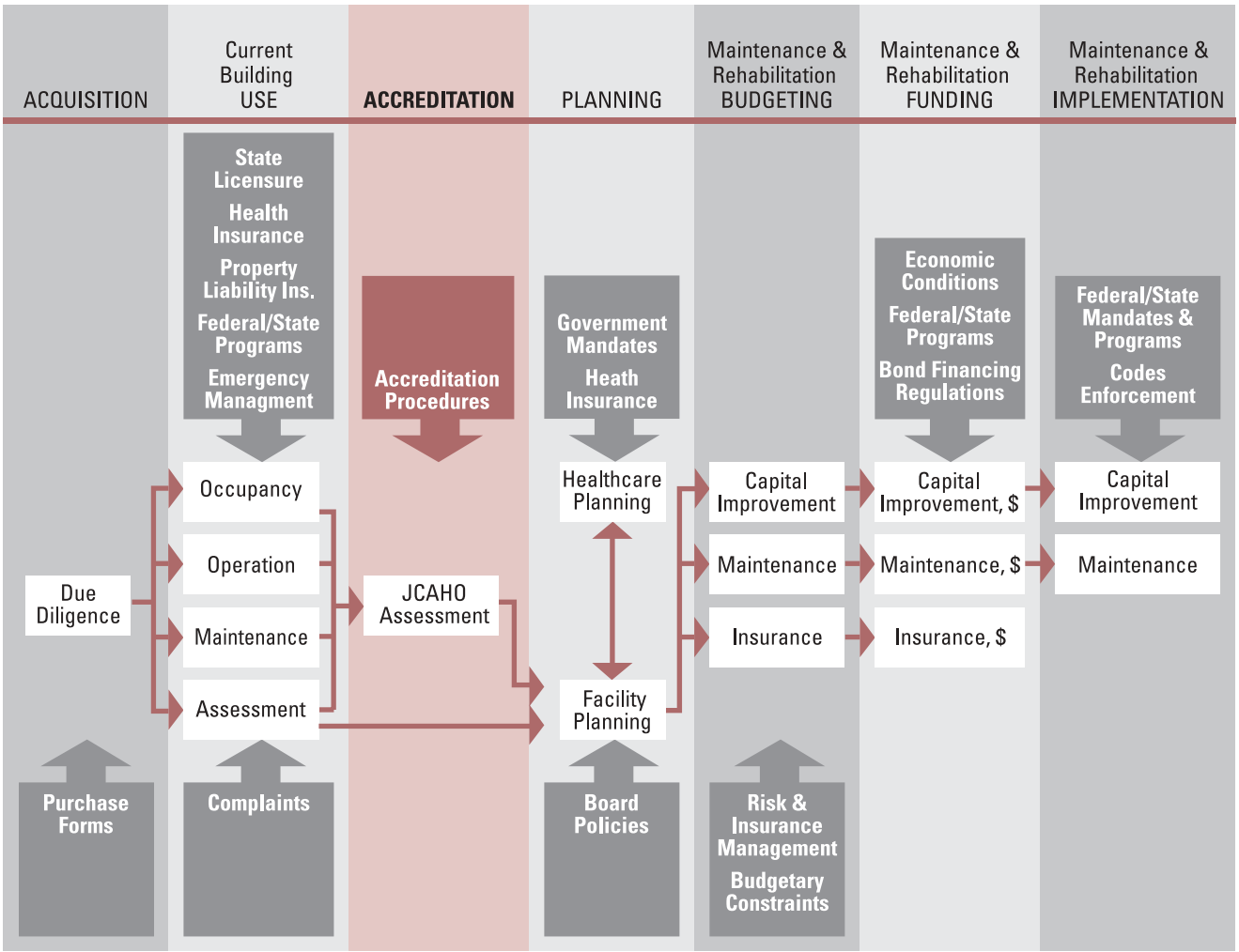
The extent of complaints about seismic vulnerability generated by hospital occupants is not known. Safety concerns of hospital staff in Utah have reportedly included seismic safety.

3. The ACCREDITATION *Phase of Hospital Facility Management*

Typical Process

The accreditation phase of the typical hospital facility management process consists of a variety of evaluation and inspection activities and is influenced by external pressures, as depicted in Figure 5.

Figure 5: Accreditation



Typical Process

Joint Commission on Accreditation of Healthcare Organizations (JCAHO) Assessment: JCAHO provides voluntary accreditation to healthcare organizations including hospitals. The Commission has been accrediting hospitals for more than 40 years. Its accreditation is a nationwide seal of approval that indicates a hospital meets high performance standards.

Despite its voluntary nature, this accreditation is, de facto, mandatory in most states, because all federal payments and reimbursements, including Medicare and Medicaid payments, are made to only JCAHO-accredited organizations. Some states, including Utah, have alternative accreditation programs that are recognized by the federal government.

JCAHO accreditation is done on a 3-year cycle. Every 3 years a hospital is assessed for compliance with JCAHO accreditation standards.

Influences and Related Seismic Considerations

As indicated in Figure 5, one external factor (down arrow) influences accreditation phase decision making.

Accreditation Procedures: JCAHO accreditation is a critical external factor that influences hospital operations, including facility management. The procedures of JCAHO accreditation of hospitals are covered in the *Comprehensive Accreditation Manual for Hospitals*, which includes EC3.2.1 – Designing the Environment of Care. EC3.2.1 contains many standards that address building performance, including compliance with NFPA 101, *Life Safety Code*©.

Environment of Care (EC) standards EC.1.4 and EC.2.4, amended and expanded in January 2001, require hospital, ambulatory care, behavioral health, home care, and long term care organizations to develop and implement a management plan that ensures effective response to emergencies affecting the delivery of healthcare. It requires the emergency management plans to address the following four phases of emergency management activities:

- Mitigation
- Preparedness
- Response
- Recovery

The JCAHO defines “emergency” as:

> “a natural or manmade event that suddenly or significantly:
>
> - disrupts the environment of care (for example, damage to the organization’s buildings and grounds due to severe windstorms, tornadoes, hurricanes, or earthquakes);
> - disrupts care and treatment (for example, loss of utilities due to floods, civil disturbances, accidents, or emergencies within the organization or in its community); or
> - changes or increases demands for the organization’s services (for example, bioterrorist attack, building collapse, or airplane crash in the organization’s community).”

The official JCAHO newsletter, *Perspectives*, dated December 2001, includes the following discussion of mitigation:

"Mitigation activities lessen the severity and impact of a potential emergency. Mitigation begins by identifying potential emergencies (hazards) that may affect the organization's operations or the demand for its services, followed by implementing a strategy that supports the perceived areas of vulnerability within the organization."

Standard EC.2.9.1 requires organizations to execute the emergency management plan by conducting emergency management drills.

The American Society for Healthcare Engineering (ASHE) has developed a tool, entitled *Hazard Vulnerability Analysis,*[1] to help organizations develop an emergency management plan. It is a simple matrix that lists a variety of hazards, including earthquake, and requires the rating of each in terms of its probability (on a 4-point scale from "none" to "high"), risk (on a 5-point scale from "low disruption" to "life threat"), and preparedness (on a 3-point scale from "poor" to "good"). The values on each scale are multiplied to arrive at a total value for each hazard. The tool instructs: "Determine a value below which no action is necessary. Acceptance of risk is at the discretion of the organization."

Seismic Consideration

Earthquake damage to hospitals is specifically noted in both the JCAHO standard and in the ASHE tool as a potential hazard to be addressed in the management plan. This document, *Incremental Seismic Rehabilitation of Hospital Buildings,* can be used in developing the management plan.

4. The PLANNING Phase of Hospital Facility Management

Typical Process

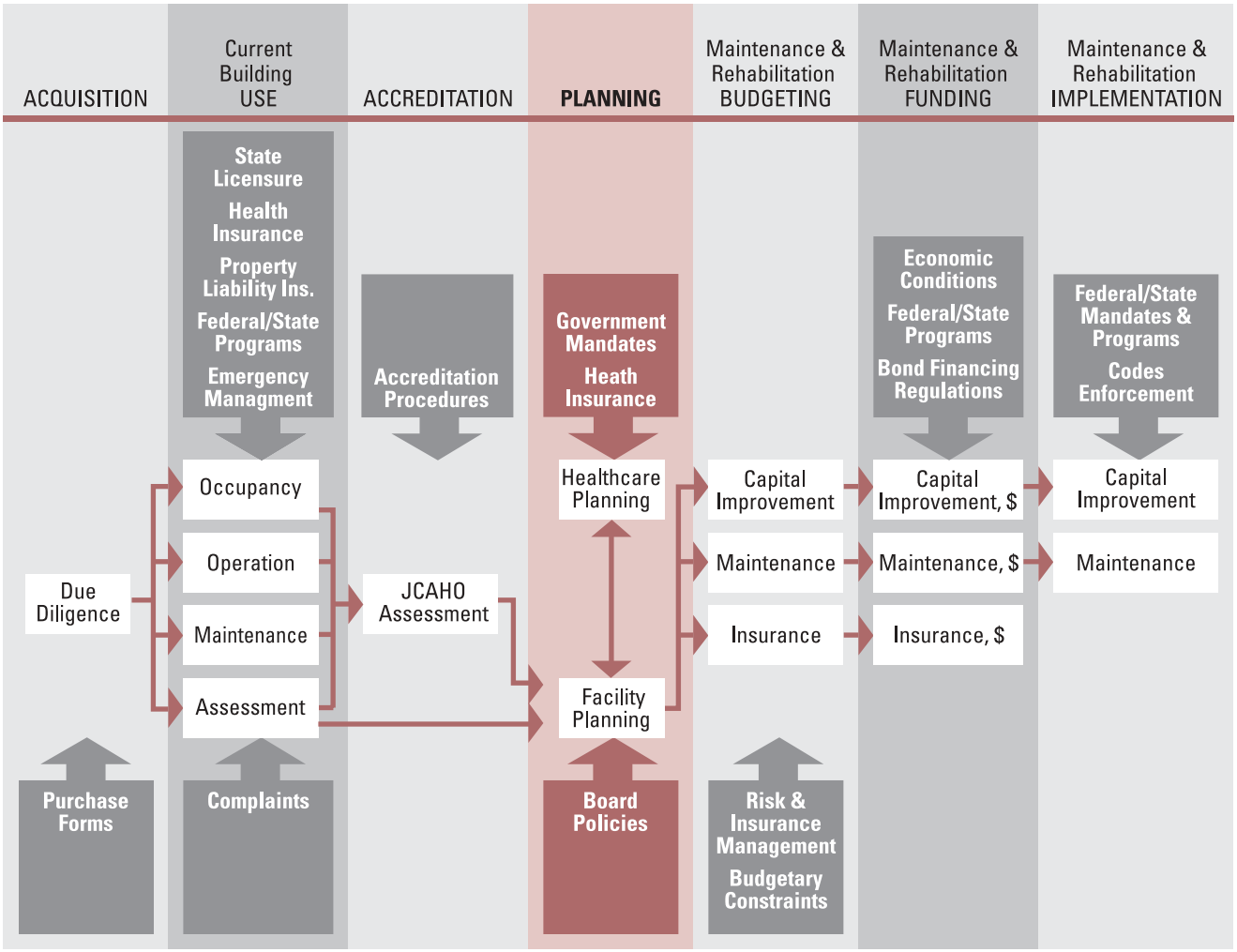
The planning phase consists of projecting and forecasting future needs. It can be carried out periodically or continuously, and it may vary as to the time period covered by the projections and forecasts. Planning functions may be carried out by the hospital administration as well as central healthcare organization staff, with or without the assistance of consultants. Planning consists of two separate but related activities—healthcare planning and facility planning—and is affected by both external government and health insurance requirements and internal board policies, as depicted in Figure 6.

Healthcare Planning: Healthcare planning attempts to formulate future healthcare delivery programs and their support needs by analyzing and forecasting several factors, such as:

- demographics (population growth or decline, neighborhood shifts, etc.)
- healthcare philosophy
- medical technology
- cultural and socioeconomic factors
- federal and state mandates
- equity and civil rights

[1] Healthcare Facilities Management Series, Management Monograph #055920, Susan B. McLaughlin, February 2001, ASHE of the American Hospital Association.

Figure 6: Planning



A national trend in healthcare planning is the movement toward outpatient care, driven by health insurance and best-practice medical care.

Healthcare planning is generally carried out by the central healthcare organization's staff. However, specific medical service improvements are generated by hospital department heads who suggest reorganization within their respective departments.

Facility Planning: Facility planning consists of preparing long-range facility plans, strategic facility plans, or a similar document. It combines the products of three distinct activities—the healthcare plan, the facility assessment, and the JCAHO accreditation (see Figure 6)—into a detailed projection of facility requirements. Thus, it is a product of the combined efforts of individual hospital staff and central healthcare administration staff. The projection may cover a defined time frame, such as 5 years.

Different organizations may use different classifications of projects in their facility plans, reflecting a variety of legal, administrative, jurisdictional, and other factors. However they may be classified, a comprehensive facility plan should include the following elements:

- New construction
- Additions to existing buildings
- Renovations of existing buildings
- Building systems replacements
- Building systems repairs
- Scheduled maintenance
- Preventive maintenance
- Building disposition (change of use, sale, demolition)

The plan will identify the time frames in which each project is to be accomplished, and it may include cost estimates. Some experts have conceptualized the facility plan as consisting of four general categories, which may provide guidance for budgeting:

- Physical plant renewal
- Physical plant adaptation
- Catch-up maintenance
- New construction

If effective, the facility plan will be used as a budgeting tool and will provide direct inputs into the budget process. It should be revised and updated on a routine basis to reflect:

- Changes in the healthcare delivery plan
- Revised facility assessments
- Budgeting and funding realities

Influences and Related Seismic Considerations

As indicated in Figure 6, two external factors (down arrow) and one internal factor (up arrow) influence current planning phase decision making.

Board Policies: In terms of internal influences, healthcare organization boards may occasionally adopt written policies on issues of political and social significance that can affect both healthcare and facility planning. These policies guide the actions of the healthcare organization.

Seismic Consideration

Boards may adopt policies addressing seismic issues, including seismic performance objectives and rehabilitation of hospital buildings, either as a one-time task or a recurring incremental program.

Government Mandates: Federal, state, and local government agencies have historically established external requirements affecting the planning phase as regards both healthcare delivery planning and facility planning. These requirements may have facility rehabilitation implications. Some of these requirements may be accompanied by funding, perhaps providing an opportunity to integrate disparate objectives into coordinated actions.

Seismic Consideration

Currently, federal or state programs do not include seismic rehabilitation mandates or implications applicable to non-federal hospitals, with the exception of California.

Health Insurance: Health insurance programs, both federal (Medicare and Medicaid) and private, establish external requirements affecting the planning

phase with regard to healthcare delivery planning, and possibly facility planning as well. Medicare depreciation schedules are one example of the latter.

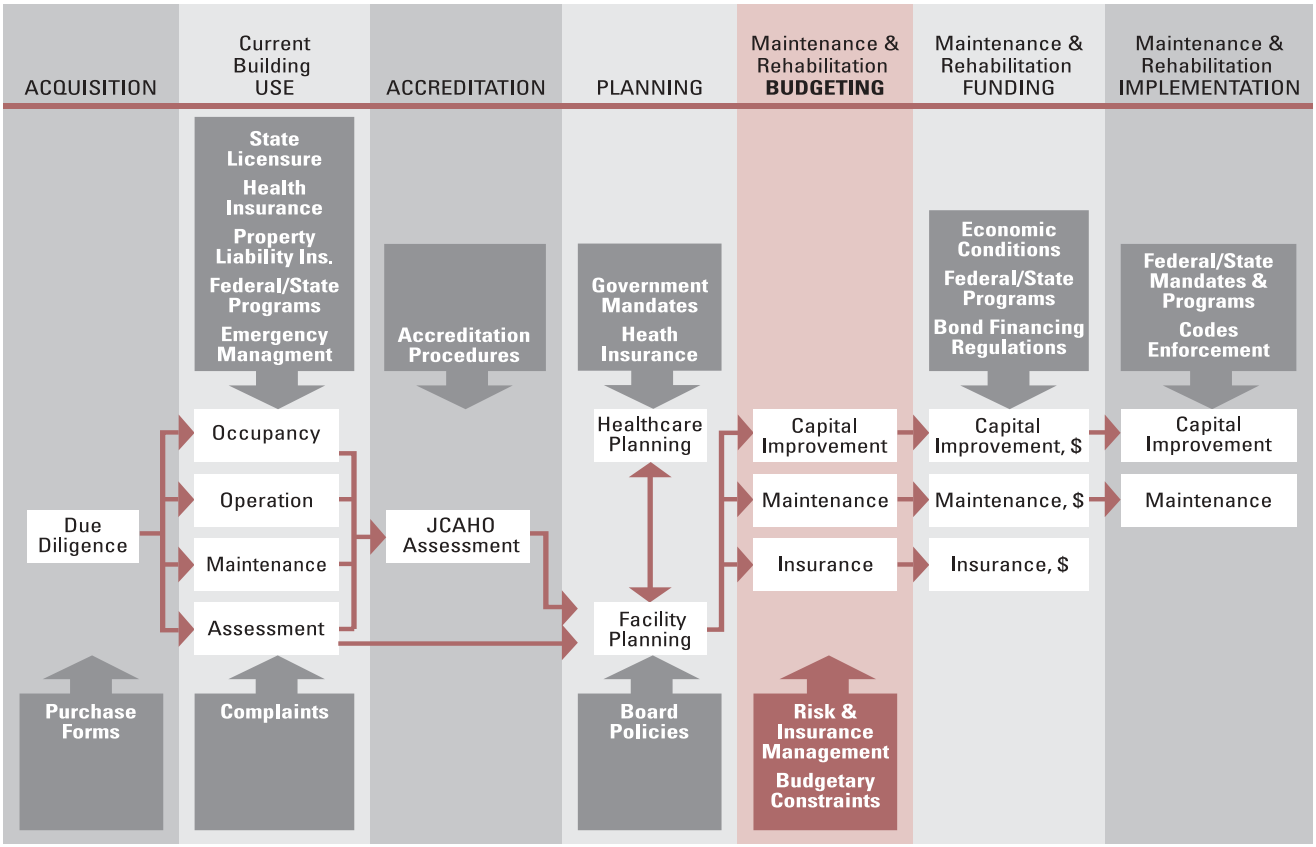
Seismic Consideration
Currently, no seismic rehabilitation mandates or implications exist in any health insurance programs.

5. The Maintenance and Rehabilitation BUDGETING Phase of Hospital Facility Management

Typical Process

The budgeting phase consists of the projection of future financial resources required to meet future needs. It is carried out annually (covering a period of one or more years). Each hospital director initiates the budgeting phase with input from the respective hospital engineering department and safety officer. Organization-wide, the vice president for facilities services oversees the budget development. The facility budget is a process that can be thought of as percolating up through the organization. It is affected by externally influenced risk management policies and internal budget constraints, as depicted in Figure 7.

Figure 7: Budgeting



Three elements of the budget are relevant to the discussion of facility management:

- Capital
- Maintenance
- Insurance

Capital Budgets: Capital budgets generally relate to the acquisition of buildings and major systems and to major additions to existing buildings, the occurrence of which is not annual or repetitive and which can therefore be amortized. The distinction between capital and maintenance budgets may vary among different healthcare organizations. At one extreme is a total separation, mandated by law, labor jurisdiction, or other factors. At the other extreme is a rather unclear separation between the two funding mechanisms.

Maintenance Budgets: Maintenance budgets generally relate to recurring annual expenditures and address existing inventories of buildings and systems without adding to the inventories. Maintenance activities are often part of operations budgets or general fund budgets.

Insurance Budgets: Financial resources earmarked for insurance may be used in different ways, including the purchase of third-party insurance, the contribution to a regional or statewide risk and insurance pool, and/or the funding a self-insurance reserve. Property and general liability insurance are relevant to facility management considerations.

Influences and Related Seismic Considerations

As indicated in Figure 7, two internal factors (up arrow) influence budgeting phase decision making.

Budgetary Constraints: Internally, political and economic conditions may place limits on hospital budgets. The problem is often exacerbated by unfunded mandates imposed on healthcare organizations by federal and state agencies.

> **Seismic Consideration**
>
> **The strategy of integrating incremental seismic rehabilitation with other work, which is an integral part of this facility and financial management model, can provide a method for addressing seismic risk reduction within budget constraints. See full discussion of this opportunity in Section B.2.2.6, Seismic Rehabilitation Planning for Specific Buildings.**

Risk and Insurance Management: The healthcare organization's risk and insurance management requirements, developed in response to external insurance influences, may have a direct or indirect role in the budget phase of the process regarding the decisions related to insurance. Medicare, for example, sets limits on capital and operating budgets and establishes detailed depreciation schedules, which influence levels of reimbursement.

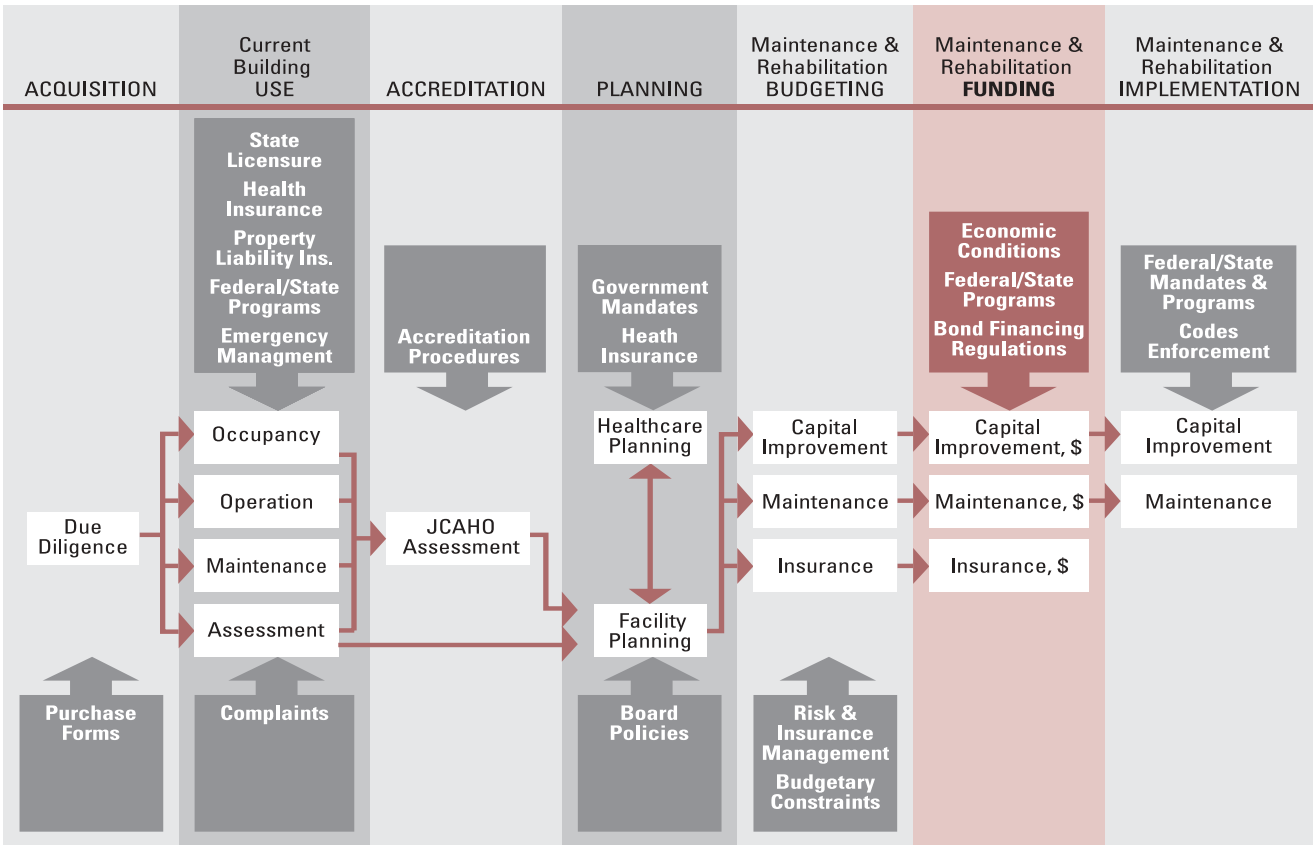
> **Seismic Consideration**
>
> **In areas of seismic hazard, the risks of building loss or damage, occupant death or injury, and healthcare organization liability must all be assessed. It must be decided whether to seek earthquake property and casualty insurance coverage and general liability coverage. Insurance companies that offer such coverage do not usually offer incentives to customers to undertake loss reduction measures in the form of seismic rehabilitation. However, this situation might change, and the question may be subject to negotiation.**

6. The Maintenance and Rehabilitation FUNDING Phase of Hospital Facility Management

Typical Process

The funding phase consists of obtaining the financial resources to meet hospital needs. The funding of hospital budgets in general, and of the three budget elements of capital, maintenance, and insurance, varies from one healthcare organization to another. Funding is influenced externally by regional and local economic conditions, federal and state programs, and bond financing regulations, as depicted in Figure 8.

Figure 8: Funding



States vary widely in their contribution to local hospital budgets. Some states limit their contribution to capital budgets and others to a general fund.

Healthcare organizations can fund their budgets by various combinations of the following sources: revenue from operations, interest income, debt (bond financing), and taxation (in the case of public hospitals). The latter (debt and taxation) are in some cases controlled or limited by state constitutions or by periodic voter initiatives. Different hospital budgets may be subject to varying requirements of approval of taxation and/or debt by the electorate.

There are many local variations in funding where healthcare organizations, municipalities, and counties have overlapping jurisdictions.

Influences and Related Seismic Considerations

As indicated in Figure 8, three external factors (down arrow) influence funding phase decision making.

Regional and Local Economic Conditions: Externally, the funding of hospital construction is subject to local and national socio-economic conditions well beyond the control of the healthcare organization. Construction funding depends on interest rates, the region's and organization's bond rating, and similar parameters.

Seismic Consideration

Even though seismic rehabilitation is clearly a risk reduction activity, there is no evidence that any healthcare organization has improved its bond rating as the result of undertaking seismic mitigation activities of any kind.

Federal and State Programs: The funding of hospital construction and rehabilitation may be subject to federal and state programs beyond the control of the healthcare organization.

Seismic Consideration

While these programs are not likely to address seismic rehabilitation, they should be taken full advantage of for seismic rehabilitation purposes.

Bond Financing Regulations: Local administrative procedures and structure in place to obtain bond financing will have a significant impact on the ability of a healthcare organization to achieve its objectives, regardless of whether they include seismic risk reduction or not. Certain types of expenditures out of the proceeds of a bond issue, such as operations or maintenance, may be prohibited by the conditions of the bond.

Seismic Consideration

Some seismic rehabilitation increments may be classified as repair or maintenance work, and thereby be precluded from a capital improvement bond. As explained in Section B.2.2.9, Seattle Public Schools used two types of bonds (Capital Levy Bonds and Capital Improvement Bonds) to cover the funding of its incremental seismic rehabilitation program in response to Washington state law.

7. The Maintenance and Rehabilitation IMPLEMENTATION Phase of Hospital Facility Management

Typical Process

The implementation phase includes design and construction and can be broken into four categories of projects, of which the latter three are relevant to existing buildings:

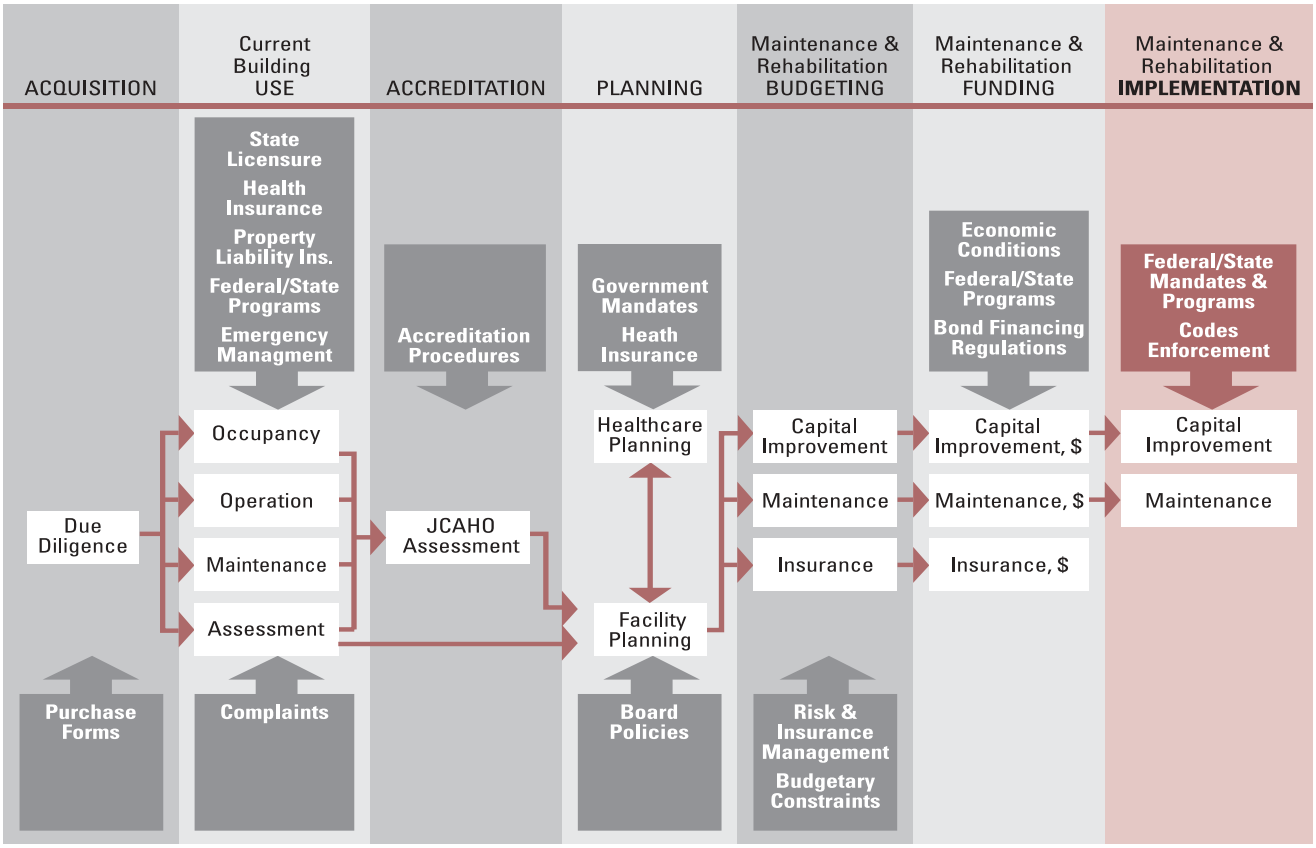
- New building construction projects
- Building acquisition projects
- Capital improvement projects
- Maintenance projects

The implementation phase is primarily affected by external federal and state programs and building code requirements, as depicted in Figure 9.

Acquisition of existing buildings is discussed above as the first phase of the facility management process.

Capital improvement and maintenance projects are managed by healthcare organization or individual hospital staffs, and carried out by these staffs and by contractors. The management of these two categories may be separated or combined, depending on issues of labor jurisdiction and legal authority.

Figure 9: Implementation



Influences and Related Seismic Considerations

As indicated in Figure 9, two external factors (down arrow) influence implementation phase decision making.

Federal and State Mandates and Programs: Externally, federal and state programs may establish requirements affecting the implementation phase (e.g., ADA and OSHA requirements). Additionally, governmental funding programs may mandate requirements for facilities in participating healthcare organizations (e.g., energy conservation).

Seismic Consideration

Currently there are no seismic rehabilitation mandates or implications in any federal programs related to existing non-federal hospitals.

Codes and Code Enforcement: Also externally, building codes, as well as the *Life Safety Code*©, impose requirements on the implementation phase, in cases of repair, alteration, or addition to existing buildings. These requirements may be enforced by a state or local agency, or there may be a requirement that hospital building staff be responsible for their enforcement. Such requirements can add costs to a project and jeopardize feasibility, unless done incrementally.

Seismic Consideration

Codes do not mandate seismic rehabilitation in repair and alteration projects, though additions must comply with building code seismic requirements. Incremental seismic rehabilitation is consistent with most building code requirements applicable to existing buildings.