NIST Strategic Facilities Plan

Presentation to the Visiting Committee on Advanced Technology
October 29, 2008

Agenda

- Are we addressing current and future needs of NIST's programs with adequate facilities?
  - Ability of existing buildings to support NIST mission
  - Facilities Improvement Plan 1998-2008
- Is NIST using the right metrics? Are there other metrics we should use?
  - Facilities Condition Index
  - Safety, Capacity, Maintenance and Major Repairs (SCMMR)
  - Mission Dependency and Facility Utilization
- Is NIST missing other opportunities?
  - Strategic Facilities Plan 2011-2021

Ability of Existing Buildings to Support NIST Mission

NIST Campuses/Sites

- **Gaithersburg** – 55 buildings & structures totaling 3.5M gsf on 578 acres, built in the 1960's. Latest buildings added in 1999 and 2003.
- **Boulder** – 26 buildings & structures totaling 0.5M gsf on 208 acres, built in the 1950's.
- **Ft. Collins** – a 390-acre site housing NIST radio stations, built in 1963.
- **Kauai** – 6,000 gsf building housing NIST radio station, located on US Navy's 30-acre site in Hawaii (1971).

Facility Condition Assessments

- **Gaithersburg** – Completed in 2004. Over 70% of buildings rated poor, with a total deferred maintenance cost of nearly $458M. An annual investment of approx. $70M is needed to systematically address the deficiencies.
- **Boulder** – Completed in Summer of 2008. Over 70% of facilities rated poor. Deferred maintenance costs total $48.5M.

Ability of Existing Buildings to Support NIST Mission

Physical Appropriateness of Research Facilities built in '50s/'60s

- Ability to meet modern research standards
  - Building systems & equipment obsolete
  - Energy use extremely inefficient
  - Do not meet current building codes and standards
  - Unable to meet precise measurement & research requirements
- Physical Configurations
  - Low floor-to-floor heights
  - No separation between labs and services.

Sustaining NIST Core Measurements and Standards Capabilities

- Increased Need for High Performance Laboratory Space
  - Stringent control of temperature, vibration, humidity and air cleanliness required for the most demanding research and measurements

Changing Needs for 21st Century Research

- Future NIST focus areas will require facilities that support specialized research

NIST Facilities Improvement Plan 1998-2008

- Developed in 1998 and updated with Addendums through 2008
  - Studies in 1990's demonstrating 67% percent of NIST lab space failed to meet program needs due to severe technical obsolescence and deteriorating conditions.
  - Also found several buildings and programs severely overcrowded.
- Identified goals included:
  - Alleviate overcrowding while providing higher quality lab environments
  - Achieve significant reduction in the maintenance backlog
  - Improve utility services and distribution systems in Boulder
  - Improve and expand clean room facilities in Boulder
  - Undertake major renovations of the General Purpose Laboratories
- Provided NIST with the vehicle for funding requests to improve NIST research facilities with three priorities: new construction, renovation, and maintenance
- Funding secured for several important capital projects & SCMMR

Current Projects in Support of the NIST Mission

Central Utility Plant, Boulder

- The Central Utility Plant (CUP) will provide chilled water for cooling, high pressure steam for heating, and laboratory quality compressed air service to the NIST Boulder facility
- A Site Utility Distribution System (SUDS) was integrated with the CUP. The SUDS will distribute utilities to Buildings 1, 2 & 3.
- Schedule: 2003-2208
- Cost: $34.9 Million (funded over 4 fiscal years)
- Rectifies the lack of centrally distributed utilities which has caused a severe loss of productivity in the labs due to inadequate services and disruptions. Dramatically improves environmental stability for the labs and increases research and measurement productivity. Will directly support construction of the Building 1 Extension.

Current Projects

- NCNR regarded as most scientifically productive and cost-effective neutron facility in US, serving more scientists and engineers than all other US facilities combined.
- Project includes development of a new neutron cold source together with a new guide tube hall, modernization of the control system, and five new world-class neutron instruments.
- Schedule: 2008-2012
- Cost: 39.0 M (funded over 3 fiscal years)
- Greatly improves capacity and scientific capabilities of the NCNR as it will serve an additional 500 research participants and will support 30% increase in the number of cold neutron instruments. Creates new measurement capabilities directly supporting the needs of science and industry. Operations will be more cost-effective as the expansion does not increase costs to operate the facility, but increases the number of instruments.

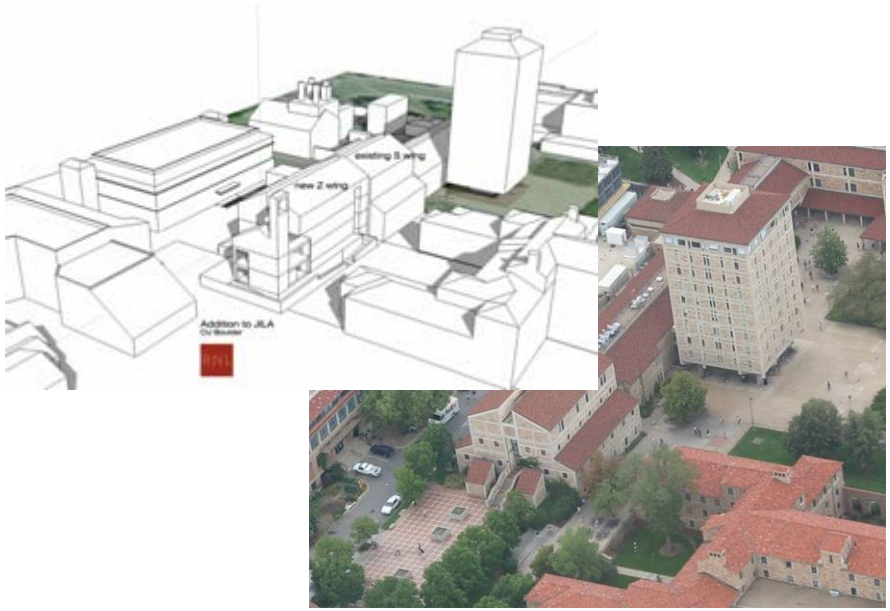
NIST Center for Neutron Research (NCNR) Expansion, Gaithersburg

Current Projects

- Construct Extension to Building 1 to provide 58,000 nasf of unique, high-performance space with stringent control of temperature, vibration, humidity and air cleanliness.
- Schedule: 2007-2011
- Cost: $77.2M (over 3 fiscal years)
- Provides new high-performance lab space that will enable NIST to support measurement science, research, and development of new technologies in multiple critical fields. Construction of new lab space with highest level environmental controls costs less than renovation, delivers higher performance space than renovations alone, and does so more quickly. Addresses needs of approximately 25% of NIST-Boulder programs that require most stringent laboratory performance. Allows future renovation of Building 1.

Building 1 Extension, Boulder Laboratories

Next Facility Priorities



JILA Building Expansion

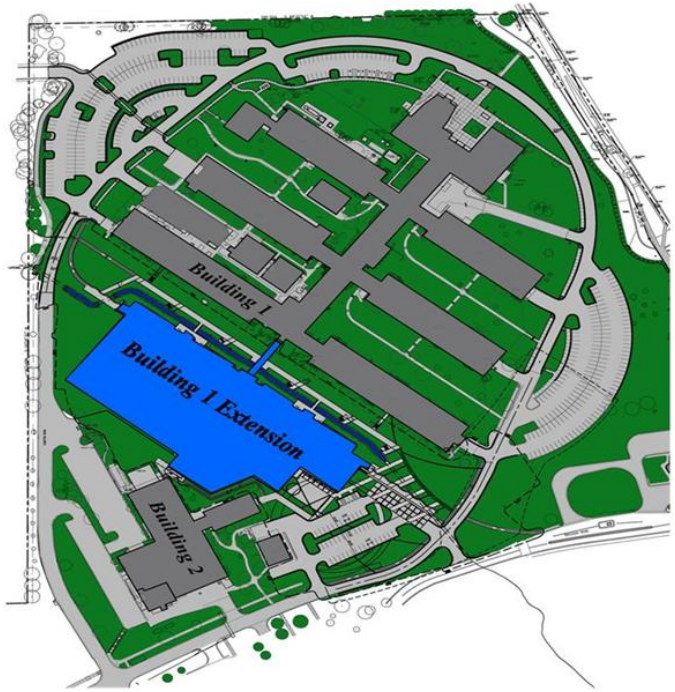
- JILA, a joint institute of NIST and the University of Colorado, is an international leader in Atomic, Molecular and Optical (AMO) science
- Expansion provides 50,000 gsf additional laboratory and office space to alleviate overcrowding and provide high performance lab environment
- Schedule: 2008-2010
- Cost: $27.5M
  - Federal: $22.5M over 2 fiscal years
  - State: $5M direct PLUS land, infrastructure, utilities and services

Expected Impacts

- Maintain world-class leadership and increase breadth of science at JILA
- Increase AMO science training capacity
- Increase productivity of JILA scientists
- Improve JILA safety

Next Facility Priorities

Building 1 Renovation, Boulder



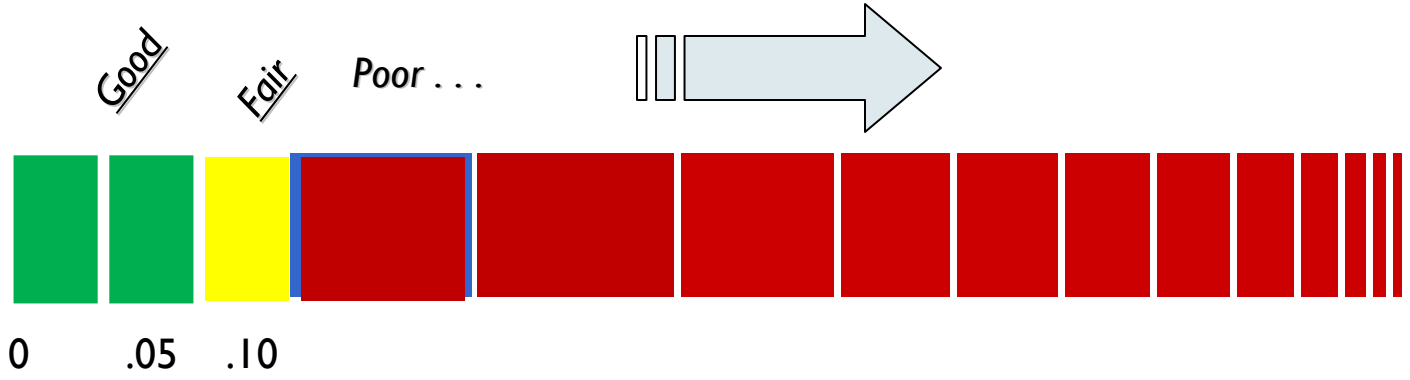
- Building 1 Renovation will provide 80,000 nasf lab space with significantly improved control of temperature, vibration, humidity, air cleanliness at "L3" performance.
- Addresses needs of about 75% of NIST Boulder programs that require significant improvements in laboratory performance.
- Schedule: Phased - planning/design in FY2010, renovation FY2011-2015
- Cost: Est. $67M (over 5 fiscal years)
- Enables dramatic productivity improvements and addresses key national needs in Boulder programs - nanotechnology, biotechnology, alternative fuels, telecommunications, advanced materials, precision timing, and many other areas.

Facilities Performance Metrics

Facility Condition Index (FCI)

- Is an industry standard parametric tool used to relatively compare building conditions.

$$FCI = \frac{\text{total cost of existing repairs}}{\text{current replacement value}}$$



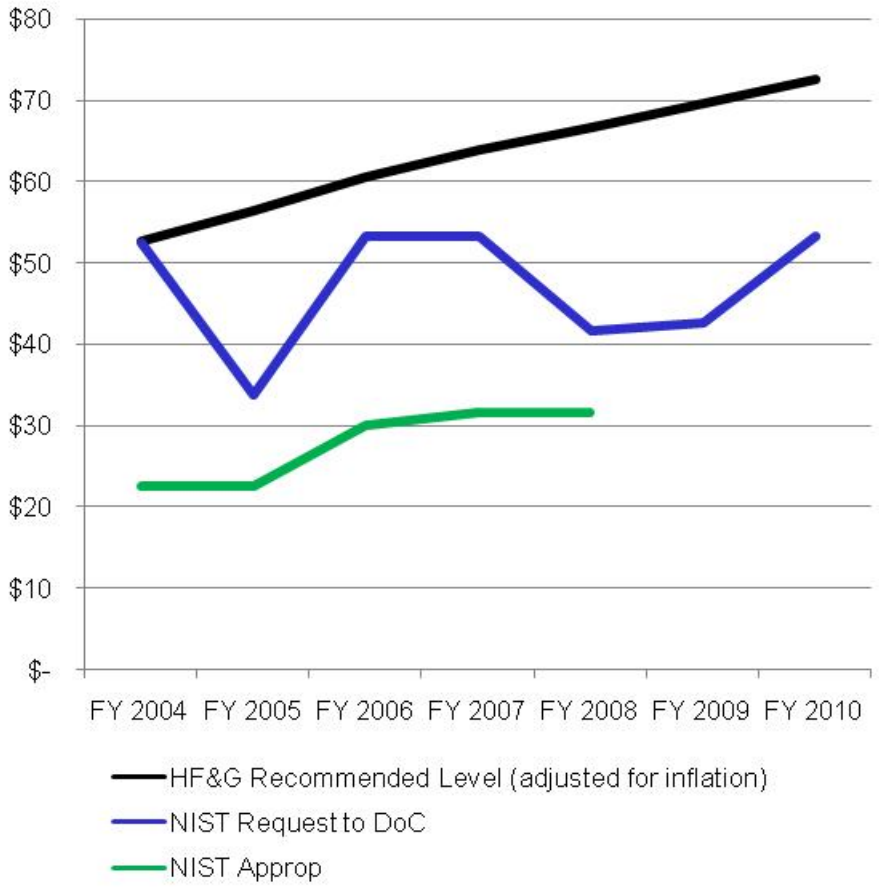
Safety, Capacity, Maintenance and Major Repair Program (SCMMR)

- "The use of SCMMR funds shall be limited to maintenance, alteration and repair of NIST capital assets, including buildings and building equipment and systems, as well as grounds and civil engineering systems (e.g. roads and utility distribution)."
  - Safety – Projects related to the safety of staff and surroundings
  - Capacity – Projects related to systems capacity
  - Maintenance & Major Repairs – Projects related to maintenance, repair and replacement of systems/equipment due to failure, obsolescence or degradation
- Prioritized implementation plan using Decision Model that considers:
  - Condition of the NIST sites and facilities
  - Criticality of the Project, i.e. safety, regulatory, NIST mission
  - Ability to execute the project
  - Environmental and Energy Standards
  - Age or Obsolescence of Facility
- The annual SCMMR Plan includes the highest priorities that can be implemented within available resources.

SCMMR Program Funding Strategy

SCMMR is key component of a comprehensive Facilities Improvement Plan

- Engineering study recommended annual investment target of 3% of Current Replacement Value (CRV) to:
  - Stop the growth of the backlog
  - Achieve a mid-range fair FCI in 7 yrs
  - Maintain FCI at recommended level
- Based on the 2004 study and investment targets, previous years' budgets have not increased the SCMMR funding sufficiently
- Investment of $350M needed over 5-7 years to reduce current backlog and achieve fair FCI; appropriate funding rate is about $70M annually



Other Performance Metrics

- Mission Dependency
  - The value a facility brings to the performance of the mission as determined by the agency
    - Mission Critical
    - Mission Dependent
    - Not Mission Dependent
- Utilization Rate
  - Ratio of occupancy to design capacity
    - Over-utilized
    - Utilized
    - Under-utilized
    - Not utilized

New Opportunities
Strategic Facilities Plan FY 2011-2021

- Provide comprehensive 10-year facilities strategy that advances NIST programs and priorities
- Balance projects to advance research, maintain facilities, support sustainability and enhance work environment
- Anticipate agency requirements and provide options
- Develop rolling 5-yr funding strategy for capital improvements
- Involve and include the NIST research community
- Strengthen tie with NIST's mission and goals
  - Direct OU and Program input
  - Facilities Planning Board with representation across NIST
  - NIST Leadership Board direct involvement

Strategic Facilities Plan

Process

- Call to OUs for projected staffing and space requirements
- Facilities Planning Board as an advisory committee to the CFMO on long-range facilities planning issues
  - Define the goals for the facilities program
  - Establish prioritization model for evaluating competing facilities priorities
  - Review and prioritize NIST-wide facility requirements
- CFMO brings recommendations to NIST Leadership Board
- NIST Leadership Board approves Strategic Facilities Plan
- NIST will use Plan to develop FY2011 CRF budget request

Strategic Facilities Plan

Goals

- Align the Strategic Facilities Plan with NIST strategic goals, objectives and priorities to address current and future program requirements.
- Optimize the use of existing NIST facilities to support the NIST mission.
- Maintain and recapitalize existing facilities to achieve appropriate condition levels and ensure reliable and cost-effective facilities.
- Ensure safe and secure facilities.
- Improve energy efficiency and sustainability of NIST facilities.
- Provide a high quality environment for NIST employees, associates and visitors.

Strategic Facilities Plan

Prioritization Criteria

- Each facility proposal will be sorted into 1 of 3 categories as its primary driver:
  - Enhance NIST Scientific Capability and Capacity
  - Maintain Existing Facilities & Infrastructure
  - Enhance Support to NIST Operations
- The projects will be prioritized within each category. This process will give the Strategic Facilities Plan a balanced approach between new facilities, reinvestment in existing facilities and adequate support facilities.

Strategic Facilities Plan

Framework

- Facilities Program Goals, Priorities and Strategies
  - Context of NIST strategic goals and focus areas
- Drivers and Challenges
- Current Inventory and Stewardship (Metrics)
  - Facility Condition Index, Mission Dependency, Facility Utilization
- Facility Program Components
  - Sustainment, Restoration, Recapitalization/Modernization, New Construction
- Current/Ongoing Capital Projects and New Initiatives
- Strategic Facilities Plan and Funding Plan

Strategic Facilities Plan FY 2011-2021

Conclusions

- Plan will be completed in February 2009.
- Will lay out a reasonable yet aggressive plan for improving NIST facilities to meet current and anticipated needs.
- Revitalizing NIST's facilities is crucial for supporting its core measurement and standards mission and for responding to the programmatic plan and future focus areas.
- Key Questions answered?
  - Are we addressing current and future needs of NIST's programs with adequate facilities?
  - Is NIST using the right metrics? Are there other metrics we should use?
  - Is NIST missing other opportunities?