



# BFRL News

## Building and Fire Research Laboratory

NIST National Institute of Standards and Technology • U.S. Department of Commerce

Hello,

October 2008

This is the first edition of a new NIST Building and Fire Research Laboratory (BFRL) newsletter. This newsletter will be a valuable tool to communicate with the communities we serve and with our many and varied stakeholders. We recognize that BFRL is but one of a number of players involved in advancing the performance, productivity, and cost-effectiveness of built facilities. Increasingly, we see ourselves as a node in a larger network of organizations dedicated to better, more efficient, safer, and less costly facilities.

We are constantly looking for opportunities to extend our impact through partnerships and collaborations, and encourage you to send us your thoughts and suggestions on how, working together, we may be an even greater influence for beneficial change and growth. I hope that reading this newsletter will motivate you to develop even closer relationships with us. I encourage you to visit our web site (<http://www.bfrl.nist.gov/>) and look forward to hearing from you ([bfrl@nist.gov](mailto:bfrl@nist.gov)).

Sincerely,

**Dr. S. Shyam Sunder**

Director, Building and Fire Research Laboratory

## NIST Leader Calls for Commitment to Technology Innovation, Collaboration in Construction Industry



Photo credit: CII

"Progress in research, development, and the application of new technology will be essential to ensuring that the nation's vast construction industry remains a world leader," James M. Turner, Deputy Director of the National Institute of Standards and Technology (NIST), said August 7, 2008 at the Construction Industry Institute Annual Meeting in Keystone, Colorado. The construction industry accounts for as much as one-seventh of the U.S. economy. Turner spoke at the 25th Anniversary Conference of the Construction Industry Institute (CII). CII is the industry's principal technology forum. NIST is the primary federal research laboratory serving the construction and fire-safety industries.

In his comments, Dr. Turner stated that, if productivity is the ultimate source of competitive advantage, we need to sharpen our focus on productivity performance in our largest economic sector. In this industry, productivity is about getting the best value across all of the many varied links in the complex construction value chain.

### Strategic Direction

BFRL is one of the Nation's primary federal laboratories serving the construction and building industries. We strive to be the source for creating critical solution-enabling tools-metrics, models, and knowledge-and promoting performance-based standards that are used by the U.S. building and fire safety industries to establish global leadership.

BFRL is involved in a wide range of scientific, engineering, and investigative work for the building and fire safety communities. We address technical challenges in response to critical national needs, with a particular mission focus on measurement science.

Our strategic goals include [net-zero energy high performance buildings](#), [breakthrough improvements in construction productivity](#), [sustainable infrastructure materials](#), [innovative fire protection](#), and [disaster-resilient structures and communities](#) under multi-hazards such as hurricanes, [earthquakes](#), and fires.

BFRL has specific statutory responsibilities for fire prevention and control, earthquake hazards reduction, windstorm impact reduction, and building and fire safety investigations.

### Focus on Recruiting

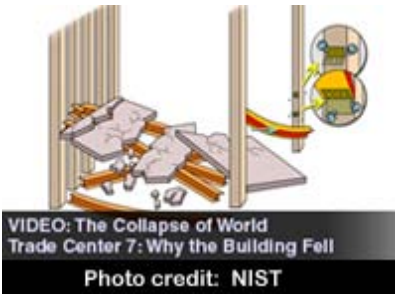
The strength of any organization is in its human capital resources. BFRL's

So, this is a systems problem of incredible complexity. The industry needs compelling metrics and decision-support tools if it is to achieve breakthrough improvements in productivity and not only through integration of information and automation technologies.

NIST has launched a multi-year collaborative research effort that aims to supply the measurement science capabilities necessary to guide the pursuit and realization of major gains in construction productivity. This multi-year R&D effort is expected to yield important practical dividends for the construction industry. And, through better-quality and lower-cost construction, customers also will profit.

For more information, and to view Dr. Turner's full comments, visit the NIST web site: [http://www.nist.gov/speeches/turner\\_080708.html](http://www.nist.gov/speeches/turner_080708.html).

## NIST WTC 7 Investigation Finds Building Fires Caused Collapse



The fall of the 47-story World Trade Center building 7 (WTC 7) in New York City late in the afternoon of Sept. 11, 2001, was primarily due to fires, NIST announced August 21, 2008, following an extensive three-year scientific and technical building and fire safety investigation. This was the first known instance of fire causing the total collapse of a tall building, the agency stated as it released for public comment its draft WTC investigation report and 13 recommendations for improving building and fire

safety. "Our study found that the fires in WTC 7, which were uncontrolled but otherwise similar to fires experienced in other tall buildings, caused an extraordinary event," said NIST WTC Lead Investigator Dr. Shyam Sunder. Heating of floor beams and girders caused a critical support column to fail, initiating a fire-induced progressive collapse that brought the building down.

According to the report, a key factor leading to the eventual collapse of WTC 7 was thermal expansion of long-span floor systems at temperatures hundreds of degrees below those typically considered in current practice for fire resistance ratings. WTC 7 used a structural system design in widespread use.

To reach the conclusions in its report, NIST complemented its in-house expertise with private-sector technical experts; accumulated an extensive collection of documents, photographs and videos related to the WTC events of 9/11; conducted first-person interviews of WTC 7 occupants and emergency responders; analyzed the evacuation and emergency response operations in and around WTC 7; and performed the most complex computer simulations ever conducted to model a buildings response behavior and determine its collapse sequence due to a combination of debris impact damage, fires and a progression of structural failures from local fire-induced damage to collapse initiation, and, ultimately, to global collapse.

For more information, and to view the draft report, visit the website: <http://wtc.nist.gov/>.

ability to accomplish its unique mission ultimately depends on its ability to attract and retain talented technical staff.

BFRL aspires to become the "employer of choice" in our arena by providing an environment where our scientists and engineers can work on challenging national problems, with top notch peers and mentors, outstanding facilities, and a comprehensive benefits package. We focus on the candidate, leverage partnerships and alliances, and tailor recruitment opportunities as appropriate.

One new tool in our "quest for talent" is the [BFRL Career Website](#).

BFRL is actively recruiting at all levels in many key areas (e.g., Simulation & Analysis of Building Mechanical Equipment and Controls, Photovoltaic Module/System Measurement Science, Information Systems Integration, Characterization of Indoor Contaminant Exposure). For more details, please visit the [BFRL Career Web Site](#).

## Recognitions

**Alan M. Lytle Receives  
ASTM/SES Robert J.**

**Painter  
Award**



[Alan M. Lytle](#), a research engineer in BFRL, is the recipient of the 2008 Robert J. Painter Award. The

award, given by ASTM International and the Standards Engineering Society, honors individuals who contribute the most outstanding service to standards development in a given year.

Lytle was recognized for his exceptional leadership and service in developing relevant

## BFRL Researchers Study How People Evacuate Tall Buildings

As part of an ongoing research project on the fire-safe design of egress systems, supported in part with funding from the General Services Administration (GSA), BFRL is collecting data on people movement in tall buildings in the United States (buildings that are 10 stories and higher). The objective is to provide scientific building evacuation data to improve the overall level of occupant safety in buildings and to contribute to a sound technical basis for improving the current egress requirements within the national model building codes and standards.



In April 2008, BFRL sent a team of researchers to study evacuation drills from three different high-rise buildings in the western United States. The research team observed people movement during evacuation drills from 10-, 24-, and 62-story office buildings. Video cameras were placed inside multiple stairways and at exit doors to capture people movement in egress systems during each evacuation drill. As a result of this trip, BFRL researchers collected over 50 hours of pixelized data on people movement during evacuation. Each videotape will be analyzed to obtain data on movement speeds of people down stairs as a function of occupant density, stair width, travel distance, delay time, encountering ascending emergency responders, and door size.

Secondary characteristics of interest include handrail usage, occupant stagger geometry, merging behavior, body sway, and body size.

For more information, contact Erica Kuligowski, [erica.kuligowski@nist.gov](mailto:erica.kuligowski@nist.gov) .

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standards in the evolving industry of 3D imaging systems. A member of ASTM International since 2006, Lytle is chair of ASTM Committee E57 on 3D Imaging Systems and also serves on Committee E54 on Homeland Security Applications.

Following active duty service as a nuclear-trained submarine officer in the U.S. Navy, Lytle joined the staff at NIST in 2001 as a robotics engineer and was selected to lead the Construction Metrology and Automation Group in 2004. His present research focuses on improving construction productivity through the use of automation systems and advanced field measurement.

### Management Updates

BFRL has a new management team in place to lead us into the future.

[Dr. William Grosshandler](#) is the Deputy Director of BFRL. [Mr. Christopher Currens](#) is the Associate Director for Program Development. [Dr. A. Hunter Fanney](#) is the Chief of the Building Environment Division. [Dr. Jonathan Martin](#) is the Chief of the Materials and Construction Research Division. [Dr. Anthony Hamins](#) is the Chief of the Fire Research Division. [Dr. Robert Chapman](#) is the Chief of the Office of Applied Economics. [Dr. Jack Hayes](#) is the Director of the National Earthquake Hazards Reduction Program (NEHRP) Office. [Ms. Karen Perry](#) is the Senior Management Advisor for BFRL.

[BFRL Organizational Chart](#)