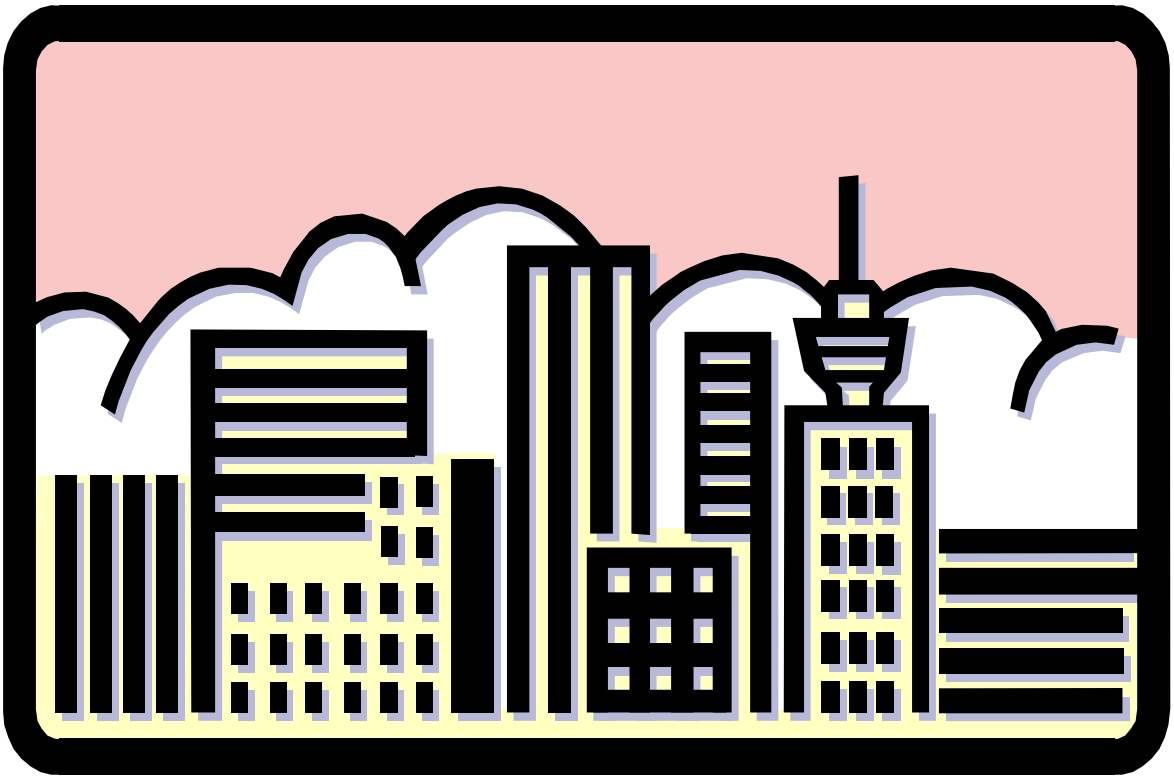
Global Policy Summit on the Role of Performance-Based Building Regulations in Addressing Societal Expectations, International Policy, and Local Needs

Summit Report



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Foreword

The latter part of the 20th Century and the beginning of the 21st Century has seen the emergence of performance-based approaches as being the way forward for building regulation. Numerous countries around the world are developing, or have implemented, performance-based building regulations. In the late 1990s, several countries took an important step in forming an international forum within which to exchange ideas, collaborate on developing a performance-based regulatory model, and to help themselves and others along the transition to performance.

In 2001, this international forum, the Inter-jurisdictional Regulatory Collaboration Committee (IRCC), recognized that building regulatory systems would soon be facing changing societal pressures and expectations, emerging global issues, and local pressures. To help the IRCC and others address such issues, the IRCC chose to hold a global summit, aimed at addressing emerging issues and pressures at a policy level. The intent was to include regulatory developers, policy-makers, and academicians inside and outside of the building regulatory arena, to raise awareness of issues, suggest tools, methods and approaches to addressing concerns, and to generally gain a better understanding of future issues and areas of focus.

The resulting Summit brought together nearly 100 leading thinkers, policy-makers, and practitioners from eleven countries around the world to address issues and offer thoughts on the challenges to performance-based regulatory systems of the future. Through two and a half days of intensive work, the Summit participants tackled several important concerns, and commented on what they see as critical challenges and needs.

The outcomes of this Summit do not provide final answers to what are unarguably highly complex issues. However, the Summit, with the issues that were discussed and suggestions that were proffered, will serve as a significant milestone in the future of global collaboration aimed at addressing changing societal pressures and expectations, emerging global issues, and local pressures on performance-based building regulatory systems.

Brian J. Meacham, Ph.D., P.E.
Editor

Acknowledgments

This Summit would not have occurred without the leadership of Robert Bowen, Director, Codes and Evaluation, National Research Council, Canada, and Chair of the Inter-jurisdictional Regulatory Collaboration Committee. The combination of Bob's leadership and of NRCC financial sponsorship was critical to the event's success. Also important was the contribution of Brian Meacham, Ove Arup & Partners, Chair of the Organizing Committee. Brian brought a breadth of knowledge and insight spanning various sectors of society along with the passion and drive to engage leading experts to join the building regulatory community in this summit. Likewise, the planning and administrative support of Richard Okawa, Vice President of International Services, International Code Council, and the financial support of the ICC and of the Australian Building Codes Board contributed significantly to the success of the Summit. Also critical to the success of the Summit was the financial support and suggestions from the reviewers at the National Science Foundation. The Summit would not have been possible without this critical support of these individuals and organizations.

The excellent venue for the Summit, the National Academy of Sciences building in Washington, DC, would not have been available without the event host, the National Research Council, particularly Richard Little, Director, Board on Infrastructure and the Constructed Environment. Likewise, we are indebted to Richard for compiling the Summit papers and presentations that accompany this report.

This Report would not have been possible without the listening, recording and reporting of the Summit reporters: Mr. Jon Traw, Traw Associates, and Prof. David Lucht, Director, Center for Firesafety Studies, Worcester Polytechnic Institute. Gentlemen – you are leaders in our community and we thank you very much for all of your hard and significant work.

The role of IRCC members in challenging ideas and looking to the future was an important catalyst behind the Summit and each in their way supported its development and key stakeholders participation.

We also acknowledge the important role played by the members of the Organizing Committee, as listed below:

- Dr. Brian Meacham, Ove Arup & Partners, USA (Chair)
- Mr. Robert Bowen, NRC, Canada, Chair of the IRCC
- Mr. Richard Little, National Research Council, USA
- Dr. Kathy Notarianni, National Institute of Standards & Technology, USA
- Mr. Richard Okawa, International Code Council, USA, and IRCC member
- Ms Beth Tubbs, International Code Council, USA
- Mr. Olav Berge, National Office of Building Technology and Administration, Norway, and IRCC member
- Mr. Wayne Bretherton, Australian Building Codes Board, Australia, and IRCC member
- Mr. Tomoki Sera, The Ministry of Land, Infrastructure and Transport, Japan, and IRCC member
- Mr. Paul Everall, Office of the Deputy Prime Minister, UK, and IRCC member
- Mr. Milosh Puchovsky, National Fire Protection Association, USA, and IRCC member
- Prof. David A. Lucht, Worcester Polytechnic Institute, USA

Finally and most importantly, we sincerely thank each and every speaker and participant. Your exceptional presentations and dialog will contribute to this important area well into the future.

Executive Summary

The Global Policy Summit on the Role of Performance-Based Building Regulations in Addressing Societal Expectations, International Policy, and Local Needs brought together nearly 100 regulatory developers, policy officials, designers, researchers, and academicians from around the world to address critical issues for the future of performance-based building regulation. Through a combination of invited papers and lengthy discussion sessions, important topics were addressed and direction for the future emerged.

Challenges
- What changing societal needs are being advanced?
- How to define actions to address those changing needs?
- Code vs. Market approaches? Appropriateness? Capabilities?
- How to set performance levels and how are they selected?

Global Culture and Society

Perhaps one of the most striking and important observations and outcomes is that the participants clearly saw a shifting frame of reference from a local, wealthy, developed country perspective to that of a global perspective, which recognizes that much of the world's population is living in comparative poverty, yet they too deserve buildings that meet basic requirements for health, safety and amenity, and that performance requirements need to reflect their situation. The message from David Eisenberg that "appropriate technology" is the way to go – appropriate to indigenous peoples and culture, appropriate to the environment, appropriate to resources – resonated with the Summit participants. As a global community, we need to stop looking at everything through the lens of developed countries, but adapt our worldview to include everyone. Reiterating the words of the late Bob Fowler, as presented by David Eisenberg, we have a responsibility for those who cannot speak for themselves, which in the performance building regulatory environment, means considering all peoples of the world, and the world's limited resources, in decisions we make about building performance requirements.

Global Culture and Society Issues
- Poverty and environment
- Three earths to sustain us
- Unintended consequences
- Enabling the best or preventing the worst
- Labor intensive/resource scarce

Performance

A critical issue to the Summit and the discussion was that of performance: what does it mean, how is it measured, how is and/or should it be used in the building regulatory environment? In general, there was support for Peter May's views that we need to be thinking about the entire regulatory regime, or system, and what that means holistically and not in isolation by parts. To date, there seems to be a history of independent activities in the performance-building arena, working on parts they know, but without the benefit of a clearly defined framework. To move forward effectively, this needs to change. In addition, the issue of being able to quantify, measure and predict performance remains a paramount

issue, as does the need to set levels of performance in the proper social and cultural context using appropriate technology (not necessarily high-tech or low-tech, but appropriate in the circumstances). There also needs to be further efforts aimed at addressing the flexibility that performance codes provide with accountability by those making decisions, particularly designers. It was noted that, as with the need for a holistic performance regulatory system, taking a holistic view of the performance of a "facility" as opposed to simply a building or structure is important.

Performance Issues
- Performance Systems (Regimes) for Buildings
- Better predicted and measured outcomes
- Levels of performance based on stakeholder needs (i.e. cultural, public health, societal, economic, legal)
- Appropriate Technology
- Flexibility vs. Accountability
- Performance of Facility vs. Performance of Building

Stakeholders

The need for broader, more responsive, and more effective communication with the wide range of stakeholders impacted by building regulations was also a strong theme. If this is not done, key stakeholder groups, such as the public may be underrepresented, leading to divergence in expected and actual performance. In the worst cases, poor communication can lead to situations such as noted by Paul Croce, where a code-compliant building can be uninsurable as the insurance company's needs are not met by the code. In order to assure that effective dialog with the right mix of people occurs, it was suggested that a "champion" is needed, focusing full time on these issues, and that some type of stakeholder organization may be beneficial. Although it was noted that codes- and standards-making organizations, professional societies and other such groups provide for stakeholder interaction, there is cause to believe that gaps in stakeholder representation exist.

Stakeholder Issues
- Stakeholder organization with champion
- Effective communications with stakeholders in terms they will understand and be responsive
- Strategies to create stakeholder dialogue

Expectations

Closely associated with the first point above, as well as with the Stakeholder discussion, expectations for building regulation, and for the performance provided by buildings, is broadening significantly to include social well-being (not simply "building" performance), societal expectations in terms of climate change and the environment, and delivery of appropriate technology within social, cultural and economic boundaries. It is not enough to construct a building that simply meets an owner's expectations in isolation, but the building must meet expectations for the building as part of

Expectation Issues
- Shift (broadening) of societal expectations
- Distinction between societal goals and regulatory goals
- Consequence integration

the local, national and international community, and its construction, operation and ultimate decommissioning should take into account the global impact.

Global Market

Finally, great opportunities are envisioned for performance building regulations in helping to foster a global community. By virtue of having regulations, standards, test methods, and related supporting factors cast in performance terms, a more open, equal market, with limited trade restrictions, is foreseen. Evidence of this has already been seen within the European Community through the Construction Products Directive. The trend towards performance regulatory documents can be useful in helping to make freer trade of products of recognized performance available on a global basis.

Global Market Issues
- Trade restrictions
- Quality of products
- Level playing field
- Performance standards
- Relevance & transparency
- Codes & standards linkage

A Roadmap for the Path Forward – Laying the Foundation

The Summit provided an extraordinary opportunity for international dialog on the future of performance building regulation and its impact on the world's people. To frame the path forward, a clear and concise destination is needed.

Summit: A place that transcends… reaches far above its surroundings… implies a lofty goal or destination

Based on all of the presentations and discussions, the following destination was agreed:

Destination: To achieve appropriate facility performance for the largest possible fraction of the world population, taking into account
- "Appropriate Technology"
- The level of performance desired by the indigenous culture
- Traditional health and safety concerns, and
- Life cycle factors like sustainability, environment, security, affordability, human rights, energy, and climate change

This indeed is a lofty goal: an honorable destination. It will not be achieved easily, and will require international collaboration, strong leadership and vision, and resources. To help reach this destination, the following strategies for the IRCC and the global building regulatory community were suggested:

Strategies
- IRCC provide holistic vision, stimulate awareness, be a catalyst
- Solicit support from others like WHO, UN, World Bank, US AID
- Identify realistic models that can be adapted to a spectrum of cultures
- Identify credible data, best practices, case studies, benchmark criteria
- Hold more policy summits

These suggestions were openly received, with several participants already thinking forward to the next Summit, perhaps in Europe or the Asia-Pacific region, but ideally in a developing country that is looking to embark down the performance path with the help of those who have started down that path already.

Background and Introduction

The world is a global market. Goods and services are traded across borders on a daily basis. With a construction-related market as high as twelve percent of the gross domestic product in some countries, it is a significant contributor to this global economy.

With the global transition to performance-based building regulatory systems, there is a need to understand the impacts such as transition will have on the construction industry, on society and on the regulatory environment. What does performance mean? How is it measured and regulated? What might be the impacts of a global performance-based building regulatory system on national economies and populations? What must be done to "get things right" in this new environment? What can be learned from others who have gone or embarked down this path? These are just some of the issues that led to the formation of the Inter-jurisdictional Regulatory Collaboration Committee (IRCC).

The IRCC, formed in 1996, is an unaffiliated committee of ten of the lead building regulatory agencies and organizations of eight countries (http://www.ircc.gov.au):

- The Australian Building Codes Board, Australia
- The Building Industry Authority, New Zealand
- The Office of the Deputy Prime Minister, UK
- The International Code Council, USA
- The Ministry of Land, Infrastructure and Transport, Japan
- The Ministry of Public Works, Spain
- The National Fire Protection Association, USA
- The National Institute for Land and Infrastructure Management, Japan
- The National Office of Building Technology and Administration, Norway
- The National Research Council, Canada

The IRCC was formed as a means to facilitate international discussion on questions such as the above. Its purpose is to work internationally, producing documents on the development, implementation and support of construction-related, performance-based regulatory systems, with a focus on identifying public policies, regulatory infrastructure, education and technology issues for implementing and managing these systems. A principal aim of the IRCC is to foster a common understanding of the international regulatory environment, while also promoting the global exchange of information and a more open environment of inter-jurisdictional commerce in building design and construction.

A key motivator in the formation of the IRCC was the realization that the now global economy would result in changes to domestic and international building regulatory policy. How does a country respond to WTO language that points to prescriptive language in standards – heretofore a national issue – as a barrier to trade, and that performance measure must be used? Should the standardization community drive the levels of acceptable risk and building performance over national requirements? What units of performance measure are regionally, nationally, or internationally accepted? What mechanisms exist to demonstrate that national performance expectations and requirements are being met?

Building regulations are legal instruments intended to ensure that buildings perform in such a way so as to provide essentially equivalent, socially acceptable levels of health, safety, welfare and amenity for building occupants and for the community in which the building is located. This is typically accomplished through regulatory controls on the design, construction and operation of buildings, covering such diverse areas as structural stability, fire safety, heating, lighting, ventilation, plumbing, sanitary facilities, indoor air quality, and sustainability.

In a traditional, prescriptive-based regulatory system, the performance objectives are often embodied in specific requirements that vary by building use or occupancy type. Such requirements may be manifest as resistance to loads, construction types, fire resistance ratings, travel distances, pedestrian circulation aids, ventilation rates, and potable and wastewater specifications. Based on the collective knowledge, experience and desires of regulatory developers and interested and affected parties, minimum requirements are established for all buildings within each use or occupancy group. Such approaches to regulation avoid the difficult task of explicitly dealing with societal goals.

However, many countries around the world have either introduced performance-based building regulations or are in the process of doing so. Rationale for introducing performance regulation ranges from downsizing of government, deregulation, and facilitation of trade, to increased design flexibility and reduction in unnecessary costs. Specific rationale notwithstanding, one observable result in many transitions to performance regulations is the significant challenge in establishing the societal goals and objectives which need then to be reflected in performance-based requirements.

As the structural nature of building regulation and its content changes, however, several issues arise, such as are the new regulations adequately addressing societal expectations and requirements for the performance of buildings, and more fundamentally, what are societal expectations for buildings and how are they incorporated and regulated. These are not simple questions, as there are myriad impacts on building regulation, ranging from the form of government and legal system, to the role of special interest groups, to the question of what should be government regulated versus market driven, to limits of technology.

Going into the next several years, there are before the building regulatory community several policy initiatives that may converge on the regulatory system, such as sustainability, security, and housing affordability to name just a few. Although these issues vary somewhat by country, the challenges are similar, and there is much to be gained by discussing the challenges and lessons learned from countries that have implemented performance-based building regulatory systems to see how we should plan for the future development of building regulatory systems.

It is with this understanding that the IRCC organized the Global Policy Summit to draw together key policy makers, regulatory officials, industry representatives, researchers and others to discuss key issues, identify potential solutions, and if possible, to draft a research and development perspective on future challenges and opportunities for advancing performance-based building regulations to meet societal needs.

Keynote Addresses

Dr. Jack Snell, Director (retired), Building and Fire Research Laboratory, National Institute of Standards and Technology, [USA]

Mr. James Lee Witt, CEO, International Code Council [USA]

The Summit opened with an eloquent and enthusiastic address by Jack Snell, which laid the foundation for the Summit, challenging the participants to bear in mind their motivations and expectations for the Summit, and which provided a basis for discussion centered around four key issues:

- We need to be clear about what we mean by "performance-based building regulation."
- Is performance-based building regulation really better regulation?
- Will performance-based building regulation lead to better buildings?
- Does/will performance-based building regulation promote beneficial globalization?

In discussing what we mean by performance-based building regulation, Jack offered his worldview on each of the principal terms, i.e., performance-based regulation. He noted that performance is about describing what is intended from buildings, rather than prescribing how an outcome is to be achieved, while emphasizing that performance can mean different things to different people, that we need to understand the interrelationships between components in a holistic, or systems approach, and that for a performance-based system to be effective, one ultimately must be able to measure performance.

> Performance determination requires, by definition, the ability to quantify outcomes, or simply, the ability to measure and predict outcomes.

Jack also highlighted the need to view building regulation in the proper context: building regulation must take into account how buildings are used, by whom, and for what purpose, and should be designed to facilitate the broad spectrum of needs while fostering innovation and resulting in safe and economically feasible buildings.

> My point is to advocate performance-based building analysis and design as a vehicle for making better decisions about what we build, what we seek to achieve with what we build, and how ultimately, it performs. Buildings are built to serve other needs. They are not constructed simply to meet an accumulation of regulatory requirements developed primarily to prevent recurrence of past woes. The key to the role of performance-based building regulation as "better regulation" is the extent to which it facilitates the emergence of "better" buildings that serve higher social ends.

Although much is being done in terms of better understanding building performance from a technical perspective, more research is needed to understand the overall system, and to develop an appropriate regulatory mechanism to link social, economic, political and technical issues together.

> I am deeply concerned that we have little or no scholarship on the subject of building regulation.

Next up was James Lee Witt, who focused upon the benefits that performance codes provide for communicating with communities about their safety concerns, noting that "performance based regulations focus on the real safety needs of a community." He challenged the participants to think about what performance means, and to think about how performance-based building regulations and the regulatory system can help address existing and emerging hazards, and to facilitate a safer environment for the populous. He noted that building codes can be useful instruments for mitigating the effects of natural and technological hazards, and how performance-based codes can help establish clear policy objectives for buildings.

James Lee discussed that fact that, internationally, performance based codes are improving our world in a number of ways, from increasing trade across borders, to fostering innovation, and strengthening our ability to share experiences of working with communities. Such codes, he noted, are giving us a better understanding of how and why we regulate buildings, and although our acceptance of performance based regulations has increased, he challenged the participants that we still have work to do to realize our full potential.

Another critical point James Lee raised for the successful use of performance regulations is the need to understand and work with key stakeholders. In the sphere of building codes, he noted, our most important constituents are our local governments and community partners, as although a small number of people may be leading the change, the communities are the ones who have to implement the new system, and good communication is necessary to assure broad acceptance.

> Performance based codes are the next step in the evolution of building regulations. These codes have the potential to bridge the communication gap between our code organizations and customers.

Session 1: The Role of Building Regulation in Meeting Expectations

Session Chair: Mr. Paul Everall, Office of the Deputy Prime Minister, London, UK

Why Building Regulations?
Ms. Anne von Weller, President – Board of Directors, International Code Council [USA]

Building Codes – A Good Tool in the Right Context
Mr. Bruce Clemmensen, Chairman, Canadian Commission on Building and Fire Codes [CAN]

Performance-based Regulations and Regulatory Regimes
Prof. Peter May, Center for American Politics and Public Policy, University of Washington [USA]

Shaping Expectations for Extreme Events
Prof. Daniel Alesch, Public and Environmental Affairs, University of Wisconsin [USA]

As part of the transition to performance-based building regulation, a number of issues have surfaced in many countries, some of which have led regulatory developers to question the purpose of building regulation and its role in meeting expectations. This is a complex issue, and is tied in large part to legislation that calls for and/or empowers building regulation, yet is also tied, rightly or wrongly, to public expectations regarding the performance, function and affordability of buildings. The focus of this session was to discuss why there are building regulations, the role they play in meeting expectations, how they intend to do this, and where market-driven forces may be more appropriate.

Anne von Weller kicked off this session with a perspective on the history of building regulation in the United States: why do we have building regulations, what purpose do they serve, and what are some of the current issues in the building regulatory environment. Many of these issues were seen as common in other countries. As we move into a performance regulatory environment, resources availability and professional accountability will play crucial roles.

> Greater understanding of the importance of codes and improved support for enforcement by the general public and our political leaders is critical to continue to improve the safety and reliability of our building stock.

Bruce Clemmensen followed with a discussion of the Canadian experience in the transition from prescriptive- to objective-based building codes, and how one needs to look at the big picture as part of the transition. Bruce reminded everyone that a well-functioning construction delivery system, effective consumer and industry information transfer, a sound legal framework for the conduct of business, reliable standards and testing, site inspections and quality control, warranty and insurance, education and training, and maintenance all contribute to the quality of building and building performance.

> While they clearly have a key role to play in achieving society's goals, it is important to recognize that building codes are only part of the process of building. Owners, designers, general and sub-contractors, and manufacturers (among others) all have an important bearing on what gets built, how it's built and how the buildings perform.

Peter May introduced the term "regulatory regimes" to the group, reminding everyone that regulations cannot be taken out of the context of the regulatory system or regime. He noted that the consequences of performance-based regulatory regimes are hard to specify in the abstract as they depend on the specifics of the regulatory design and how it is implemented, and that any regulatory regime must confront a fundamental political problem of deciding how tight controls should be in promoting consistency and accountability versus how much discretion should be granted in promoting flexibility and innovation.

> Regardless of the form that performance-based regulation takes, it cannot be considered as separate from the broader regulatory system. The appeal of performance-based regulation is as much about introduction of a new regulatory regime as it is about regulating for results.

This session concluded with a lighthearted yet important presentation by Dan Alesch that discussed the possible role of international standardization as a potentially useful tool for performance building regulation.

> The ISO model provides a useful example of how expectations concerning structural performance in the face of extreme events might be developed using performance-based structural design regulations and, then, use the relationships among firms to result in widespread private implementation of standards that might not be otherwise adopted by national governments.

- An American barrel of dry measured is 105 dry quarts, but a liquid barrel is 31.5 gallons, unless it is a barrel of petroleum, in which case it contains 42 gallons. British barrels range from 31 to 42 gallons, depending.
- A hogshead is seven firkins (US) or just under six firkins (British). Both are a little less than half a pipe.
- A rod is 5.5 yards; four rods make a chain, which is the distance between two wickets. Ten chains make a furlong and, of course, eight furlongs make a mile.

Dan noted that we needed to address Priorities, Poverty, Parochialism and Purloining, aptly questioning how the US can fit in the global market when we stick to archaic measures. He suggests that the way to overcome obstacles is to create positive expectations within industry and amongst consumers.

Session 2: Demographic and Urban Issues

Chair: Mr. Olav Berge, Office of Building Technology and Administration, Norway

The Impact of Rapid Ageing in Japan on Accessibility Issues

Dr. Satoshi Kose, Professor, Shizuoka University of Art and Culture [Japan]

Changing Demographics, Disability Access and the Use of Performance-Based Design

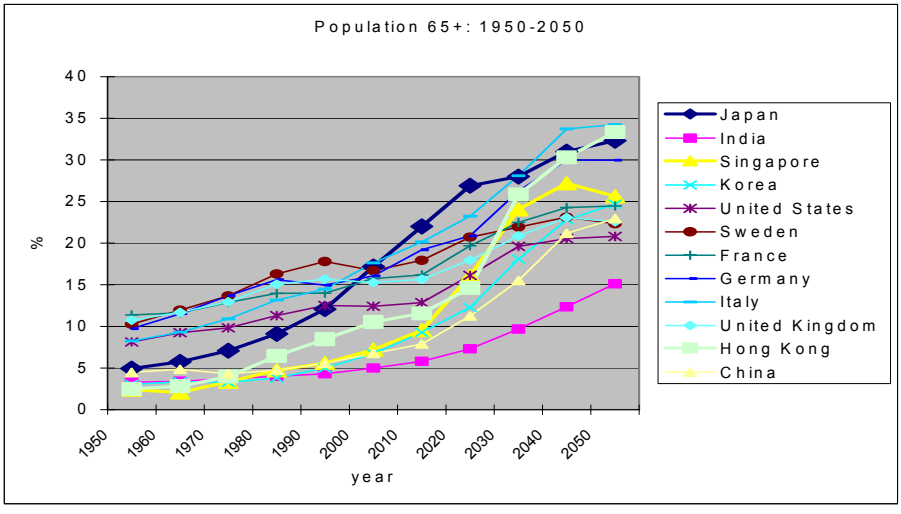
Mr. Garry Fielding, Director - Local Planning Regional & Rural Planning Division, Department of Infrastructure, Planning & Natural Resources [AUS]

How Do We Solve This Problem? Aftermath of 9/11

Mr. David Maola, Council on Tall Buildings and the Urban Habitat [USA]

This session aimed to challenge implicit assumptions regarding the expected characteristics of people who use buildings and the impact of changing demographics, from persons with disabilities to an aging population. Challenges include what population a building should be designed for, what happens when the population changes and the building does not, and how can civil rights legislation aimed at allowing equal access be rectified with building regulation that provides a minimum level of safety. This session also considered how the impact of September 11, 2001 might have affected views on tall buildings in the urban environment.

Satoshi Kose opened this session with a dramatic indication of the rapidity with which the population in Japan and in other countries is ageing, and the impact this has on building regulation.



With an increasingly aging population, there are growing concerns of accessibility and usability of structures by the elderly. Satoshi discussed the challenges with revising the Building Standards Law, outlined steps that are being taken, and offered a list of issues that need to be addressed in Japan and likely elsewhere.

> In 1970, the ratio of population 65+ was just 7%. In 1994, it was 14%. It took only 24 years, i.e., less than a generation, for Japan to double the ratio. It is a speed that has never been paralleled. Japan will still continue to grow older, and in the year 2015, the ratio of people 65+ will be more than 25%.

Carrying on the theme of accessibility and an aging population, Garry Fielding provided a view on the situation in Australia, expanding his discussion to include demographic challenges, such as how an increasingly overweight population will likely translate into a great percentage of persons with impaired mobility. Garry raised the issue of whether provisions for persons with disabilities was appropriate for the aged, and noted how at least in the case of tactile ground surface indicators, what works for the disabled may lead to trips and falls for the aged. Also, although steps are being taken to consider ageing in place for residential facilities, current legislation does not consider the many other building use types.

> In Australia, we have recently amended our building code to introduce a new classification of building which specifically accommodates the needs of the aged and embraces a concept known as *ageing in place*. Effectively, this allows a person through the various stages of ageing and through their needs for high and low levels of care to remain in the one facility.

As a transition into the next session, David Maola discussed the view that people want to live in an urban environment, taking advantage of all that a city has to offer, and do not want to live in bunkers. He spoke about various issues with respect to tall building design – a hallmark of the urban environment – and how balance is important when establishing performance and design objectives.

Session 3: Emerging Societal Expectations, Pressures and Threats

Chair: Mr. Milosh Puchovsky, National Fire Protection Association, USA

BRAVE NEW WORLD–Emerging Societal Expectations, Pressures, and Threats
Ms Patricia Lancaster, Commissioner, Department of Buildings, City of New York [USA]

A Larger Context for Risk and Responsibility
Mr. David Eisenberg, Director, Development Center for Appropriate Technology [USA]

The Use of Performance-Based Building Codes to Attain Sustainable Housing Objectives: The South African Approach
Mr. R.B. Watermeyer, Technical Committee for Construction Standards, Standards South Africa; Director, Soderlund & Schutte Consulting Engineers [South Africa]
Dr. Rodney Milford, Director, Division of Building and Construction Technology, Council for Scientific and Industrial Research [South Africa]

What Do People Want from the Coming Global Performance Regulatory World?
Dr. John Hall Jr., Assistant Vice President, National Fire Protection Association [USA]

Towards a Sustainable Built Environment Prepared for Climate Change?
Dr. Frank Henning Holm, Managing Director, Norwegian Building Research Institute, [Norway]

The environment, sustainability, noise pollution, durability, security, and affordability are emerging as issues that society is pressuring the building regulatory community to address. At the present time, many of these issues are not addressed in building regulation, either implicitly or explicitly, and it is not clear if it is appropriate to address them in building regulation, and if so how to address them, and what the implications could be (positive and/or negative).

In addition, a number of hazards and threats not historically considered, or not explicitly considered, in building regulation are emerging as well. These include a broad spectrum of threats, from radon, to off-gassing of building materials and contents, to extreme natural hazard events potentially associated with global warming, to the terrorist threat. Challenges include identification of the hazard, the likelihood of the hazard occurring, the potential consequences, public expectations with respect to protection, available mitigation technology, cost, and who will pay. This session focused on emerging societal expectations, pressures and threats, as well as how different worldviews impact the significance one places on various aspects of "performance".

> Society's expectations have changed. Our perception of big, strong buildings protecting us and lasting for hundreds of years is over. Our valuation of democracy has been challenged and our definition of freedom has been altered. We are voluntarily (and without complaining, even as New Yorkers) allowing authorities to question us and limit us.

Patricia Lancaster opened this session with a view into the impact that the terrorist attacks of September 11, 2001 had on the City of New York, and how the Department of Buildings was responding to the situation and to the expectations of the populace. She noted that in this new environment, much work is required to achieve balance, starting with what information should be made available to the public, to what protection features can be mandated as "minimum levels" and what protection features should be left to the market to select and implement.

With a new societal expectation that building industry professionals will make buildings safer – will protect the public – Patricia challenged the participants that they should think of themselves as emissaries from our industry to the world at large, demonstrating that we are knowledgeable, capable and concerned.

The session, and the Summit as a whole, then took a different direction when David Eisenberg reminded the participants that there are many other world views on performance and risk than those that America and other developed countries hold. David noted that the world's population is rising, levels of consumption are rising in developed and developing countries, and we have a responsibility to examine all of our assumptions about technology and progress: risk and uncertainty.

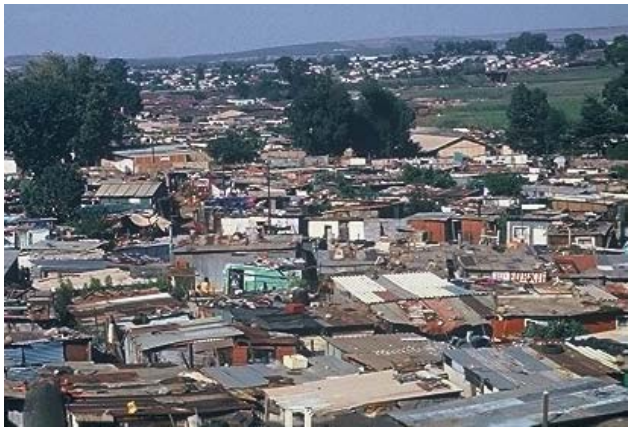
> If we are to responsibly create policies that can enable performance-based building regulations to meet societal expectations and local needs, we need to first understand the context in which those needs and expectations exist. Which societal expectations and local needs are we going to meet? Are we only serving, those with loud, clear voices who are present in these discussions, or do we also need to serve those who can't represent themselves in this process?

There exists today a body of research showing that if each person on Earth consumed resources and generated wastes at the rate of the average American and Canadian, we would need two more Earths to sustain that level of human activity.

David spoke about the incredible rate at which building materials are generated and used, the fact that sustainability must include the life cycle from raw material through ultimate end state, and the arrogance of assuming that what works for developed countries must work for developing countries as well. He offered that one of the keys is the concept of "appropriate technology," which is the lowest or simplest level of technology that can do the job well. High-tech is not always the best answer: sometimes low-tech, intermediate-tech or some combination will be best based on specific uses and needs. David suggested that there is a need to enhance the local capacity of communities and people to meet their own needs, and by doing so, we also shorten vulnerable supply lines for goods and services, create more efficient and resilient systems of supply, support more robust, durable local economies, and support healthier cultural, political, and social structures.

"Safety is very important, but we need to think about the responsibilities for our collective safety; especially the welfare of future generations who, it's worth noting, are unable to represent their own interests." *- Bob Fowler, FAIA, P.E., C.B.O., former Chairman of ICBO and founding Chairman of the ICC, and former Vice President of the WOBO (deceased)*

Ron Watermeyer continued many of the themes introduced by David, using the situation in South Africa as the basis for his discussion. At present, building regulations do not address traditional construction and informal settlements, which account for just over one third of the building stock. To address this concern, performance descriptions for sustainable housing, which reflect societal goals for sustainable development, have been developed. Ron spoke about which aspects of these performance descriptions can be used to regulate housing units in terms of performance-based building regulations and suggested how societal objectives can be accommodated at a local level by establishing different levels of performance in different market sectors.



Although the concept of different levels of performance has been discussed in other venues, this was perhaps one of the first applications of the concept to address the range of socio-economic conditions that exist within or between countries.

> Different levels in performance can be established to provide greater accessibility to the poor to certain building occupancies or, for that matter, to address societal concerns relating to any building occupancy.

In the next presentation, John Hall tackled the challenging question of what people want from the coming global performance regulatory world. In setting the context for his presentation, John spoke to why we have regulations, the influence of the market, how economist's view human wants and needs, and the challenges associated with using such metrics as the value of human life, as inferred from the choices people make. In discussing his main points, John spoke to the challenges of performance-code development by committees that have traditionally developed prescriptive codes, of translation problems, of incomplete knowledge and over reaching, of real differences between countries and of different value systems.

> Half the people of the world are trying to survive on $2 a day or less. There is no combination of rational choices they can make with those resources that will give them the core essentials of a decent life as we in the developed countries understand the term. Does that mean that they value life less than we do? Of course not. They simply lack the resources to act on their values.

Above all, John urged caution to do things right.

> What do people want?
>
> They want more safety for less money. If what they actually receive is less safety for much less money, there is no guarantee that they will consider that a good deal.
>
> They want the benefits of new knowledge, and they want those benefits to be widely shared. They want precautions taken to avoid the risks of new knowledge, and they will apply a duty of care to the design professionals who are leading the parade to the new world.
>
> They want more safety at less cost. As with performance, the danger in globalization is that they will actually receive either less safety or more cost than they had had under the old rules.
>
> They want enough control over their own lives to be able to pursue their own values. If they are caught up in a revolution where the already-powerful write new rules that the people do not understand and under which the effects on ordinary people are at best a mixed bag, then they will resist, they will object, and they will oppose.

Frank Henning Holm ended this session with a sobering discussion on the impacts of global climate change, issues of sustainability and the relationship to the built environment. Frank provided background on international studies, reports and efforts, ranging from the 1987 Brundtland Report to the 2002 *World Summit on Sustainable Development*. He spoke about several efforts related to the transition from 'green buildings' to sustainable built environment, including efforts within the ISO and the EC.

Frank then transitioned into discussion of the impact of climate change on the built environment. We have already seen dramatic changes, such as consecutive years of 100-

year flooding in the UK, high temperatures in Europe, and other climate-related events. What happens if such occurrences increase in frequency? Beyond the primary effects, such as temperature, wind speed and flooding, Frank raised the secondary and tertiary concerns of environmental impact and social, behavioral and institutional change.

For the improvements in buildings to be sustainable, the changing climate regime of today has to be taken into account. In order to do so, we need to learn more about the impact of different climate change scenarios on building performance and how society best can adapt to these changes.

The bottom line is that we lack knowledge on the interdependencies of climate change scenarios on the environment, people and the built environment, and that more research and education are needed, along with a holistic approach to addressing these critical issues.

Session 4: Performance Regulation and Regulatory Alternatives

Session Chair: Dr. Kathy Notarianni, NIST, Gaithersburg MD, USA

Designing and Implementing Performance-Based Regulation: Lessons from Health and Safety Policy
Prof. Cary Coglianese, Harvard University, JFK School of Government [USA]

Performance-Based Regulation in Theory and Practice: Lessons from EPA's Performance Track Program
Dr. Dan Fiorino, US Environmental Protection Agency [USA]

Towards a New Model of Performance: The Role of Standards and Market-Driven Solutions
Ms. Pat Keindel, President, Canadian Standards Association [CAN]

Eurocodes - A Building Code for Europe
Mr. Pascal Bar, DG Enterprise: G5 Construction Unit, European Commission [EC]

Performance regulation is becoming a dominant mode of regulation in the United States and globally. This is being driven by a variety of factors, including realization that prescriptive regulation can be inflexible and restricting of rapidly changing technologies, that prescriptive regulation may not be meeting societal expectations, and that performance provides a less restrictive playing field than prescription. However, there are numerous challenges to performance regulation, as one must be able to specify, measure, calculate and monitor performance in a widely acceptable manner. In addition, in many regulated areas, such as environmental protection, there is a move to employ more market-driven measures, rather than focusing on a centralized command and control approach. The principal aim of this session was to explore different approaches to regulation and how they may be applicable to the built environment.

Despite growing interest in the performance of government regulation, researchers have yet to subject performance-based standards to close empirical scrutiny. There has been relatively little study of how performance-based regulation works in practice across different regulatory settings. Moreover, in many areas of regulation, the use of performance-based standards has remained less frequent than might be expected.

Cary Coglianese began this session with a look at the social and governmental cost implications of performance standards (codes, regulations) versus means

standards (prescriptive), with the assumption that both approaches result in the same social benefit. Cary began by discussing the outcomes of a workshop held in 2002 that brought together various federal agencies and researchers to discuss the use of performance regulations across a broad spectrum of regulated areas.[1] The participants in the referenced workshop focused on the issues of the role for performance-based standards in the regulator's toolbox, what are the conditions under which a performance-based standard is the appropriate regulatory instrument to use, and what particular challenges can be expected to arise in implementing performance-based regulation.

> Performance standards will sometimes be the best regulatory instrument, but not always. Both performance standards and means standards require careful analysis if they are to function well. The relative demands any type of regulatory standard places on government resources will be a key factor in deciding when to use them and how to design them.

As one approach to identifying when a decision-maker might choose a performance standard or a means standard, Cary argued that cost is an appropriate metric, as assuming that performance standards and means standards result in the same net social benefits, a comparison of the social and governmental costs will yield important information for decision making. In his analysis, he noted that performance standards can be more costly for government, especially on the enforcement side. To help reduce the cost, the better-focused performance standards are, and the easier it is to identify and assess performance compliance, the more cost-effective and useful they will be.

> Why change? New and emerging problems, changes in the institutional landscape, dynamism in economic relationships, changes in industry motivations and behavior, and the benefits of experience.

Up next was Dan Fiorino, who spoke about the US Environmental Protection Agency's Performance Track Program. The program has several benefits, including the ability for EPA to validate performance of various environmental protection efforts, and to provide firms with more flexibility and lower costs. There are 310 participants in the program, and the benefits have been tangible, including forcing technology upgrades and behavioral change, instilling an environmental ethic, building an infrastructure (legal, technical, etc.), increasing the costs of mismanagement, and creating a foundation for policy evolution.

Pat Keindel provided a perspective on performance regulation from the Canadian Standards perspective. Pat started with an overview of the role of standards in the building regulatory system in Canada, and transitioned into a discussion of changing roles and emerging expectations and needs. In particular, she spoke of a shift in the Canadian government's traditional

> The door is opening on a possible new model of "performance-plus" in which regulations and the prescriptive standards on which they are based address certain base requirements – while other market-driven solutions adopted by industry address a higher layer of expectations associated with the buildings we build and use.

[1] Coglianese, C., Nash, J. and Olmstead, T., (2002). *Performance-Based Regulation: Prospects and Limitations in Health, Safety and Environmental Protection*, Regulatory Policy Program Report No. RPP-03. Harvard University, Cambridge, MA (http://ksghome.harvard.edu/~.CCoglianese.Academic.Ksg/publications.html).

"command and control" approach, looking more to the standards development organizations to step up and help fill a need of assuring consumer expectations are being met. She also discussed impacts of the new objective-based code hierarchy. Pat also introduced the concept of "performance-plus." In essence, performance-plus is an approach that provides guidance for meeting regulated minimum criteria, while also providing guidance for achieving performance levels that are above and beyond the regulated minimums, but which together, provide a comprehensive package. Such an approach combines aspects of traditional regulation with market-based regulation, allowing consumers more choice.

Closing this session was Pascal Bar, who provided an overview of the regulatory approach used for the Eurocodes. Pascal noted that when completed, the Eurocodes will form a set of 56 European standards that will provide calculation methods to determine the mechanical strength of each element in a structure needed to withstand expected loads. These calculation methods will be used to design buildings and civil engineering works regardless the type of construction method or materials used (concrete, steel, composite steel/concrete, masonry, timber, aluminum). The Eurocodes will also contain specific calculation rules for geotechnical works, earthquake resistance, stability and mechanical resistance of structures, including structures submitted to fire, dimensions of structural elements, and required performance and durability of the products to be incorporated into the structure.

> The aims are the free circulation of services (engineering, design of construction works) in internal market, free circulation of structural products, development of research, and increased competitiveness of consulting engineering offices and entreprise in the context of international competition.

Pascal spoke of the lengthy path required for development of the Eurocodes, which has its roots in the 1970s, as well as related factors, such as the Construction Products Directive and CE markings.

Session 5: Setting Goals to Deliver on Expectations

Session Chair: Mr. Brian Ashe, Australian Building Codes Board, Canberra, Australia

Regulatory Effectiveness and Performance Based Regulation
Dr. N. Prasad Kadambi, U.S. Nuclear Regulatory Commission, [USA]

Performance with Uncertainty: Quantifying Expectations of Performance in Fire Safety Engineering Calculations
Dr. Kathy Notarianni, National Institute of Standards and Technology [USA]

Public Safety is Not Enough!
Dr. Paul Croce, FMGlobal [USA]

Three Useful Tools for Goal Setting: Judgment Analysis, the Taylor Russell Diagram, and the Systems Dynamics Model
Dr. Elise Weaver, Social Science and Policy Studies, Worcester Polytechnic Institute [USA]

Whose Needs and Expectations and the Performance of What?
Prof. Eric Burnett, Civil and Environmental Engineering, Pennsylvania State University [USA]

Regardless of the regulatory area, a challenge exists in setting goals to deliver on expectations. In the traditional building regulatory system, where the code advanced by building on past failures and losses, the rationale for the change was often straightforward

and transparent. In a performance-based system, especially one in which emerging threats, hazards, expectations and pressures are trying to be addressed, one cannot rely on the past as a guide for the future. As such, there is a need for tools to help regulatory developers understand the emerging pressures and translate them into building regulatory language. Related to this is the challenge that any performance regulatory system faces: identifying or developing the tools, mechanisms and criteria that are necessary to define, measure, calculate, estimate, and predict performance. Not only does performance mean different things to different people, the properties or attributes one uses to define performance, and the latitude given to those responsible for performance-based analysis and design will have a significant impact on the success or failure of the performance system. This session considered various challenges that policy makers face in trying to establish goals to deliver on expectation, and provided insight as to identifying suitable tools, mechanisms and criteria available to measure, calculate, estimate, and predict performance at the time the regulatory system is implemented.

Prasad Kadambi led off this session with an overview of efforts within the US Nuclear Regulatory Commission (USNRC). Prasad began by giving an overview of nuclear reactors design in the US, and then focused in on guidance for performance-based regulation (NUREG/BR-0303) developed in support of the agency's goal to promote risk-informed and performance-based regulation. He noted that the agency expects that regulatory practices will improve in effectiveness and efficiency if performance-based approaches are used appropriately, and that the conceptual model of effectiveness has been shown to work reasonably well in specific instances. The thesis is that regulations that are performance-based are more amenable to assessment of effectiveness than regulations, which are prescriptive-based, because performance measures and criteria are explicitly identified at the front end. In a performance-based approach, regulatory expectations are explicitly identified, if necessary, in a hierarchical structure of regulatory goals and objectives. The goal of the step-by-step process is to identify a reasonably performance-based regulatory alternative that the decision maker may wish to consider while resolving an issue. Prasad noted that having incorporated these concepts in two recent rulemakings, it should be possible to test for their effectiveness after a period of implementation.

> The USNRC pursues regulatory effectiveness in order to obtain greater congruence between the expectations from promulgation of a regulation, and the outcomes in the field that result from the regulation.

Decision-making and uncertainty were key themes of the presentation by Kathy Notarianni. In her talk, Kathy provided an overview of a methodology for the application of an uncertainty analysis to a fire safety engineering calculation, and showed how results of this type of analysis can be used to create distributions of time to untenability, demonstrate the effect of selecting various sets of performance criteria, compare two designs, and provide insight to model development.

> Our current performance-based building codes are touted as a way to stimulate creative designs and engineering systems that increase safety and reduce costs, but how does an engineer or architect prove that a design is safe enough? The truth is that we are uncertain.

Kathy strongly held the view that the treatment of uncertainty in the application of a performance-based building code regulation is key to ensuring and maintaining an appropriate level of public safety while allowing the flexibility necessary to reduce costs.

> Proper treatment of uncertainty will assist engineers and architects in the design process, and assist code officials by increasing confidence in the acceptance of a performance calculation. It will aid researchers in prioritizing enhancements to both the physics and structure of fire models, and aid policy makers by incorporating scientific knowledge and technical predictive abilities in policy decisions.

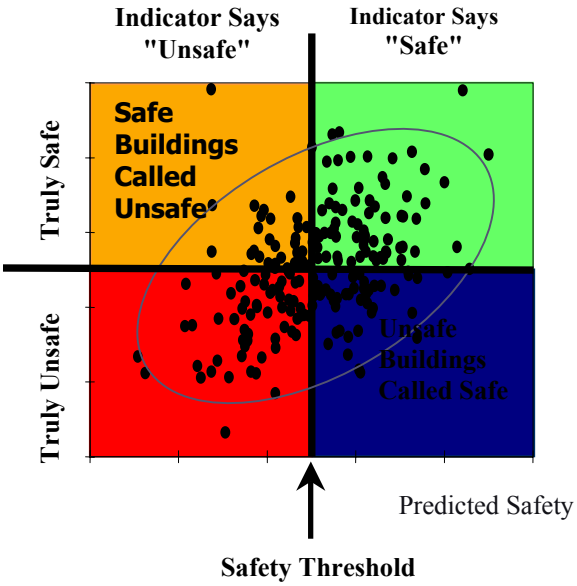
Paul Croce followed with the challenge that public safety is not enough – our goal ought to be public well-being. Paul made the observation that in today's performance-based design applications, the most frequent criterion used or promoted is life or public safety. In such applications, the criterion is usually interpreted as *life safety for the building occupants*, and the design is performed to provide enough time for occupant evacuation. He noted that even if a design is adequate by such a criterion, the design could still be inadequate in the larger picture, citing an example where a performance-based designed facility, which used occupant safety as a criterion and was accepted by authorities having jurisdiction, was found to be uninsurable. Although this was mostly a result of inadequate water supplies, he noted that such designs do nothing for first responders or for loss events that can involve more than a single building. Paul suggested that going forward, perhaps a better aim is to focus on broader goals and objectives, which encapsulate many of the more focused objectives gaining attention today, and by doing so provide better overall public well being. He also suggested that to move things forward, a stakeholder organization, with a Champion committed to the effort, is needed.

> By using broader criteria…
> - Life safety achieved…
> - Fire service and other responders protected
> - Less overall damage and disruption
> - Maintenance of economy
> - Faster and less costly recovery

Elise Weaver then introduced three useful tools for goal setting: judgment analysis, which can be used to design a safety indicator that is based on expert judgment; the Taylor-Russell diagram, which can be used to decide an appropriate threshold for that safety indicator; and, the system dynamics model, a computer simulation tool, which can be used to investigate a regulatory structure to allow for changes to the indicator threshold over time and across contexts. As part of her presentation, she illustrated how the three tools can be combined for use in building regulatory policy development by helping participants better understand what level of safety is desired, how to set a safety or performance thresholds, and how to assess the impact code revisions on buildings.

Elise suggests that judgment analysis can be used to gain insight into how diverse experts rate buildings on safety, as well as for developing models of the judgment policies of clusters of experts. From these outcomes, a policy maker could consciously select a compromise among such judgment policies to create an acceptable indicator of safety.

Once there is some indicator selected for assessing building safety, some type of safety threshold is helpful for identifying "safe" and "unsafe" buildings. In assessing data and



selecting thresholds, the Taylor-Russell diagram, illustrated on the left, can be helpful, as it can be used to envision simultaneously the connection between 1) the choice of threshold; 2) the effectiveness of an indicator; and 3) the resulting consequences. At this point in the process, Elise noted, one hopes that the community at large will accept the selected threshold, and that it will be stable. Unfortunately, there is no guarantee that the tradeoff of false positives and false negatives will be shared by others, or that a particular threshold will always be appropriate. In order to have a responsive policy context that is protected from too wide an overreaction to recent events, it may be necessary to build in legal structures that regulate the threshold in an appropriately responsive manner. Rather than test out these structures in practice, it makes sense to simulate these phenomena in a computer simulation, which is where systems dynamics comes in. Elise pointed out that the outcome of such a modeling effort would be a simulation that would allow policy makers to test the consequences of various threshold choices and a safety index that improves its predictive quality over time. In addition, it would allow them to set up and test a regulatory environment that would build in constraints against too sensitive a response to recent events, while guaranteeing the flexibility to update the model. In other words, this tool can be used to help avoid extreme swings in public policy, which inevitably tends to divide stakeholder further and further apart over time.

This session ended with a presentation from Eric Burnett, who challenged the participants with the question of whose needs and expectations and the performance of what? He used for context his experience with the building regulatory environment in the Commonwealth of Pennsylvania, specifically as it relates to residential energy code requirements. Eric started with an overview of the Commonwealth, and the fact that until recently, there was no statewide building code. However, given fast growth and other factors, builders actually requested codification. In response to requests, the Commonwealth began the process of adopting the International Building Code and the International Residential Code in 1999. In December 1999, the Pennsylvania Housing Research/Resource Center (PHRC) was asked to look at the IRC residential energy provisions, as well as those of the National Association of Home Builders (NAHB), and to consider alternatives as well. In the end, Eric noted that he and his colleagues ultimately determined that neither the IRC or NAHB provisions fit the performance expectations for Pennsylvania, and that new provisions were needed.

- 20 % of population (2.5 million) live in non-coded areas
- 21.5% of these areas are fast growing, and
- about 32% of housing starts are in non-coded areas

…situation so bad that the builders requested codification!

Session 6: Performance-Based Building Regulation in Practice

Session Chair: Ms Beth Tubbs, International Code Council, Northbridge MA, USA

Performance-Based Code - 7 Years On - The Norwegian Experience
Mr. Olav Berge, Director General, National Office of Building Technology and Administration [Norway]

Performance-Based Codes: Contemporary and Emerging Policy Challenges, Lessons for Strengthening the Performance Regulatory Framework and Future Directions
Mr. Brian Ashe, Australian Building Codes Board [AUS]

Performance-Based building Regulation: The UK Experience
Mr. Paul Everall, Head of Building Regulations Division, Office of Deputy Prime Minister [UK]

How to Make Performance Codes Perform
Ms. Zophia Zager, Director of Building Code Services, Fairfax County, VA [USA]

Performance-Based Regulation in the Building Sector – the New Zealand Experience
Mr. Peter Mumford, New Zealand Ministry of Economic Development [NZ]

Performance-based building regulation is in place or under development in more than a dozen countries. The movement to performance-based building regulation has occurred for many of the same reasons as performance regulation in other areas, but the implementation has been quite diverse. This session explored the reasons why various countries and jurisdictions have moved to performance regulation, what they chose to regulate in a performance matter, and what challenges remain.

Olav Berge started this session with an overview of the performance building regulatory system in Norway. Although the "Nordic model of performance based codes" was conceived in the seventies, Olav noted that it was not fully utilized until the Building Code of 1997 replaced the traditional descriptive code. Once in place, however, several problems with the system were encountered in practice, including how to define adequate safety levels, lack of stakeholder competence, lack of guidance for analysis, and too much trust in and documentation of analyses. In addition, significant quality problems were also seen throughout the system. As a result, it was found necessary to introduce new procedural rules regarding building control, partly to accommodate the functioning of the performance based code, and also to address the need for improved quality in buildings and for assuring competence for those practicing in all aspects of design and construction.

The revisions to the Building Act saw a change in focus from building control, in the traditional sense, to a more quality-oriented system, following the basic idea of the ISO 9000 series approach. Another advancement with the Norwegian system is the internet-based focus, which allows all information for permitting, including payment of fees and monitoring of plans, to be conducted over the web.

Paul Everall provided an overview of the evolution of building regulations for England and Wales, from their start as prescriptive regulation in 1666 through transition to functional regulation in the 1980s. The transition in the 1980s, facilitated by a general push for deregulation, came about as a means to help address shortcomings in the existing system in terms of providing clarity, adding flexibility, and providing alternate means for risk management. The resulting Building Regulations 1985 saw a reduction from over 300 pages of regulatory text to less than 20 pages of functional requirements. Backed by "approved documents" and design guidance, the new system has been generally well received, with those who embrace performance utilizing the flexibility allowed, while those more comfortable with prescription relying more on the approved documents.

In the late 1970's and early 1980's people were becoming increasingly concerned that these prescriptive rules were unsuited to modern society. Legislation was brought before Parliament in 1983 to change to a performance based system, and in 1985 most of the prescriptive rules were abolished and the new system implemented.

The history of building regulatory development in Australia, including the transition to a performance-based system, was presented by Brian Ashe. Australia developed its first national model building code in the 1980s. In the 1990s, the transition to a performance-based code was made. The single performance code is intended to provide common minimum performance requirements, which address health, safety and amenity, and which fosters innovation and the use of alternate solutions to the prescriptive deemed-to-comply options. Presently, the focus has shifted from traditional foci of fire and structural stability to include issues of ageing, persons with disability, energy efficiency, and other social issues. As a result of this change, the code development process is becoming a stronger forum for public policy debate – a healthy development.

Future Directions

- Next generation building code
- Protocol for development
- Formal risk management approach
- Regulation – last resort
- Regulation Impact Statement (RIS)
- RIS throughout development

A review of the performance code developments in New Zealand was given by Peter Mumford, who also provided considerable insight into recent performance issues with moisture impact on buildings in New Zealand and the government's response. At issue was the observation that a number of residential dwellings were experiencing moisture problems and that no-one was steeping up to assume responsibility.

The conditions for the success or failure of many regulatory systems are likely to lie in a complex web of interactions between factors that are either external or internal to the system. New Zealand attribute the failure of the building control system to a 'systems failure' – a number of contributing factors have been identified but the relative weighting of these has not been done.

This resulted in government enquiries, media attention, and ultimately a decision to restructure the Building Industry Authority. A number of internal and external issues were identified as contributing factors, including lack of education and training, technical innovation and risk-taking without the benefit of experience and understanding, and information asymmetries between industry and consumers.

Critical Success Factors

- Establishing the right performance expectations of buildings
- Establishing the right expectations of the regulators
- Addressing issues of critical mass
- Addressing capability problems in regulated sector
- Creating a 'learning system'

Although the New Zealand government could have concluded from this situation that performance was not the right approach, they did not, noting that performance regulation worked well in other sectors, and was not itself the root problem. Instead, the government took several steps to address the systemic problems, including broadening the goals of the building regulations, providing more training and oversight, providing more regulatory enforcement powers and funding to support that effort, fostering better cooperation with other government agencies, providing for licensing and certification, and providing for better consumer protection.

Concluding this session, Sophie Zager provided her views on what is required to make performance codes perform in a US jurisdiction, where the concept of performance building codes is new. One of the major concerns is simply uncertainty about performance codes, how they will be used, the level of education required, and how to assure expectations are met. Enforcement officials are concerned about their knowledge in performance concepts; designers and owners are concerned about the uncertainty in approvals; all stakeholders are concerned about actual building performance over time. To address these and other concerns, Sophie suggested that the public needs to be more involved in shaping building codes and related policy, which could be facilitated by groups such as the ICC though workshops and related forums, that professionals need to assume greater accountability for their designs, and the liability associated therewith, and that greater industry collaboration is needed between engineers, researchers, enforcement officials, designers, and others. Echoing a sentiment of Jack Snell's opening remarks, Sophie also highlighted the need for more university education on performance concepts for enforcement officials and others.

> I don't think I would be giving away any state secrets if I were to say that the term "performance codes" still evokes a healthy amount of skepticism among both municipal employees and the industry we regulate. Municipal employees, such as me, question the sufficiency of our own credentials and the adequacy of our existing code enforcement infrastructure in the performance-based code environment

> In my opinion, two things are crucial for successful transformation from the existing system into a building performance-based system: engagement of all stakeholders, and the reexamination of the current allocation of responsibility and accountability for ensuring code compliance.

Session 7: International Trade Issues

Session Chair: Mr. Richard Okawa, International Code Council, Whittier CA, USA

The Role of European Technical Specifications and Their Impact on National Regulations: The Road Towards Harmonization

Mr. Julio Salazar, Ministry of Public Works (Minsterio De Fomento) [Spain]

Changing Dynamics of the Global Standards Community and the Potential Impact on Trade

Mr. James Thomas, American Society for Testing and Materials [USA]

Facilitating Trade Through Technical Assessment

Mr. John Berndt, General Secretary, World Federation of Technical Assessment Organizations [Canada]

A key motivator in the formation of the IRCC was the realization that the now global economy would result in changes to domestic and international building regulatory policy. However, there are many questions as to how the global economy and international trade issues will influence, or be influenced by, national building regulatory policy. This session focused on international trade issues related to the building regulatory environment.

Julio Salazar led off this session with a discussion of building industry trade issues from the European Commission perspective, focusing on the Construction Products Directive. Julio noted that the need for reduced barriers to trade within the EC has roots in the Cassis de Dijon case of the European Court of Justice, which essentially determined that there should be free movement of product between EC member states. As a means of compliance, with respect to building materials, the Construction Products Directive was established. In addition, Julio noted that there is a series of related components, including CE marking, common technical specifications and testing requirements, accreditation, and related requirements, tools and systems. Julio concluded that, in additional to working well within the EC, the model may have benefits with respect to international trade, as it provides for compatibility of approach, coherence of regulations, coherence of standards, transparency and impartiality of regulations and standards, an appropriate level regulation, transparency and impartiality in obtaining certification, recognition of certificates, compatibility of market surveillance, and development of required infrastructure.

> Cassis de Dijon case (European Court of Justice case 120/78). The Court resolved (in part, that) products legally manufactured and marketed in one country should, in principle, move freely throughout the Community, where such products meet equivalent levels of protection to those imposed by the Member State of exportation and where they are marketed in the territory of the exporting country.

> Construction Products Directives – Essential Requirements (buildings and civil engineering works)
>
> - ER1 Mechanical resistance and stability
> - ER2 Safety in case of fire
> - ER3 Health, hygiene and environment
> - ER4 Safety in use
> - ER5 Protection against noise
> - ER6 Energy economy and heat retention

Next up was Jim Thomas who spoke about the role of the standardization community in the international trade environment. The development and use of standards has a long history and a strong association with the building code industry. Over time, standards have evolved from a means of assuring local uniformity to a means of providing for entry to and uniformity within the global market. Jim noted that with recent directions of the World Trade Organization and related groups, the focus of standardization is changing; however, regardless of how things play out, standards will always play a role in making the world safer.

> The global standards community is a mirror that reflects conditions in the world market. As the role of tariffs decreased in the global marketplace, the role of standards increased. In the global marketplace, standards were now expected to act as passports to multiple markets, the means by which producers were able to satisfy ranges of regulatory requirements.

John Berndt brought this session to a close with a discussion about an alternative approach to facilitating trade through the use of technical assessment. John argues that companies operating on a global basis face challenges given the number of national requirements and the proliferation of standards on the one hand, and WTO requirements to focus on performance measures as a means to minimize barriers to trade on the other. The result places manufacturers in difficult positions in terms of gaining required approvals in numerous countries and jurisdictions. Technical assessments and cooperative agreements, John suggests, can be helpful in addressing some of the issues, as the assessment can be based on desired performance and not specific standards, which can be especially useful for assessment of innovative products.

Global forces have changed competition

- Firms now have global commercial interests
- Borders erased with new communications technologies
- Trading blocs harmonize within, but not with others
- Proliferation of international standards
    - 1957 – few dozen ISO standards
    - 1997 – 12,000 ISO standards

Summary Discussion

Facilitators: Prof. David Lucht, Worcester Polytechnic Institute, Worcester, MA [USA] and Mr. Jon Traw, Traw Associates, Whittier, CA [USA]

As part of the Summit, a lengthy discussion period was built into each session. The presentations by invited speakers, as summarized in the previous section, served as the basis for discussion. In addition, discussion amongst participants was encouraged during breaks, as well as during the specially designated sessions at the end of each day.

As a means to help capture the essence of the discussions, David Lucht and Jon Traw served as Summit reporters – sitting in on all sessions – taking notes on sessions and discussions – initiating discussions with participants during breaks – and generally helping to capture the sentiment of the group. On the last day of the Summit, David and Jon presented a snapshot of their views and impressions of the tenor of the Summit and of the key issues that arose. David and Jon started by restating the Mission and Scope of the IRCC, which provided context for the presentations and discussions of the preceding days. They then reiterated, as a reminder to the participants, the basic questions and challenges that were posed to the invited speakers in advance of the Summit and that formed the basis of discussion. With this background in place, David and Jon went on to summarize their perceptions and interpretations of the key issues and outcomes.

IRCC Mission: Advance at an international level, a framework, guidance and support documents on issues relative to the development, implementation and support of construction related performance-based regulatory systems.
IRCC Scope: Identify the broad public policy, regulatory infrastructure, education and technology issues related to managing the successful implementation and continuation of construction related performance-based regulatory systems.

Challenges
- What changing societal needs are being advanced?
- How to define actions to address those changing needs?
- Code vs. Market approaches? Appropriateness? Capabilities?
- How to set performance levels and how are they selected?

Global Culture and Society

Perhaps one of the most striking and important observations and outcomes is that the participants clearly saw a shifting frame of reference from a local, wealthy, developed country perspective to that of a global perspective, which recognizes that much of the world's population is living in comparative poverty, yet they too deserve buildings that meet basic requirements for health, safety and amenity, and that performance requirements need to reflect their situation. The message from David Eisenberg that "appropriate technology" is the way to go – appropriate to indigenous peoples

Global Culture and Society Issues
- Poverty and environment
- Three earths to sustain us
- Unintended consequences
- Enabling the best or preventing the worst
- Labor intensive/resource scarce

and culture, appropriate to the environment, appropriate to resources – resonated with the Summit participants. As a global community, we need to stop looking at everything through the lens of developed countries, but adapt our worldview to include everyone. Reiterating the words of the late Bob Fowler, as presented by David Eisenberg, we have a responsibility for those who cannot speak for themselves, which in the performance building regulatory environment, means considering all peoples of the world, and the world's limited resources, in decisions we make about building performance requirements.

Performance

A critical issue to the Summit and the discussion was that of performance: what does it mean, how is it measured, how is and/or should it be used in the building regulatory environment? In general, there was support for Peter May's views that we need to be thinking about the entire regulatory regime, or system, and what that means holistically and not in isolation by parts. To date, there seems to be a history of independent activities in the performance-building arena, working on parts they know, but without the benefit of a clearly defined framework. To move forward effectively, this needs to change. In addition, the issue of being able to quantify, measure and predict performance remains a paramount issue, as does the need to set levels of performance in the proper social and cultural context using appropriate technology (not necessarily high-tech or low-tech, but appropriate in the circumstances). There also needs to be further efforts aimed at addressing the flexibility that performance codes provide with accountability by those making decisions, particularly designers. It was noted that, as with the need for a holistic performance regulatory system, taking a holistic view of the performance of a "facility" as opposed to simply a building or structure is important.

Performance Issues
- Performance Systems (Regimes) for Buildings
- Better predicted and measured outcomes
- Levels of performance based on stakeholder needs (i.e. cultural, public health, societal, economic, legal)
- Appropriate Technology
- Flexibility vs. Accountability
- Performance of Facility vs. Performance of Building

Stakeholders

The need for broader, more responsive, and more effective communication with the wide range of stakeholders impacted by building regulations was also a strong theme. If this is not done, key stakeholder groups, such as the public may be underrepresented, leading to divergence in expected and actual performance. In the worst cases, poor communication can lead to situations such as noted by Paul Croce, where a code-compliant building can be uninsurable as the insurance company's needs are not met by the code. In order to assure that effective dialog with the right mix of people occurs, it was suggested that a "champion" is needed, focusing full time on these issues, and that some type of stakeholder organization

Stakeholder Issues
- Stakeholder organization with champion
- Effective communications with stakeholders in terms they will understand and be responsive
- Strategies to create stakeholder dialogue

may be beneficial. Although it was noted that codes- and standards-making organizations, professional societies and other such groups provide for stakeholder interaction, there is cause to believe that gaps in stakeholder representation exist.

Expectations

Closely associated with the first point above, as well as with the Stakeholder discussion, expectations for building regulation, and for the performance provided by buildings, is broadening significantly to include social well-being (not simply "building" performance), societal expectations in terms of climate change and the environment, and delivery of appropriate technology within social, cultural and economic boundaries. It is not enough to construct a building that simply meets an owner's expectations in isolation, but the building must meet expectations for the building as part of the local, national and international community, and its construction, operation and ultimate decommissioning should take into account the global impact.

Expectation Issues
- Shift (broadening) of societal expectations
- Distinction between societal goals and regulatory goals
- Consequence integration

Global Market

Finally, great opportunities are envisioned for performance building regulations in helping to foster a global community. By virtue of having regulations, standards, test methods, and related supporting factors cast in performance terms, a more open, equal market, with limited trade restrictions, is foreseen. Evidence of this has already been seen within the European Community through the Construction Products Directive. The trend towards performance regulatory documents can be useful in helping to make freer trade of products of recognized performance available on a global basis.

Global Market Issues
- Trade restrictions
- Quality of products
- Level playing field
- Performance standards
- Relevance & transparency
- Codes & standards linkage

A Roadmap for the Path Forward – Laying the Foundation

The Summit provided an extraordinary opportunity for international dialog on the future of performance building regulation and its impact on the world's people. To frame the path forward, a clear and concise destination is needed. Based on all of the presentations and discussions, the following destination was agreed:

Summit: A place that transcends… reaches far above its surroundings… implies a lofty goal or destination

Destination
To achieve appropriate facility performance for the largest possible fraction of the world population, taking into account

- "Appropriate Technology"
- The level of performance desired by the indigenous culture
- Traditional health and safety concerns, and
- Life cycle factors like sustainability, environment, security, affordability, human rights, energy, and climate change

This indeed is a lofty goal: an honorable destination. It will not be achieved easily, and will require international collaboration, strong leadership and vision, and resources. To help reach this destination, the following strategies for the IRCC and the global building regulatory community were suggested:

Strategies

- IRCC to provide holistic vision, stimulate awareness, and be a catalyst
- Solicit support from others, such as WHO, UN, World Bank, US AID
- Identify realistic models that can be adapted to a spectrum of cultures
- Identify credible data, best practices, case studies, benchmark criteria
- Support the creation of a stakeholder organization to foster stakeholder dialog, and the identification of a champion
- Hold more policy summits

These suggestions were openly received, with several participants already thinking forward to the next Summit, perhaps in Europe or the Asia-Pacific region, but ideally in a developing country that is looking to embark down the performance path with the help of those who have started down that path already.

In the end, the IRCC, invited speakers, and participants all agreed: the Summit was extremely successful in bringing together policy officials, regulators and researchers, from across the United States and around the globe, to begin an important exchange of information and ideas, and to begin tackling important societal, cultural, legal, technical, and political issues impacting performance-building regulations locally, nationally, and worldwide. Moving forward, significant research, development and education efforts in the areas outlined above, timely and continuing technology transfer, and international collaboration will be needed to achieve the desired destination for performance-based building regulation.

Workshop Participants

Ms. Sarah Abdelkader
US Department of Transportation
Volpe National Systems Tranportation Center
55 Broadway Street
Cambridge, MA 02142
USA

Prof. Daniel Alesch (emeritus)
Public and Environmental Affairs
University of Wisconsin
USA

Ms. Kathleen Almand
Society of Fire protection Engineers
7315 Wisconsin Ave.
Bethesda, MD 20814
USA

Mr. John Archer
National Research Council
Institute for Research in Construction
Canadian Codes Centre, Bldg. M23A
Ottawa, K1A 0R6
Canada

Mr. Brian Ashe
Australian Building Codes Board
GPO Box 9839
Canberra, 2601
Australia

Mr. Finn Norman Bangsund
National Office of Building Technology and Administration
Mollergt. 16
Oslo, N-0028
Norway

Mr. Pascal Bar
DG Enterprise: G5 Construction Unit
European Commission
Brussels
Belgium

Mr. Olav Berge
National Office of Building Technology and Administration
PO Box 8742
Youngstorget
Oslo, N-0028
Norway

Mr. Denis Bergeron
National Research Council
Institute for Research in Construction
Canadian Codes Centre, Building M23A
Ottawa, K1A 0R6
Canada

Mr. John Berndt
World Federation of Technical Assessment Oranizations
c/o Institute for Research in Construction
Canadian Codes Centre, Building M23A
Ottawa, K1A 0R6
Canada

Mr. Robert Bowen
National Research Council
Institute for Research in Construction
1200 Montreal Road, M-20
Ottawa, K1A 3K2
Canada

Mr. Wayne Bretherton
Building Industry Authority
Level 11, Greenock House
39 The Terrace
Wellington
New Zealand

Mr. Barry Brown
Building Industry Authority
Level 11, Greenock House
39 The Terrace
Wellington,
New Zealand

Mr. Richard Bukowski
National Institute of Standards and Technology
100 Bureau Drive
Gaithersburg, MD
USA

Prof. Eric Burnett
Civil and Environmental Engineering
Pennsylvania State University
USA

Mr. Marvin Cantor
American Instiute of Architects
1235 New York Ave, NW
Washington, DC
USA

Mr. Bruce Clemmensen
Canadian Commission on Building and Fire Codes
C/o Institute for Research in Construction
Ottawa, K1A 0R6
Canada

Mr. John Cochran
Callison Architecture, Inc.
1420 Fifth Ave.
Seattle, WA 98101
USA

Prof. Cary Coglianese
Harvard University
JFK School of Government
Weil Hall
79 JFK Street
Cambridge, MA 02138
USA

Mr. Jerry Crabill
PO Box 7410
Olympia, 98507-7310
USA

Dr. Paul Croce
FM Global
1151 Boston-Providence Turnpike
Norwood, MA 02062
USA

Mr. Paul Domich
National Insitute of Standards and Technology
100 Bureau Drive
Gaithersburg, MD 20899-8600
USA

Mr. Vincent Donnally
NAVFAC Engineering Innovation and Criteria Office
6506 Hampton Blvd.
Norfolk, VA 23508-1278
USA

Mr. David Eisenberg
Development Center for Appropriate Technology
P.O. Box 27513
Tucson, AZ 85726-7513
USA

Mr. Paul Everall
Office of Deputy Prime Minister
London
UK

Mr. Garry Fielding
Local Planning Regional & Rural Planning
Division, Dept.of Infrastructure, Planning & Natural Resources
Austrialia

Dr. Dan Fiorino
US Environmental Protection Agency
Washington, DC
USA

Mr. John Gibson
USA

Mr. Wataru Gojo
National Institute for Land and Infrastructure Management
1 Tachihara
Tsukuba, Ibaraki 3050802
Japan

Mr. William Grosshandler
National Institute of Standards and Technology
100 Bureau Drive
Gaithersburg, MD 20816-8660
USA

Dr. John Hall Jr.
National Fire Protection Association
1 Batterymarch Park
Quincy, MA
USA

Mr. Frank Hodge Jr.
International Code Council
1 Town Center Court
Hilton Head Island, SC 29928
USA

Dr. Frank Holm
Norwegian Building Research Institute
Oslo
Norway

Mr. George Humphrey
City of Burnaby
4949 Canda Way
Burnaby, B.C. V5G 1M2
Canada

Mr. David Johnson
Prince George's County
1220 Caraway Court
Largo, MD 20774
USA

Ms. Zita Johnson-Betts
Department of Justice
950 Pennsylvania Ave., NW
Washington, DC 20530
USA

Ms. Edwina Juillet
NTF/LSFPWD
637 Riverside
Luray, VA
USA

Mr. N. Prasad Kadambi
US Nuclear Regulatory Commission
Washington, DC
USA

Mr. J. Edmund Kalie
Prince George's County
1220 Caraway Court
Largo, MD 20774
USA

Ms. Pat Keindel
Canadian Standards Association
5060 Spectrum Way
Mississauga, Ontario
L4W 5N6
Canada

Mr. Jatinder Singh Khokhar
City of Falls Church
300 park Avenue, West Wing City Hall
Falls Church, VA 22046
USA

Ms. Kathryn D. Knorr
Foreign Affairs and International Trade
24 Sussex Drive
Ottawa, K1A 0G2
Canada

Dr. Satoshi Kose
Shizuoka University of Art and Culture
Noguchicho
Hamamatsu, Shizuoka 430-8533
Japan

Mr. Koichi Koshiumi
The Building Center of Japan
No. 30 Mori Bldg.
3-3-2, Toranomon Minato-Ku
Tokyo, 105-8438
Japan

Mr. Richard Kuchnicki
International Code Council
5203 Leesburg Pike
Falls Church, VA 22041
USA

Ms. Patricia Lancaster
NYC Department of Buildings
280 Broadway
New York, NY
USA

Mrs. Marit Langen
NBTA
Pb. 8742, Youngstorget
Oslo, 0028
Norway

Mr. Gustav Pillgram Larsen
National Office of Building Technology and Administration
Mollergt 16
Oslo, 0028
Norway

Ms. Pilar Linares-Alemparte
Ministry of Science and Technology
Serrano Galvache, 4
Madrid, 28033
Spain

Mr. Richard Little
National Research Council
Board on Infrastructure and the Constructed Environment
500 5th Street, NW
Washington, DC 20001
USA

Ms. Mariana Llinares-Cervera
Ministry of Science and Technology
Serrano Galvache, 4
Madrid, 28033
Spain

Prof. David Lucht
Worcester Polytechnic Institute
100 Institute Road
Worcester, MA 1609
USA

Ms. Nicole Malenfant
James Lee Witt Associates, LLC
1201 F Street, NW
Washington, DC 20004
USA

Mr. David Maola
Council on Tall Buildings and the Urban Habitat
USA

Prof. Peter May
Center for American Politics and Public Policy
Univeristy of Washington
USA

Mr. Peter Mazikins
American Forest & Paper Association
1111 19th Street, NW
Washington, DC 20036
USA

Mr. Rodney McPhee
Canadian Wood Council
99 Bank Street
Ottawa, K1P 6B9
Canada

Dr. Brian Meacham
Arup
1500 West Park Drive
Westborough, MA 01581
USA

Mr. Rodney Milford
Division of Building Construction Technology,
Council for Scientific and Industrial Research
South Africa

Mr. Ted Miltiades
Georgia Dept. of Community Affairs
60 Executive Park South NE
Atlanta, GA 30329-2231
USA

Mr. Peter Mumford
New Zealand Ministry of Economic Development
33 Bowan Street, PO Box 1473
Wellington, 6001
New Zealand

Mr. Paul Myers
ICC Building A Safer World Foundation
5203 Leesburg Pike
Falls Church, VA 22041
USA

Mr. Tatsuo Narafu
Building Research Institute
1 Tachihara
Tsukuba, Ibaraki 3050802
Japan

Dr. Kathy Notarianni
National Institute of Standards and Technology
100 Bureau Drive
Gaithersburg, MD 20816-8660
USA

Mr. Richard Okawa
International Code Council
5360 Workman Mill Road
Whittier, CA 90601
USA

Mr. Jake Pauls
Jake Pauls Consulting Services
12507 Winexburg Manor Drive
Silver Spring, MD 20906
USA

Mr. Jose Luis Posada
Ministry of Development
Paseo de la Castellana 67
Madrid, 28071
Spain

Mr. Milosh Puchovsky
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02269-9101
USA

Mr. Emory Rodgers
DHCD
Richmond, VA
USA

Mr. Julio Salazar
Ministry of Public Works (Minsterio De Fomento)
Paseo de la Castellana, 67
28071 Madrid
Spain

Mr. Tomoki Sera
Ministry of Land, Infrastructure and Transport
2-1-3 Kasumigaseki, Chiyoda-Ku
Tokyo, 100-8918
Japan

Mr. Javier Serra
Ministry of Development
Paseo de la Castellana 67
Madrid, 28071
Spain

Mr. Jack Snell
c/o NIST/BFRL
100 Bureau Drive
Gaithersburg, MD 20816-8660
USA

Ms. Francoise Szigeti
ICF-Internatioal Center for Facilities
440 Laurier Avenue, West
Ottawa, Ontario K1R 7X6
Canada

Mr. Stephen Szoke
Portland Cement Association
5420 Old Orchard Road
Skokie, IL 60002
USA

Mr. Shigetaka Takamiya
Australian Building Codes Board
Level 3, 33 Allara Street
Canberra, 2601
Austrialia

Mr. James Thomas
American Society for Testing and Materials
100 Barr Harbor Drive
West Conshohocken, PA 19428-2959
USA

Ms. Elaine Thompson
Allied Tube & Conduit
16100 S. Lathrop Avenue
Harvey, IL 60426
USA

Mr. Jon Traw
Traw Associates Consulting
14435 Eastridge Drive
Whittier, CA 90602
USA

Mrs. Beth Tubbs
International Code Council
244 Brookway Drive
Northbridge, MA 01534
USA

Mr. Jeff Vasey
Building Policy Branch
Ministry of CAWS, PO Box 9951, Stn Prov. Gov't
Victoria, BC V8W 9R3
Canada

Mr. Jason vonWeller
Engineering and Building Inspection Dept.
Bountiful City
790 S 100 E
Bountiful, UT 84011
USA

Ms. Ann vonWeller
International Code Council
Bountiful City
790 S 100 E
Bountiful, UT 84011
USA

Mr. R.B. Watermeyer
Technical Committee for Construction
Standards, Standards South Africa, & Director,
Soderlund & Schutte Consulting Engineers
South Africa

Prof. Elise Weaver
Social Science and Policy Studies
Worcester Polytechnic Institute
100 Institute Road
Worcester, MA 01609
USA

Mr. Robert Weber
R.D. Weber & Associates, Inc.
9784 Ice Box Canyon Court
Las Vegas, NV 89117
USA

Mr. Rick Weiland
International Code Council
5203 Leesburg Pike
Falls Church, VA 22041
USA

Mr. James Lee Witt
International Code Council
5203 Leesburg Pike
Falls Church, VA 22041
USA

Mr. Armin Wolski
Arup
901 Market Street 260
San Francisco, CA 94709
USA

Mr. Ichiro Yamaguchi
General Building Research Corporation of Japan
Hurusato Bldg. 1-2-10 Minamishinmachi
Chuuou-ku
Osaka 540-0024
Japan

Ms. Zophia Zager
Fairfax County
USA