ARE YOU COVERED??...

Simulation, risk and indemnity

A view from an experienced practitioner - what's yours?
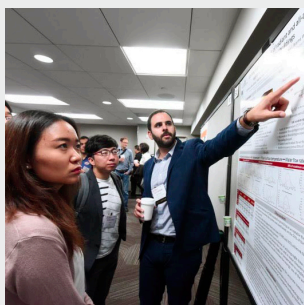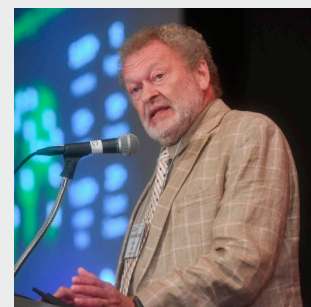
... and a summary report on Building Simulation 2017 in San Francisco

INTERVIEW — with Ardeshir Mahdavi, who is University Professor at TU-Wien, Vienna, Austria, an IBPSA Fellow, and recipient of the IBPSA Distinguished Achievement Award at BS2017
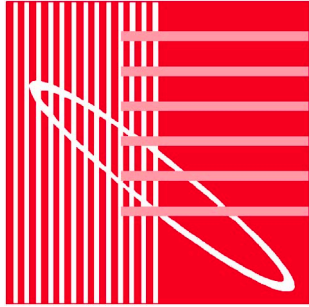
SOFTWARE NEWS — about ASHRAE Standard 205P, new weather data from Climate.OneBuilding.Org, Alternative Compliance Paths for LEED, developments in DesignBuilder, Sefaira, and Equa

GLOBAL COMMUNITY NEWS — from IBPSA affiliates in Australasia, the Nordic countries, Switzerland and the USA

CALENDAR OF EVENTS — 13 conferences and other events for your diary

Contents

Did you know *that the page layout and typography of ibpsaNEWS have been specifically designed for reading on-screen ever since volume 10 in 1999, and all the items in contents lists, and web and email addresses, are active links? Try it on your tablet! - Editor*

President's message

Dear IBPSA Colleagues and Friends,

As reported in other sections of this edition of *ibpsa*NEWS, Building Simulation 2017 in San Francisco was a great success. More than 770 delegates attended, making BS 2017 IBPSA's largest conference to date. Two keynotes, four provocations, more than 100 technical sessions, awards, competitions results, receptions, a banquet, posters, workshops, committee meetings, and vendor exhibits … a good time was had by all.

A significant innovation at BS 2017 was that many sessions included both peer-reviewed papers and oral non-paper presentations of various types. This approach is a good fit for our field that straddles academic work and practical application. Case studies, panel discussions, and preliminary reports are timely and useful, but they are not suitable for inclusion in archival conference proceedings. The mixed-session approach provides flexibility as to what gets presented and fosters practitioner/academic interchange. The response to this format was overwhelmingly positive, based on delegate survey responses. I hope that future Building Simulation conferences retain the approach.

Other new features that debuted at BS 2017:

- Recordings of presentation slides and audio, now posted for viewing via **www.ibpsa.us/news/recorded-sessions-building-simulation-2017-are-now-available**
- A mobile device app that provided session and other information to delegates. This supplemented the printed program, with the advantage that last-minute information could be included.

Because of the availability of non-paper presentation formats, the criteria for peer-reviewed papers were tightened. The page limit was increased to 10 (formerly 8) and more revisions were requested. The result is that more than 330 high-quality papers have been added to IBPSA's proceedings collection. All papers are publicly available via **www.ibpsa.org**. In addition, the authors of 16 papers have been invited to expand their contributions for submission to the Journal of Building Performance Simulation.

Another BS 2017 development was an emerging focus on the building modeling community as people and as a workforce. There were discussions about bringing new people into the field, equality issues, mentoring, and expanding international collaboration. The IBPSA Board of Directors approved a project on accreditation and formed a committee on inclusivity. Historically, IBPSA has addressed the domain of building performance simulation – what to model and how to model those things. These new initiatives recognize that IBPSA's purpose includes supporting the people

working in the field, a sign of maturation of our organization. If you would like to contribute in these areas (or any aspect of IBPSA, for that matter), please get in touch with me – we are always looking for people to join committees.

Looking ahead, 2018 will be a year of regional conferences, including eSim, SimBuild, BauSIM, BSO, and ASim. Please support your local affiliate by submitting papers and attending. As usual, the papers from regional conferences will be available through **www.ibpsa.org**, so your work will benefit from worldwide visibility.

It is also not too soon to start thinking about BS 2019, to be held September 2 − 4, 2019 in Rome. Abstract submission deadlines will be upon us in less than a year. IBPSA-Italy has planning activities well underway.

Finally, thanks once again go to the generous sponsors who supported Building Simulation 2017 and thus IBPSA. A full sponsor list is found on **www.buildingsimulation2017.org/sponsors.html**.

Best wishes for successful modeling!

Charles S. Barnaby

Building Simulation 2017

Notes from the conference

Philip Haves, Erik Kolderup, and Chip Barnaby

The 15th International Building Performance Simulation Association (IBPSA) Conference and Exhibition was held at the Hyatt Regency Embarcadero Hotel in San Francisco, from August 7 to August 9, 2017. The conference was hosted by IBPSA-USA and attended by 776 delegates from 44 countries. There were approximately equal numbers from the public and private sectors, providing a good balance between academic researchers and design practitioners.

There were seven parallel sessions, with the time divided approximately equally between presentations of double blind-reviewed technical papers and presentations without papers, in a variety of formats. The presentations can be categorized as follows:

- **Refereed technical papers - 334 total**
  - 188   18 minute oral presentations
  - 115   3 minute oral summaries
  - 31   posters without an oral summary

- **Non-refereed - 103 total**
  - 57   18 minute single presentations
  - 26   35 minute sessions
  - 5   60 minute sessions
  - 7   75 minute sessions
  - 8   posters

In terms of the topics represented, the relatively new topic of urban scale modeling had the largest number of presentations, followed by best practices and windows and daylighting. Other new program features included impromptu sessions on late-breaking topics and four short 'provocations' on the state of building simulation. Slide-plus-audio recordings of technical presentations are available free of charge to conference registrants and for a $200 fee for non-attendees at **https://ibpsa.confex.com/ibpsa/2017/webprogram/** . As at previous IBPSA conferences, the technical papers will be freely available via **www.ibpsa.org**.

The four 'provocaters'

Left to right:

Gail Hampsmire

Jonathan Wright

Martha Brook

Cole Roberts

After a welcome reception, keynotes were given by Anica Landreneau, Director of Sustainable Design and Consulting at HOK Architects, (on *The Value of Energy Modeling to Owners and Architects)* and Paul Linden of University of Cambridge (on *The Challenge of Simulating Airflow in Buildings: Lessons from Oceanography to Aerospace*).

Keynote speakers Anica Landreneau   ... and Paul Linden

ASHRAE President Bjarne Olesen spoke on the needs and benefits of international collaboration in the development and application of simulation and co-chaired a forum on the topic with IBPSA President Chip Barnaby.

ASHRAE President Bjarne Olesen

Autodesk and the US Department of Energy were Platinum-level sponsors and the California Energy Commission, Google and Southern California Edison were sponsors at the Gold-level and each had the opportunity to make a lunchtime presentation. There were 17 Silver-level sponsors and 19 Bronze-level; one of the benefits enjoyed by all the sponsors was the opportunity to meet students and job-seeking recent graduates at a special reception.

Amir Roth of US DOE (left) and Krishnan Gowri of Autodesk
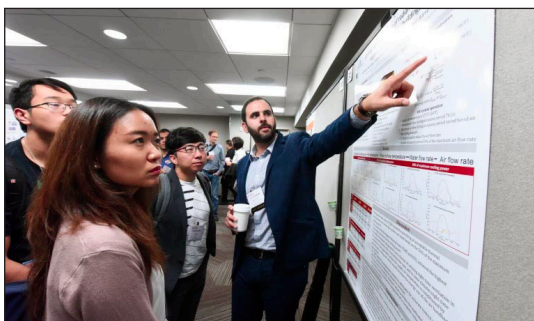
< Poster session

Networking >
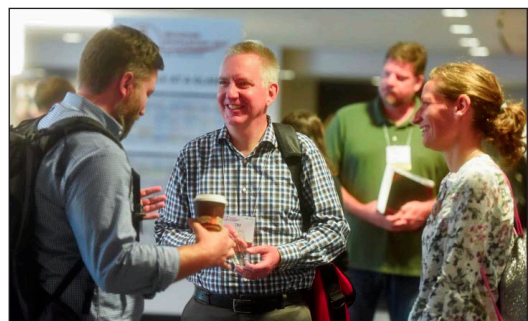
Several vendors had exhibition booths, and training workshops were offered by software venders before and after the main three days of the conference.

Exhibition booths: Autodesk   Southern California Edison   IES

The conference closed with a plenary announcement that Building Simulation 2019 will be hosted by IBPSA-Italy in Rome. IBPSA Board, committee, and annual member meetings were held. IBPSA's Project 1 collaboration on Modelica-based modeling convened a participant gathering.

Vincenzo Corrado and Andrea Gasparella announcing that Rome will be the location of Building Simulation 2019

If you missed the conference, you can view most of the technical sessions here: **https://ibpsa.confex.com/ibpsa/2017/webprogram/meeting.html** .

The two keynote presentations are also available for all to view for free here: **www.ibpsa.us/news/recorded-sessions-building-simulation-2017-are-now-available** .

And you can also view our **full photo archive**.

Finally, a big thank you to all our sponsors and endorsing organizations:

SPONSORS

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2017 IBPSA Awards and Fellowships

IBPSA Distinguished Achievement Award
presented by IBPSA President Chip Barnaby to Ardeshir Mahdavi

Highly commended for design analysis award
presented by Christina Hopfe to Marshal Maskarenj *(received by Ronita Bardhan)*

Student modelling competition
Harvard University (US) awarded winner

... and Georgia Tech (US) awarded 'highly commended'

Student travel awards
Were given to 5 recipients this year: Martin Heine Kristensen (Aarhus University, Denmark) for a paper on *Bayesian Calibration Of Building Clusters Using A Single Geometric Building Representation*; Christoph Waibel (ETH Zürich, Switzerland) for *Validation of Grasshopper-based Fast Fluid Dynamics for Air Flow around Buildings in Early Design Stage*; Qi Li (Georgia Institute of Technology, USA) for *A Framework for Empirical Validation of Building Performance Simulation under Uncertainty*; Kun Zhang (Polytechnique Montreal, Canada) for *Sky Temperature Estimation and Measurement for Longwave Radiation Calculation*; and Maria del Carmen Bocanegra-Yanez (University of Strathclyde, Scotland) for *Modelling Indoor Environmental Quality In Low Energy Housing.*

IBPSA Honorary Awards

IBPSA makes awards on a biennial basis at each Building Simulation Conference for outstanding work in the building performance simulation field, providing there is a qualified candidate. The categories awarded are:

- IBPSA Outstanding Young Contributor Award
- IBPSA Innovative Application Award
- IBPSA Distinguished Achievement Award

Awards were made in all three cetegories at San Francisco.

IBPSA Outstanding Young Contributor Award

This award recognizes an individual at the beginning of their career who has demonstrated potential for significant contributions to the field of building performance simulation. This year's award goes to: **Liam O'Brien**

Liam O'Brien completed his Ph.D. study at Concordia University. He is an associate professor and program advisor for Carleton University's Architectural Conservation and Sustainability Engineering program and the principal investigator of the Human Building Interaction Lab. He is currently a subtask co-leader for IEA EBC Annex 66 on "Definition and Simulation of Occupant Behavior in Buildings". He has won several prestigious awards including the Carleton Research Achievement Award and the Early Researcher Award. He also contributed to the rapid growth of IBPSA Canada and three successful eSim (IBPSA Canada) conferences from 2012 to 2016.

IBPSA Innovative Application Award

This award recognizes an individual, group or firm, who has made a significant contribution to the effective application and/or advancement of building performance simulation in practice. This year's award goes to: **Professor John Mardaljevic**

John Mardaljevic was one of the pioneers of what is now known as climate-based daylight modelling or CBDM. CBDM is an advanced design tool which enables designers to model the illumination performance of fenestration in buildings. In 2013 the UK Education Funding Agency (EFA) made climate-based daylight modelling a mandatory requirement for the evaluation of designs submitted for the Priority Schools Building Programme (PSBP). CBDM is and will grow to be a cornerstone of optimal façade design.

IBPSA Distinguished Achievement Award

This award recognizes an individual who has a distinguished record of contributions to the field of building performance simulation, over a long period. This year, the Board has decided to bestow this honour on: **Professor Ardeshir Mahdavi**

Ardeshir Mahdavi is the Chair of Building Physics and Building Ecology at TU Wien. Prior to his current position, he was Full (tenured) Professor of Building Physics at CMU (Carnegie Mellon University, Pittsburgh, PA, USA), and he has also acted on multiple occasions as Visiting Professor of Building Physics at different universities around the world, including, for instance, NUS (National University of Singapore). He has supervised over 60 doctoral students and 130 Master of Science students.

Ardeshir Mahdavi has conducted internationally acclaimed research in the fields of Building Physics, Building Performance Simulation, Building Controls and Diagnostics, Building Automation, Building Information Modelling, Building Ecology, and Human Ecology.

He has authored and co-authored over 140 journal papers, 550 conference papers, and 70 scientific writings in book chapters and research documentations. He is a frequent Keynote speaker at international conferences (e.g., IBPSA, CLIMA, PLEA, CIB, ECPPM, CESBP, BAUSIM, BSA, CAAD Futures, eCAADe, ICAUD).

One of his keynotes which was made on the subject of occupant behavior at Building Simulation 2011, and his chapter on the same subject in the book by Hensen and Lamberts, are and will be lasting contributions to the BPS field.

2017 IBPSA Fellows

The IBPSA Board of Directors elects new Fellows on a two-year cycle. We are pleased to introduce the 2017 class of new IBPSA Fellows:

Andreas Athienitis

Professor Athienitis is an internationally distinguished researcher in the modeling, simulation and innovative design of solar and high performance buildings. He is the author of over 240 refereed journal and conference papers, with 7 best paper awards and several books. He is a distinguished Canadian leader of two NSERC strategic research networks unifying top researchers, institutions, and industries.

Andrew Corney

For over 12 years, Andrew has worked with WSP group in three continents providing and leading building design and simulation services for dozens of projects, many of which were recognized as best practice projects by the industry. In particular, Andrew pioneered new design solution in the areas of natural daylighting, innovative natural ventilation and air-conditioning solutions.

Craig Wheatley

Craig has 21 years' experience of engineering consultancy and 9 years' experience at executive board level. He is a Chartered Member of the Energy Institute in the UK and he is currently responsible for the strategic direction of the IES Virtual Environment (VE) software. He coordinates the IES client Futures Group that provides industry focus for future development of the VE, and heads the IES Partnership Programme integrating enterprise partners within the VE.

Etienne Wurtz

Etienne Wurtz is Scientific Director at CEA INES (The French National Solar Energy Institute) and the leader of the Building Energy research program at CEA Tech. Etienne has had an exemplary academic career, first as lecturer at the University of La Rochelle, then CNRS and CEA. Etienne's scientific interests particularly focus on innovative simulation tools and solutions for building comfort and energy performance. Etienne is the president of IBPSA France – organizing successful national and international conferences (e.g. BS 2013 in Chambéry, France). He is also a very perseverant promoter of building performance simulation in industry and in national directives.

Gerhard Zweifel

Gerhard Zweifel has a track record of more than 30 years in building simulation. He is a recognized expert in developing, applying and teaching tools for digital building and system design, modelling and simulation. Gerhard is a founding member of IBPSA Switzerland and became its first president. Gerhard's professional, educational and research activities led to a measurable increase in the use of building simulation in Switzerland. He is Task leader for the revision of the CEN/TC 156 Energy Performance Standard for Buildings and contributes to the revision of national standards.

John Mardaljevic

Professor John Mardaljevic developed and pioneered the daylighting simulation field now known as Climate-Based Daylight Modelling (CBDM). Since then, he has actively promoted the diffusion and adoption of CBDM through numerous publications, conference presentations, teaching and supervision activities, and in his role as the daylight expert on national and international panels. He has applied CBDM to a number of design and consultancy projects, such as the NY Times building, and National Trust heritage properties buildings, to name but a few.

John Wright

John Wright is a professor of mechanical engineering at the University of Waterloo, Ontario, Canada, and has made a significant contribution to window performance analysis. His work was key to the development of the VISION and WINDOW simulation programs and he continues to advance methods for simulating complex fenestration systems. He was a prominent member of the NSERC Solar Buildings Research Network (2006-2010) and Smart Net-zero Buildings Research network (2011-2016).

Malcolm Cook

Professor Malcolm Cook is well-known for his work on the natural ventilation of buildings. Anyone working in the field of simulating buoyancy-driven air flow within buildings and between buildings will have encountered his publications on the topic and will have been influenced by his contributions. He is also known for his efforts to transfer simulation from academia to industry. At Loughborough he developed and launched an MSc programme which is still contributing future experts to the building simulation community. He has contributed significantly to the development of IBPSA.

Michel Bernier

Professor Michel Bernier of Polytechnique Montréal, Canada, has been involved in IBPSA since 2003. He is an internationally recognized researcher in the simulation of thermal processes and energy performance of building systems. He has made several significant contributions to advanced simulation and design methods for geothermal heat pump systems as well as in the experimental validation of novel analytical evaluation of bore field thermal response factors for ground source heat pump systems. He has received several awards in recognition of his work and is also recognized for his leadership in education by having developed undergraduate and graduate courses.

Mitsuhiro Udagawa

Professor Mitsuhiro Udagawa has been developing an energy and environment simulation tool, EESLISM (Energy and Environment Simulator with LInear System Model) since 1989. EESLISM is a whole system simulation tool combining both building heat load simulation and the mechanical building heating and cooling system for HVAC and DHW. The application of the simulation tool for the optimum design and the evaluation of sustainable buildings including solar buildings is also his major accomplishment. He served as a Board member of IBPSA, the President of IBPSA Japan (2001-2003), and the President of the Japan Solar Energy Society (JSES). He has written more than 430 papers in the field of building services engineering.

Peter Simmonds

Peter Simmonds is a recognized expert in the field of radiant heating and cooling systems. Peter is a simulation practitioner who has hands-on experience in simulating, designing and then constructing actual radiant heating/cooling systems. His successful projects include the Academic Teaching Hospital in Netherlands (1994); the new Bangkok airport (2004), The Akron Art Museum, Ohio, and the Louis Vuitton Museum, Paris. He was awarded an ASHRAE fellowship in 2006 and the ASHRAE exceptional Service award in 2014.

Pieter de Wilde

Professor Pieter de Wilde has a 20+ year track record of teaching and research in building performance simulation covering areas such as the role of building simulation in the design and operation of buildings, management of climate change, and studies of the energy performance gap. He has published 180 papers and (co-)authored 13 books/chapters/editorships. He currently serves as the chair of IBPSA-England and as the secretary of IBPSA World. His effort and commitment in supporting IBPSA activities are also noteworthy.

Shengwei Wang

Professor Shengwei Wang has published over 240 journal papers and over 90 conference papers and two books, and co-authored four other books. He was ranked as one of the top 150 most cited scholars in Energy Science and Engineering according to Elsevier, 2016. He is an associate editor of Science and Technology for the Built Environment and a fellow of CIBSE and HKIE.

Tianzhen Hong

Tianzhen Hong is a Staff Scientist, leading a research team at LBNL. He leads the EnergyPlus development at LBNL, was the founding developer of DeST (the only building performance simulation engine in China), the lead developer of VisualDOE 4.0, and the technical lead of the web tool Commercial Building Energy Saver. He has developed and applied new methods and tools to improve the modeling of occupant behavior, and he leads the IEA Annex 66 and ASHRAE Task Group on occupant behavior. So far, he has published 53 journal articles.
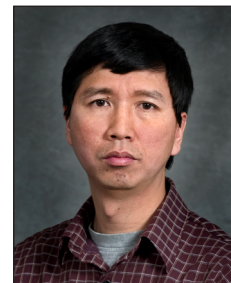
Xianting Li

Professor Xianting Li has spent more than 20 years researching and teaching in the fields of indoor air distribution simulation and control, emergency ventilation systems, air-conditioning systems and new HVAC equipment. Dr Li developed an algorithm to simulate the performance of complex refrigeration systems. He is the President of Commission E1 of the International Institute of Refrigeration (IIR), the Vice-President of the Chinese Association of Refrigeration (CAR), the President of the Ventilation Commission of the Chinese Committee of HVAC, and he has been the administrator of ASHRAE's Beijing Group since 2009.

Yiqun Pan

Professor Yiqun Pan has spent 20 years researching and teaching in the fields of building simulation, building automation, green building technology and community energy planning. Yiqun Pan participated in the development of a Chinese EnergyPlus Interface: VisualEPlus, and led the study on energy modeling of a prototypical shopping mall in Shanghai. She was also the Chair of the first IBPSA Asia conference (ASim2012).

Zulfi Cumali

Zulfi Cumali has made significant contributions to the field of building energy simulation over a 40 year period through his computer code development, which was usually under contract to the National Labs. His work has fundamentally shaped the foundations of many of the simulation programs in use today. Specifically, he made major contributions to DOE-1, DOE-2, EnergyPlus and other programs.

Nominations for new IBPSA Fellows should be sent in the first instance to Cheol-Soo Park, Chair of the awards and fellows committee, at cheolspark@skku.ac.kr. ■

Open practitioner modeling competition

Introduction

As part of Building Simulation 2017 the local IBPSA-San Francisco Bay Area Chapter organized an open practitioner competition, the winner to be announced at the conference. The competition brief called for the Design and Simulation of a Laboratory Building in San Francisco, and included requirements for minimising building energy consumption by designing the most efficient MEP and envelope systems possible, while maintaining comfortable conditions inside the building. Innovative simulation-aided design was encouraged.

There were over 40 initial entries, with 12 Teams from five different countries making a final submission. The sizes of the individual practitioner teams were determined by the teams themselves.

The winner was AECOM's High Performance Buildings and Communities Team, who took home the honours together with a $1,500 Cash Prize sponsored by IES Ltd – so a big congratulations to the AECOM team! The report for AECOM's winning entry can be found at **https://upload.iesve.com/uploads/staff/13727/01_ AECOM.pdf**.

IES interviewed Victoria Watson, an Associate with AECOM and the AECOM team captain, to find out how practitioners achieve such high levels of building performance. Other team members made contributions to the discussion where appropriate.

As well as Victoria Watson, the team included Sandy Mukherjee, Abhinay Sharma, Maria Spastri, Aman Singhvi, Xiaofei Shen, Kenneth Teeter-Moore, Calum Thompson and Lisha Deng.

Interview with the winning team

IES: The number of participants in the competition entries ranged from one to nine people on a team, and AECOM had the largest team, with nine members. Can you tell us about the teamwork ethos at AECOM and why you chose to include so many team members in your entry?

AECOM team captain Victoria Watson (VW): Wow, that's interesting. I think the competition brief was written in a way that appealed to individuals and groups in different ways which is great. We wanted to use the opportunity to include the whole team at the time so we could capitalize on the team building experience. The whole team doesn't get to work on the same project in our day to day project activity so this was a great opportunity. Having a large team also allowed us to cover lots of different expertise from modelling HVAC systems to creating visually appealing graphics. Everyone on the team had different strengths and together we are stronger.

IES: Interestingly, there was a team entry of one person who came in third in the competition and a team of only two people who came in second. Surely, you must have had some headaches during the design, or is that all part of the process?

VW: Having a large team definitely required more coordination between members to make sure we fully capitalized on the benefits of team work. Working within AECOM as a large multi-discipline design consultancy we were all used to working on large inter-disciplinary teams. However, the fresh twist was operating as a multidisciplinary team … within an existing team. This gave us a new perspective on things as we found it much easier to break down some of the communication barriers you can sometimes find on projects as we were all aligned in the project goal.

IES: The design brief called for accurate and intelligent use of building simulation in your design process. Your winning report demonstrated a rather unique visualisation describing your various simulation analyses during the building design process, at different phases of design. Can you describe this to us?

VW: Our design process focused on the importance of integrative design between the different expertise in the team (MEP/Architecture/simulation) to ensure a high performance solution can be achieved. One of our team members, Abhinay Sharma, created a graphic to illustrate this, and I'll leave it to him to describe it.

Abhinay Sharma: From the beginning the entire team was committed to ensure a continuous integrated approach was implemented to produce a final design solution. We pursued a non-linear approach throughout the allotted time of 8 weeks and converged at the final solution unanimously. This approach naturally pushed the process graphic from a linear timeline to a spiral culminating in a design solution at the end. This provided the opportunity to show when each of the processes started and how they interacted with other ongoing processes. The spiral shape also allowed us to incorporate the 8 week timeline in a circular fashion thus providing a concise snapshot of time used in every process.
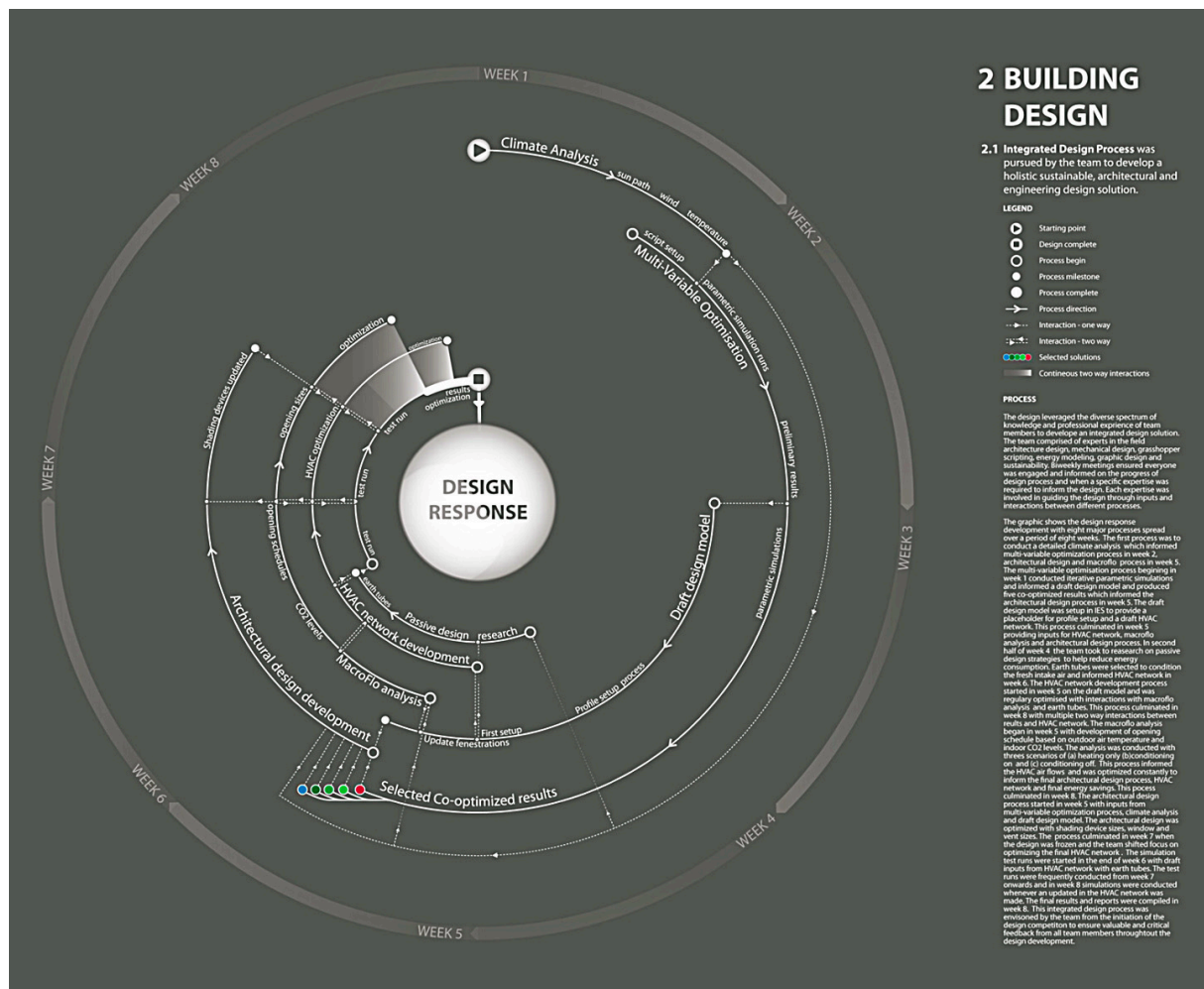
IES: On that note, do you have advice for what tools should be applied at different stages of design, or is that something that evolves differently for every project?

VW: We find that energy simulation tools are constantly evolving their capabilities and therefore we try to keep abreast with these changes so we can utilize these. We do find that different tools are more appropriate at different stages of the design and it's not possible to use a "one size fits all" approach. We do consider each project when deciding how much energy simulation should be undertaken, when should it be undertaken and what tool should be used. Factors that influence those decisions include project performance aspirations, timeline, budget, code requirements, client requirements and the design team. We tend to split our performance based design tools into conceptual (such as Sefaira / Grasshopper) and detailed (e.g. IESVE / Transys). We look for opportunities to bridge the gap between the tools where possible and that's where interoperability is very important. One of the most important things is that the person controlling the tool is comfortable with that tool (to avoid garbage in = garbage out) and sometimes this will mean a certain tool is actually the right choice for a particular project because of modeller expertise.

IES: Can you describe what "multi-objective, multi-variable optimization simulation" is and when it should be applied on a typical project?
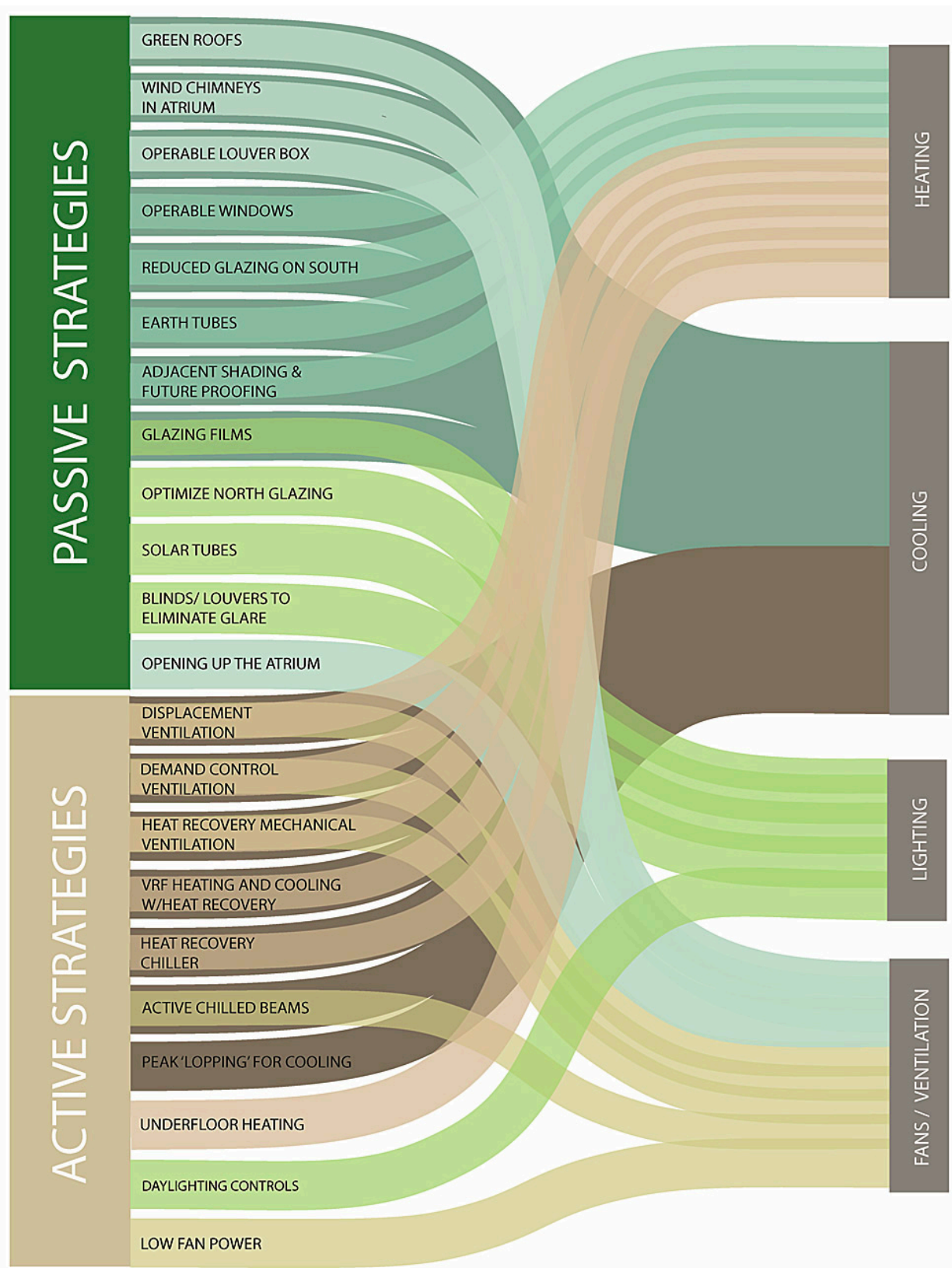
VW: Multi-objective, multi-variable optimization simulation is when you are trying to optimize multiple outputs (in our case minimize glare and maximize daylight) whilst varying multiple variables (in our case number of windows, window area, location and shading) within the limits set.

Xiaofei Shen, team member who led the team's graphics production: This evolutionary trade-off analysis tool is the best way to provide energy performance feedback for design decision support in a quicker and comparatively more accurate way. This is especially important at the beginning of the conceptual stage when there are millions of redundant iterations generated from the parametric models, which is more possible due to the extensive usage of scripting architectural design programs nowadays. With the limit of time and budget restrictions, we'll rely more and more on this rich-data multi-task methodology to tackle the complex active system design issues in future performance based building design.

Aman Singhvi, team member who led the multivariable optimization process: The computational capacity that we have at our disposal today through our regular computers is enough to solve thousands upon thousands of possible outcomes for a given set of inputs. Multivariable multi-objective optimization simulation numerically eliminates 'unfit' design solutions through an exhaustive search-and-optimization process. Even though this method can be used at any stage and at any scale of the design process, it is immensely useful in the early concept stage when there are countless parameters affecting the design, resulting in virtually infinite solutions.

IES: How important is it to identify the synergies between various energy end uses, when analysing passive and active design strategies? What approaches did you consider for this during the competition?

VW: It is important as building design involves a lot of trade off of different elements therefore considering synergies between strategies allows the "biggest bang for your buck" approach to be taken. It is also important because sometimes energy performance can throw you results you were not expecting that could be missed when looking at things in isolation. A good example of this is with earth tubes or heat recovery, where it's easy to see how these techniques can reduce building heating and cooling load, but they also increase fan energy. I learnt this the hard way moving from the UK where heat recovery was seen as a "no brainer" to sunny southern California where it often doesn't stack up.

PASSIVE STRATEGIES

GREEN ROOFS

WIND CHIMNEYS IN ATRIUM

OPERABLE LOUVER BOX

OPERABLE WINDOWS

REDUCED GLAZING ON SOUTH

EARTH TUBES

ADJACENT SHADING & FUTURE PROOFING

GLAZING FILMS

OPTIMIZE NORTH GLAZING

SOLAR TUBES

BLINDS/ LOUVERS TO ELIMINATE GLARE

OPENING UP THE ATRIUM

ACTIVE STRATEGIES

DISPLACEMENT VENTILATION

DEMAND CONTROL VENTILATION

HEAT RECOVERY MECHANICAL VENTILATION

VRF HEATING AND COOLING W/HEAT RECOVERY

HEAT RECOVERY CHILLER

ACTIVE CHILLED BEAMS

PEAK 'LOPPING' FOR COOLING

UNDERFLOOR HEATING

DAYLIGHTING CONTROLS

LOW FAN POWER

HEATING

COOLING

LIGHTING

FANS / VENTILATION

Sandy Mukherjee, team member who led this process for the competition: The primary idea was first to identify all the lowest hanging fruit given the design brief/ constraints. Listing our active and passive design options side by side allowed us to understand where all the synergies lay and which ones we could take advantage of in our design. We took smaller parts of the building first to test out our various strategies as well as to ensure that the synergies are working in our favour and as we expected. We then applied it to the whole building. This part-to-whole approach gave us some confidence in our modelling, especially for systems that aren't very straightforward to model like the earth tubes.

IES: There were some very innovative design features integrated into the design, such as solar tubes, wind-catchers, natural ventilation via operable windows, solar shading, high-efficiency VRF and below-ground ventilated earth tubes. In hindsight, how difficult was it to accurately simulate the performance of each of these design features?

VW: We definitely had some challenges trying to ensure we were modelling certain elements as accurately as possible. However the reality of energy simulation is that there is also some trade-off on accuracy when bringing certain strategies together into an energy model. One software can't be an expert in modelling the intrinsic detail of every design solution, however for us finding a reasonable level of accuracy, so that we could comfortably trade off approaches against each other, was what we were looking for.

IES: The HVAC modeling diagram seems quite involved and we recognise ApacheHVAC being utilised. Do you have any advice for integrating the process of HVAC sizing and HVAC energy simulation with this tool?

VW: ApacheHVAC is great for modelling bespoke systems as it allows for ground up construction of the system air streams and controls and so can be tailored to suit most situations. Using the in-built prototype systems is a great way to get something up and running quickly and also use for reference when building new systems. It's important when using ApacheHVAC though to take ownership of the controls and components and work through them understanding what is being done at each step (and making changes where it doesn't match the design). There is definitely some trial and error involved with running it through ApacheHVAC but that's part of the fun of learning! Sometimes the control strategy will be left until the end of design but using ApacheHVAC brings it to the front of design where it should be as you need to be able to set up and control the systems in the model (again the prototype controls are a great starting point). ApacheHVAC is always improving in auto-sizing capabilities and this can be very useful at a stage where the system design has not fully evolved.

IES: AECOM's use of visual analysis in the design brief was exceptional. Is this due to a limitation in existing simulation tools or rather an intentional method to apply your own unique visual techniques in order to stand out?
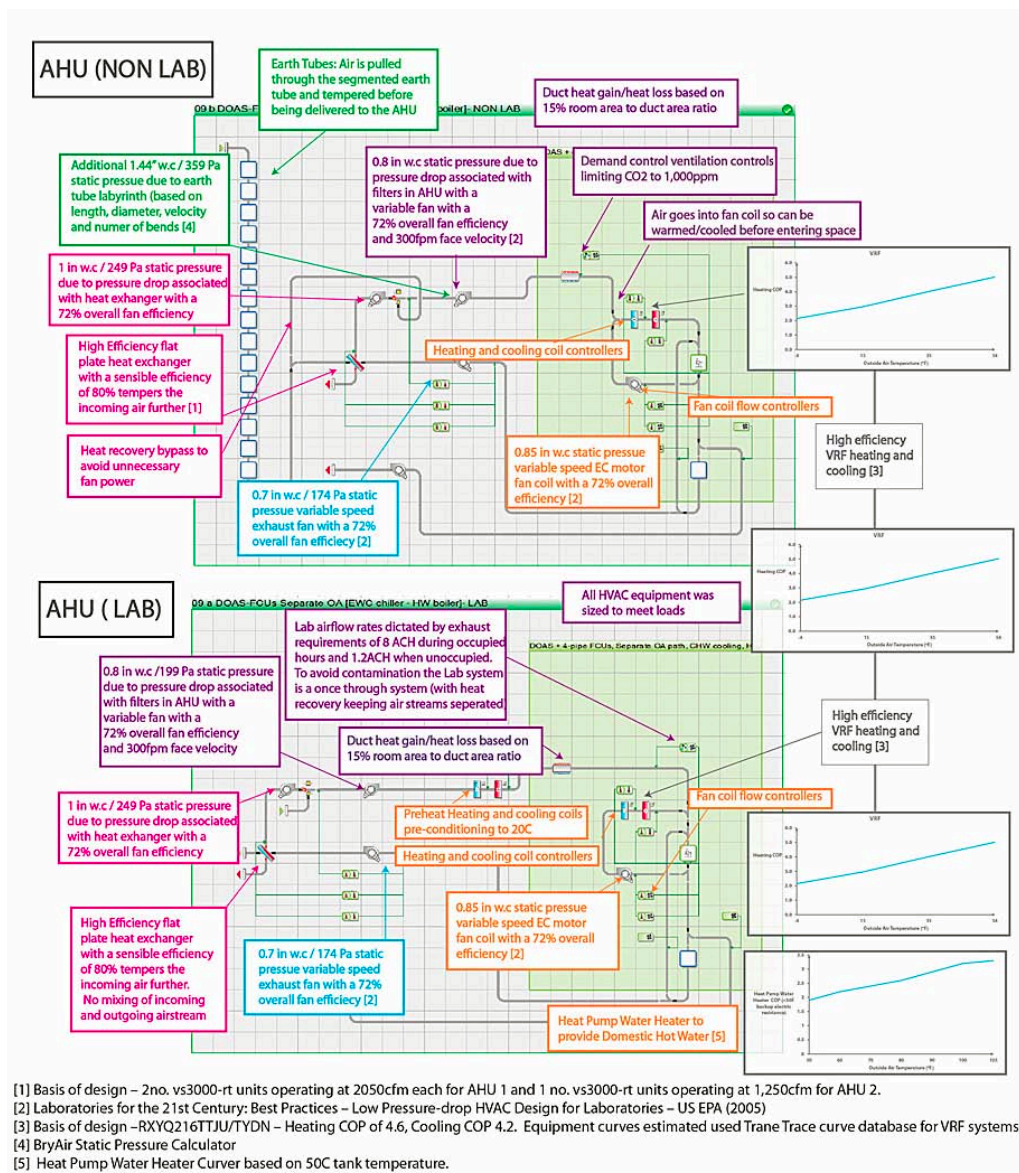
VW: Being able to present design ideas and analysis in a visual fashion is important as many people find it easier to understand things when presented in this way. Having the larger team enabled us to pair up expertise - detailed analysis with graphical expertise to ensure we had robust analysis behind the visuals. What makes visualizations so powerful is that they put the key information up front and therefore ensure the take-away message is what you are trying to communicate. This inherently means that they are often bespoke as one solution doesn't fit all and therefore unique visuals are much more powerful.

IES: On that same topic, what is your advice for the commercial building performance software vendors for visualisation outputs? Do firms like yours prefer 'canned' reports and graphs, or do you prefer a facility to export data, and customize the output, or are both options still as desirable as ever?

VW: I think that software vendors should focus on making sure they can provide outputs clearly which can be

worked with in a user friendly manner (e.g. viewing different parameters / saving selections) so the tool can be used for analysis and exporting the data. If this can be done well it supports the actual analysis being done quickly in the tool which frees up time for any bespoke visuals if needed outside the software that work for the project.

Xiaofei Shen: The data from the building performance simulation software is objective, and must be accurate and consistent with each other no matter what software you use. The way we visualize the data, on the contrary, needs to be customized, which is more subjective, to fit into different situations from one project to another. Because of this, we prefer all the parameters and outputs exported from the software to be editable in different formats, so we can always have our own options to address them in different ways. Sometimes they need to be integrated with the architecture and building system design, for better and easier communications with designers, clients and the public.

[1] Basis of design – 2no. vs3000-rt units operating at 2050cfm each for AHU 1 and 1 no. vs3000-rt units operating at 1,250cfm for AHU 2.
[2] Laboratories for the 21st Century: Best Practices – Low Pressure-drop HVAC Design for Laboratories – US EPA (2005)
[3] Basis of design –RXYQ216TTJU/TYDN – Heating COP of 4.6, Cooling COP 4.2. Equipment curves estimated used Trane Trace curve database for VRF systems.
[4] BryAir Static Pressure Calculator
[5] Heat Pump Water Heater Curver based on 50C tank temperature.

IES: The reviewers noted that while AECOM emphasized low energy consumption in your report, metrics for thermal comfort and daylight performance were also analysed simultaneously. How important is it to provide an integrated whole-building set of solutions?

VW: This is very important. The concept of a high performance building is not limited to energy performance but also includes occupant wellness. The building is built in a matter of years (sometimes less) and is in use for decades, typically being built for occupants.

IES: After all is said and done, was the experience of the competition worth it for the recognition and/or for the internal team-building? Will you take any lessons learned and apply them in your day-to-day practice?

VW: I definitely think it was worth it for the improved skills, the community recognition of our efforts and most importantly the team-building element. Let's see what some of the team thought!

Team member Maria Spastri: We have explored various capabilities and skills among our team members, which not only expanded our understanding of what we each can work on, but it also enriched our modeling knowledge; and strengthened further our foundation for future collaborative works.

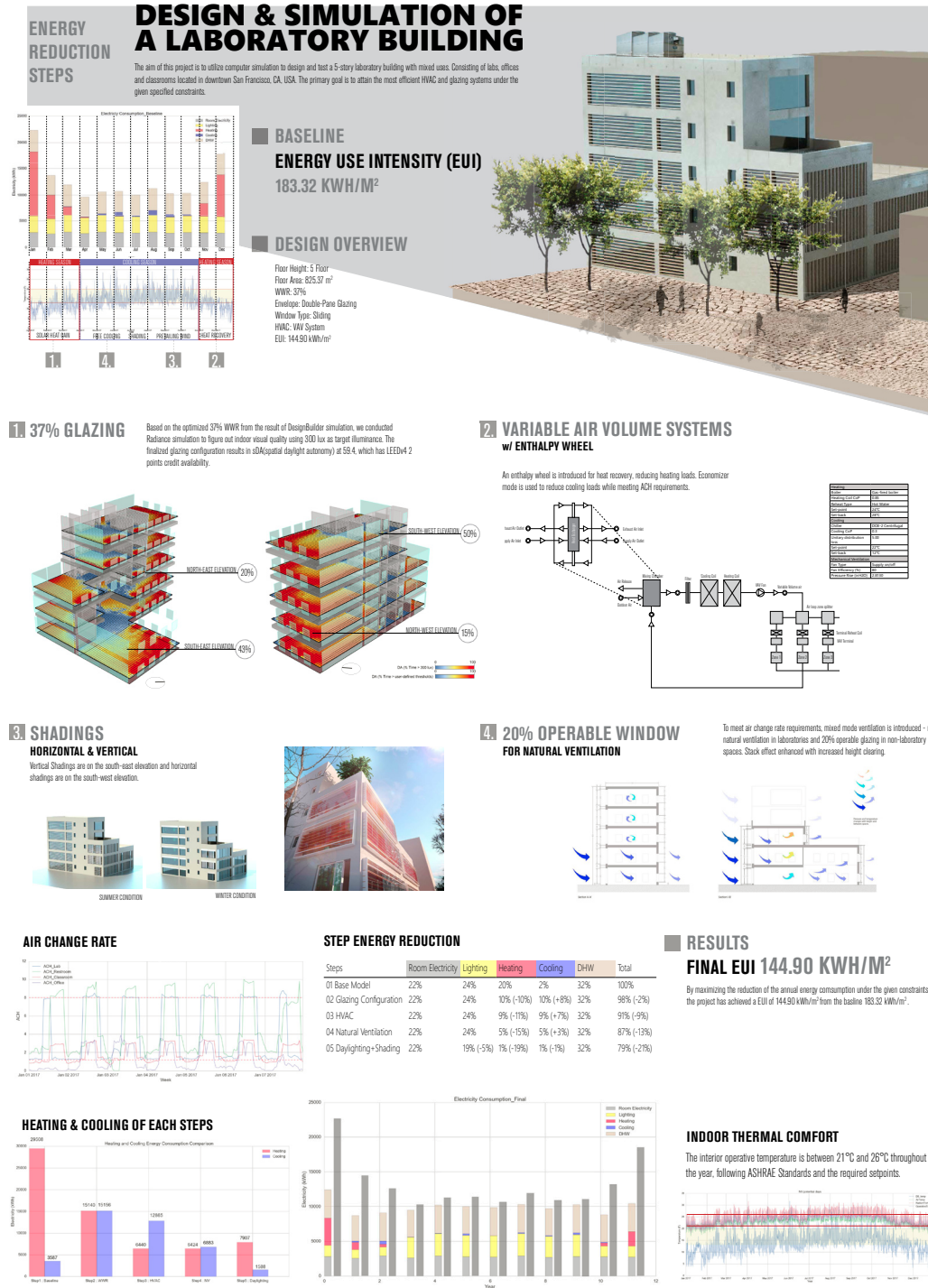Team member Sandy Mukherjee: The experience of going through the process definitely taught us two things:

1 Effective and timely collaboration and team work is instrumental in producing quality deliverables. With a diverse team, the workload gets distributed and members can take ownership of various parts of the design which can then get stitched together at the end.

2 Quite often, as we're more technically inclined, we focus more on the energy simulation results/savings side of things but tend to ignore the story telling aspect. Strong visuals backed by robust analysis can sometimes be very effective in exhibiting the strength of the design, whereas analysis outputs by themselves can get one lost in numbers.

IBPSA-SFBA AND IES: Thank you again to AECOM for raising the bar with this simulation report. I really hope the organisers of the next Building Simulation Conference in Rome include a practitioner competition! ■

Student modeling competition

The winning entry from Harvard University

ENERGY REDUCTION STEPS

DESIGN & SIMULATION OF A LABORATORY BUILDING

The aim of this project is to utilize computer simulation to design and test a 5-story laboratory building with mixed uses. Consisting of labs, offices and classrooms located in downtown San Francisco, CA, USA. The primary goal is to attain the most efficient HVAC and glazing systems under the given specified constraints.

BASELINE
ENERGY USE INTENSITY (EUI)
183.32 KWH/M²

DESIGN OVERVIEW
Floor Height: 5 Floor
Floor Area: 825.37 m²
WWR: 37%
Envelope: Double-Pane Glazing
Window Type: Sliding
HVAC: VAV System
EUI: 144.90 kWh/m²

1. 37% GLAZING Based on the optimized 37% WWR from the result of DesignBuilder simulation, we conducted Radiance simulation to figure out indoor visual quality using 300 lux as target illuminance. The finalized glazing configuration results in sDA(spatial daylight autonomy) at 59.4, which has LEEDv4 2 points credit availability.

2. VARIABLE AIR VOLUME SYSTEMS w/ ENTHALPY WHEEL

An enthalpy wheel is introduced for heat recovery, reducing heating loads. Economizer mode is used to reduce cooling loads while meeting ACH requirements.

3. SHADINGS
HORIZONTAL & VERTICAL
Vertical Shadings are on the south-east elevation and horizontal shadings are on the south-west elevation.

4. 20% OPERABLE WINDOW FOR NATURAL VENTILATION

To meet air change rate requirements, mixed mode ventilation is introduced – no natural ventilation in laboratories and 20% operable glazing in non-laboratory spaces. Stack effect enhanced with increased height clearing.

AIR CHANGE RATE

STEP ENERGY REDUCTION

Steps	Room Electricity	Lighting	Heating	Cooling	DHW	Total
01 Base Model	22%	24%	20%	2%	32%	100%
02 Glazing Configuration	22%	24%	10% (-10%)	10% (+8%)	32%	98% (-2%)
03 HVAC	22%	24%	9% (-11%)	9% (+7%)	32%	91% (-9%)
04 Natural Ventilation	22%	24%	5% (-15%)	5% (+3%)	32%	87% (-13%)
05 Daylighting+Shading	22%	19% (-5%)	1% (-19%)	1% (-1%)	32%	79% (-21%)

RESULTS
FINAL EUI 144.90 KWH/M²

By maximizing the reduction of the annual energy consumption under the given constraints, the project has achieved a EUI of 144.90 kWh/m² from the baseline 183.32 kWh/m².

HEATING & COOLING OF EACH STEPS

INDOOR THERMAL COMFORT

The interior operative temperature is between 21°C and 26°C throughout the year, following ASHRAE Standards and the required setpoints.

Ching Che Huang & Christine Marie Vähringer & Esteban Estrella Guillén & Jung Min Han & Tai Hsin Hsu - Graduate School of Design - Harvard University
chuang@gsd.harvard.edu · cvoehringer@gsd.harvard.edu · estrellaguillen@gsd.harvard.edu · jhan2@gsd.harvard.edu · thsu@gsd.harvard.edu

The 'highly commended' entry from Georgia Tech
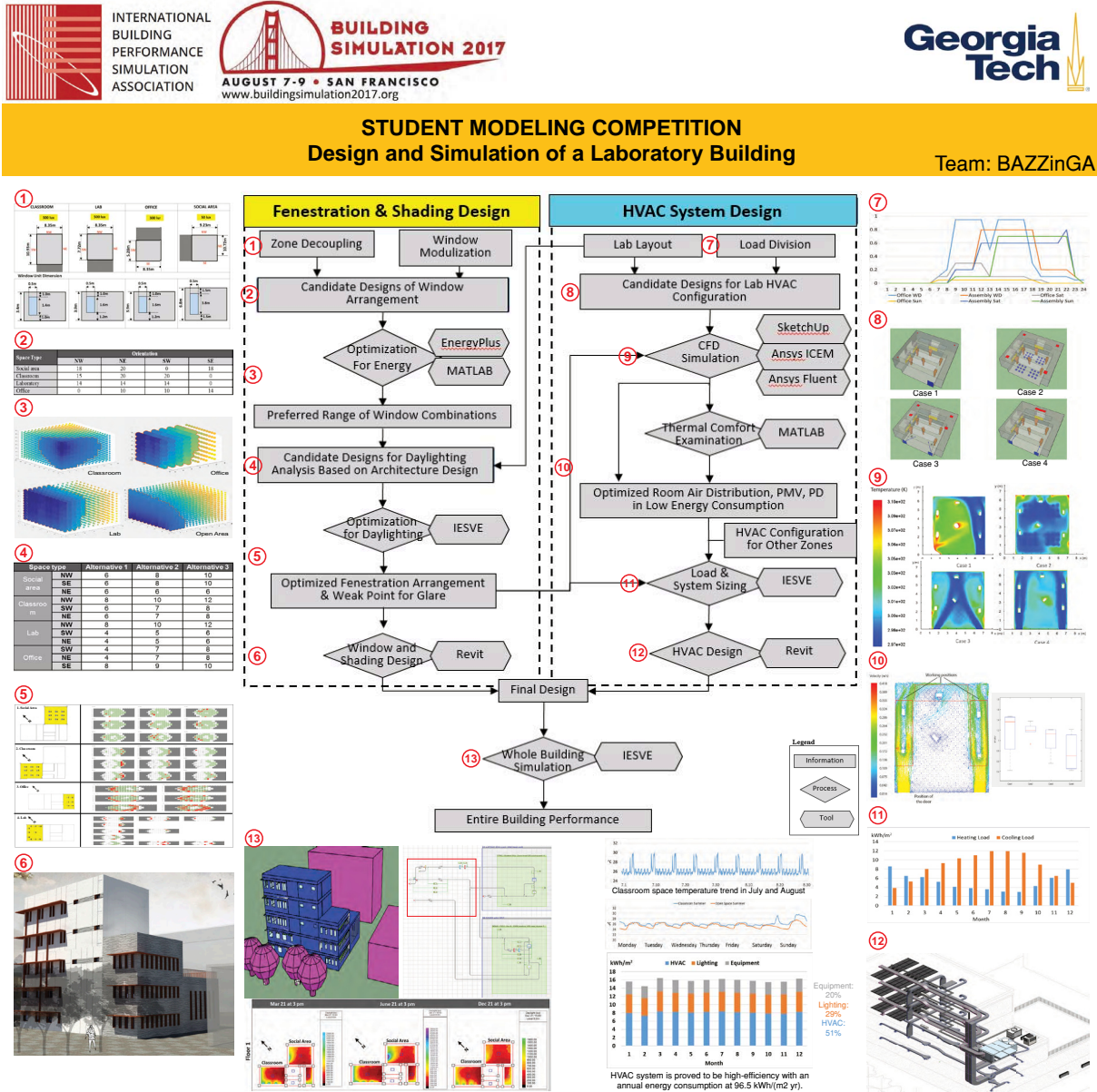
IBPSA New Blood Forum

The IBPSA Communication Committee held an impromptu 'New Blood Forum' session during BS2017. Chaired by Veronica Soebarto, the Forum aimed to seek new ideas from the younger generation — whether young in age or young at heart — on how to improve communications between IBPSA and its members worldwide, as the first step to enhancing the impact of IBPSA on practices and communities outside the organisation.

The Forum was very well attended and many great ideas were discussed for IBPSA to consider and implement. Here are some of them:

- ◼ IBPSA should reach out to both early career researchers and early career practitioners

- ◼ Students are important ambassadors for enhancing the impact of IBPSA, bringing familiarity with BPS concepts into the practices they join and so helping to make conducting BPS common practice. Most students *will* end up working in practice, thus IBPSA must pay attention to improving its student-related activities.

- ◼ Student-related and early career researchers/practitioners-related activities can be done within IBPSA Affiliate and Chapters, but IBPSA's future Building Simulation conferences also need to include specific forums/activities for this younger generation.

- ◼ IBPSA needs to improve its communication strategies by making use of various social media such as LinkedIn, Twitter and Facebook.

- ◼ IBPSA already has LinkedIn and Twitter accounts and these need to be exploited more effectively.

- ◼ There was a suggestion that future BS conferences should also provide travel scholarship opportunities to enable young practitioners to attend the conference.

The Communications Committee thanked the participants, particularly those who stayed behind to have further discussions. There were a lot of enthusiasms in the audience and this was much appreciated. Many of those who stayed behind were very keen to help IBPSA achieve the above goals.

The Communications Committee welcomes other ideas and invites others who would like to continue their contribution to IBPSA by joining the Committee. If interested, please contact Christina Hopfe, **C.J.Hopfe@ lboro.ac.uk** . ◼

Ardeshir Mahdavi, TU-Wien, Austria:
modelling people and urban microclimates

At this year's IBPSA Symposium in San Francisco (August 2017), Professor Ardeshir Mahdavi received the IBPSA Distinguished Achievement Award. This award recognizes a distinguished and continuous record of contributions to the field of building performance simulation.

Ardeshir Mahdavi is University Professor and Director of the Department of Building Physics, Building Ecology and Architecture at TU Wien, Vienna, Austria. He is also the Head of the Institute of Architectural Sciences as well as the Director of the Graduate Studies Program in "Building Science and Technology" at the same university. Prior to his current post he was a tenured Full Professor of Architecture and Building Physics at Carnegie Mellon University in Pittsburgh (USA). Additionally, Ardeshir Mahdavi has held positions and activities in numerous other countries, including Singapore, Brazil, Turkey, Germany, and India. He became an IBPSA Fellow in 2013.

With this Award, Ardeshir Mahdavi has been recognized as a member of a select group of scholars in the field of building science, whose contributions have significantly advanced the state of pertinent knowledge.

Ardeshir Mahdavi

Christina Hopfe (CJH) interviewed Professor Mahdavi (AM) for IBPSA News.

Christina J Hopfe (CJH): First of all, congratulations on the IBPSA Distinguished Achievement Award! You join the likes of Curt Pedersen, Tom Maver, Qinyan Chen, Godfried Augenbroe (to mention just a few - see www.ibpsa.org for the full list of awardees). What does this award mean to you?

Ardeshir Mahdavi (AM): Recognition by the community of our peers is perhaps the highest form of professional acknowledgement we can receive. Given my long association with the IBPSA community, it wouldn't be candid to say this Award doesn't mean a lot to me.

CJH: You are very well known in the building simulation community. Your research scope spans several fields including integrated computational design support systems, building automation, energy-efficient buildings, user behaviour, and human ecological reasoning in building science. Could you tell us a little about what you are currently working on?

AM: I don't know if this is a good or a bad thing, but I do like to work on multiple problems simultaneously. Two essential lines of inquiry which I have pursued over the last 15 years have now become main stream: one addresses the inadequacy of our models of buildings' inhabitants, their presence, their requirements, their perception and evaluation processes, and their behaviour and actions. The other concerns the challenges

of modelling the urban microclimate and urban-level energy transfer processes. I have also been working on generative methods for the integrated design of buildings and their environmental control systems. A further long-term interest has been the ontological aspects of building modelling. This includes also a deeper understanding of the challenges involved in a seamless integration of performance agenda in integrated building modelling.

CJH: You are a frequent keynote speaker at international scientific conferences. I still remember well your keynote at BS 2011 in Sydney, Australia. It was the final keynote speech on day 3 on "The human dimension of building performance simulation". You reported at that time that it should be our intention "not only to approach a deeper understanding and appreciation of the human dimension of building performance simulation, but also to encourage further creative developments in building performance simulation tools and practices that are sensitive and responsive to (both tool and building) users' characteristics, needs, and requirements."

You highlighted that knowledge about the "people factor" — people's behaviour and presence in buildings — was still rather limited. Much has happened since that time and I wonder if you would like to comment on the evolution of BPS in this particular area, bearing in mind possible approaches to the representation of occupants' actions and behaviour relating to input information to BPS?

AM: In recent years, the collective efforts of the community, for instance, in the framework of the IEA EBC Annex 66, has created much substantial work as well as critical insights into the related problems in this area. Coming from the building physics area, I must confess that understanding the fundamental processes involved in human perception, evaluation, requirements, and control-oriented behaviour is far more challenging than understanding physical phenomena such as heat and mass transfer in and around built structures. Currently, we do not have detailed and mature causal models of inhabitants' perception of and behaviour in buildings. It is thus not surprising to observe, in this area, the prevalence of rather simple engineering models or the recent emergence of insufficiently tested data-driven black or grey box models. Nonetheless, as a scientist, I found the prospects of fundamental theories of human perception and behaviour extremely exciting. To arrive at mature theories in this area, and to derive from those theories solid perceptual and behavioural models for engineering applications would be highly rewarding. Toward this end, we obviously need not just loose and sporadic interactions amongst natural sciences, engineering, and human sciences, but a truly intensive collaborative approach.

CJH: What do you tell your students are the most important aspects of building performance simulation?

AM: This question reminds me of a saying by Antoine de Saint-Exupery: "If you want to build a ship, don't drum up people to collect wood and don't assign them tasks and work, but rather teach them to long for the endless immensity of the sea." Increasingly, I have found this insight relevant to my work and discussions with my students. More than ever, our students, as future scientists, engineers and designers will have to deal with multiple critical and complex challenges, involving environment, technology, human factors and economic constraints, as well as demographic and political developments. Needless to say, deep understanding of building physics and expertise in computational methods represents the indispensable core requirement in the education of our students in the building performance simulation domain. But intelligent and productive deployment of the rich potential of computational modeling requires, in my view, much more. If I had to identify a single most important message, it would be the capacity for independent, systemic and critical reasoning.

CJH: Thank you very much! ■

Modelling and indemnity

On 14 July 2017 Peter Simmonds posted a question on the Bldg-sim message board:

> **❝ Just a simple question: how many simulation experts and modelers provide an indemnity clause to their clients? Are we all guaranteeing the results are true and can be obtained? What happens if predicted results don't materialize? Who's to blame/responsible? Comments and suggestions please. ❞**

This is a very important question, since some jurisdictions have started to look at the regulation of actual, rather than calculated, energy use. What if the simulation results promise compliance but the operating energy use does not comply?

Some modelers include disclaimers to make clients aware of the potential limitations. In the next couple of newsletters Jim Dirkes, Paul Riemer, Nicholas Caton, Dan Nall and others will look at this issue in more detail.

Jim Dirkes starts the ball rolling with an introduction to the topic. Paul Riemer and others will continue the debate in the next edition of *ibpsa*NEWS (April 2018) with an article discussing what and how were we trying to predict and why there is a gap?

If you have any comments and suggestions, please send them to **C.J.Hopfe@lboro.ac.uk** .

Liability for energy modelers

Jim Dirkes, President, Building Performance Team

How liable is an energy modeler that his / her model, prepared during the design phase, matches actual utility bills? That depends … on a very large array of variables. Some of those variables are intuitive and can be understood by most people; others are not. As an example, how well do you understand whether a brain surgeon has done an excellent job removing your aunt's brain tumor? Or whether your auto mechanic made a marvelous repair of your timing belt? For most of us, these activities are outside the range of our personal expertise. We can easily understand that the brain surgeon should never leave gauze inside the surgery site, or that the mechanic should install the manufacturer-recommended belt. Beyond those, however, we don't have much basis to judge. Keeping that in mind, the discussion of modeling liability has two sides of the coin….

On the modeler's side of the coin:
Expertise is developed gradually and over time. It's almost always developed best under expert instruction. A martial arts Black Belt trains intentionally for greater understanding and effectiveness. So, too, does a modeling "Black Belt" (see Ellen Franconi / Rocky Mountain Institute's definition of the progression toward Black Belt modeling at **https://d231jw5ce53gcq.cloudfront.net/wp-content/uploads/2017/04/Pathways-to-Zero_ Black-Belt-Modeling_Matrix_2010.pdf**). Expertise is grown in a progression of experience, understanding and effectiveness. That, in turn, takes several years as the student starts with basic understanding, then gradually learns more advanced skills. When sparring, the Black Belt sees a foot move or hips shift, knows what is likely to come next, and "magically" responds in an instant. A White Belt (beginner) is not equipped with the

with the experience to see those things and flounders around by comparison.

Similarly, the Black Belt modeler knows what comes next when an input is changed… or can determine what input may have caused certain outputs to act the way they do. The White Belt (beginner) modeler sees "magical" results with little understanding of how the results are connected to the input. Every Black Belt-to-be starts under the tutelage of a Master instructor who patiently cultivates understanding and skills in their student. Excellent training results in excellent performance.

There also seems to be a lack of understanding among engineers regarding controls intricacies and how their Sequences of Operation may be interpreted by the controls contractor. In my commissioning projects, it's common to be able to "drive a truck" through various not-so-clear descriptions of operation. The as-built controls system may work very differently than the as-imagined-by-the-engineer system. Similarly, the modeler makes an interpretation of the controls operation and may understand it incompletely.

On the client's side of the coin:
A client has a right to expect excellence, including well-conceived model structure, appropriate inputs and knowledgeable workarounds. The client is normally not, however, equipped to judge whether they receive appropriate excellence. They are in the same position as you are when wondering about that brain surgeon's technique; the client employs the modeler because they (the client) are not expert in modeling skills. They have no way of evaluating the modeler's expertise unless they hire a third party modeling expert to review the model … and then they must still trust someone whose skills they lack.

Jim Dirkes

The client must consider that "appropriate excellence" for a not-built-yet facility must recognize the design environment that they have initiated. Commonly, the design team lacks detailed knowledge about operations because they don't actually operate buildings. The client / owner also often lacks detailed knowledge of operations for the new building… because it's a new building - different than others they might own.

A client is also unlikely to recognize the construction and operating environments' impact on "appropriate excellence". The construction process' success, even when built by exceptional companies and people, is widely variable. How airtight is the building compared to assumptions? Were the HVAC systems commissioned and, if so, how effectively? What is the part-load efficiency of installed equipment compared to the values assumed during design? etc., etc., etc. These are only a few of the host of variables which can dramatically impact performance of the built facility compared to the modeled facility.

Continuing with differences… When the Owner begins occupancy of the lovely new facility, what regard will they have for operating their facility to match modeler assumptions? It's unlikely they'll know or care about matching those assumptions – they'll operate as they see fit. Thus, another set of variables which may not be accounted for in the energy model.

Now, considering collaboration between both sides of the coin:
In short, nobody can anticipate fully (before construction) the way the built environment will work. This needs greater understanding by everyone in the industry. Expecting that an energy model will closely match reality is insanity. From a statistical standpoint, if there are 10,000 variables that must come together for every new facility (there are many more), and every one of them is 99.9% perfect, the results will add up to less than .5% agreement. Design, construction and modeling teams do an amazing job to get the level of satisfaction that we routinely see – but it's not reasonable to expect a mathematical model of energy use to match the built reality perfectly (or even well). In the extremely rare, (arguably accidental) circumstance where construction, installation and operations match the modeler's assumptions, energy use should be ''reasonably'' close to what's reflected on the utility bills. In my experience that's too rare to consider.

After construction concludes, it is both possible and practical to calibrate an energy model to actual operation… but ''actual'' operation isn't always evident (i.e., experiences cited at **http://buildingperformanceteam. com/bpt-insights-blog/item/73-modeled-performance-isn-t-actual-performance**). ''Actual'' takes careful investigation by a facility operations Black Belt, and there are not many of those folk. While the modeling Black Belt pool is growing, it seems that many more are needed! Our industry hasn't begun to spend enough effort on understanding why the vast majority of buildings are not operating to their design potential, let alone optimally. If we're to do that, a lot more well-trained people are needed.

Let's make it happen!

Summary

1 No tool is fully useful if used inexpertly or inadvisedly. Wonderful tools wielded by novices don't work as well as when wielded by a Master. Attentive, committed novices become Black Belts when trained by Masters. Find and encourage Black Belts who are committed to train others.

2 Clients will almost always lack deep understanding of the design, construction and modeling processes, so educating them will be helpful. Because many clients are too busy with their core business and unlikely to invest the time needed to understand some of the issues surrounding excellence in modeling, it's advisable to a) be patient, b) hone communications skills and c) include a gracious disclaimer in your modeling proposals that reflects the complexity of modeling issues without appearing to discredit the value of your modeling efforts.

The Building Performance Team is a small, Michigan-based team made up of multi-disciplinary professionals specializing in commercial and industrial building performance. With collaborative partners from across the United States, BPT integrates engineering fundamentals, hands-on experience, innovative approaches, attention to detail and appreciation for the needs of real people and organizations to provide services in energy auditing and modeling, commissioning for new and existing buildings, design review, construction oversight, evaluation and implementation planning. ■

Forthcoming events

Date(s)	Event	Web site
2017		
01-02 November 2017	**Seminar on the practical use of simulation tools for calculation of energy and indoor climate in buildings** Trondheim, Norway	**www.ibpsa-nordic.org**
08-09 and 27 November 2017	**DesignBuilder training courses** Loughborough University, UK	**www.designbuilder.co.uk/training/training-events**
15-16 November 2017	**Australasian Building Simulation 2017** Melbourne, Australia	**www.airah.org.au**
03-06 December 2017	**WSC 2017: Winter Simulation Conference** Las Vegas, Nevada, USA	**www.wintersim.org**
2018		
20-24 January 2018	**ASHRAE Winter Conference 2018** Chicago, Illinois, USA	**www.ashrae.org/membership--conferences/conferences/2018-ashrae-winter-conference**
12-13 April 2018	**CIBSE ASHRAE Technical Symposium 2018** London, UK	**www.cibse.org/symposium**
09-10 May 2018	**eSim 2018: 10th IBPSA-Canada Conference on Building Simulation** Montreal, Canada	**http://esim2018.etsmtl.ca**
04-07 June 2018	**SimAUD 2018: Symposium on Simulation for Architecture + Urban Design** Delft, The Netherlands	**http://scs.org/simaud/**
10-13 June 2018	**EG-ICE 2018 - 25th International workshop on intelligent computing in engineering** Lausanne, Switzerland	**http://eg-ice2018.epfl.ch**
23-27 June 2018	**ASHRAE Annual conference 2018** Houston Texas, USA	**www.ashrae.org/Houston**
11-12 September 2018	**Building Simulation and Optimization 2018** Cambridge University, UK	**www.bso2018.event.cam.ac.uk**
26-28 September 2018	**2018 ASHRAE Building Performance Analysis Conference and SimBuild** Chicago, Illinois, USA	**www.ashrae.org/membership--conferences/conferences/ashrae-conferences/2018-ashrae-building-performance-analysis-conference-and-simbuild**
10-12 December 2018	**PLEA 2018** Hong Kong, China	**www.plea2018.org**
2019		
02-04 September 2019	**BS19: Building Simulation 2019** Rome, Italy	**www.buildingsimulation2019.org**

Note that the dates in this calendar may, but do not necessarily, include pre and/or post-conference workshop days

IBPSA NORDIC

01-02 November 2017
Trondheim, Norway
www.ibpsa-nordic.org/

Seminar on the practical use of simulation tools for calculation of energy and indoor climate in buildings

On 1 & 2 November 2017 IBPSA-Nordic and Norsk VVS Energi og Miljøteknisk Forening are holding a seminar to promote knowledge about and the practical use of simulation as a means of improving the energy, environmental and financial performance of buildings and their technical systems. The seminar will focus on simulation tools and is designed to encourage their greater use as a time and cost-saving measure in the delivery of construction projects. The lecturers are experienced users of simulation tools from both educational and research institutions and from industry.

IBPSA-Nordic draws members from the four Nordic countries of Denmark, Finland, Norway and Sweden. The event will be held largely in Norwegian, with some lectures in English. The day will include:

- 09.30: Velkommen – Åpning av seminaret *V/Vojislav Novakovic, NTNU, Møteleder*
- 09.35: IBPSA Nordic Formål og organisering *V/Vojislav Novakovic, NTNU*
- 09.40: Opportunities and challenges in Building Performance Simulation *Mohamed Hamdy, NTNU*

Session 1: Fokus på oppvarming, kjøling og termisk inneklima
- 10.15: Nye muligheter for simulering av energiforsyning med ny NS3031:2016 *Tor Helge Dokka, Skanska*
- 10.40: Energy efficiency of hydronic space-heating distribution systems in super-insulated residential buildings *Martin Thalfeldt, NTNU*
- 11.05: Design of a modulating heat pump system and the impact on the dynamic coefficient of performance *John Clauß, NTNU*
- 11.30: Hvordan lage gode data-input for å sikre simuleringsresultater? *Natasa Nord, NTNU*

Session 2: Fokus på bygningskropp, dagslys og ventilasjon
- 12.45: Fasadeanalyser, status i kongeriket *Arnkell J. Petersen, Erichsen & Horgen AS*
- 13.10: Fuktberegninger for bygningskroppen *Stig Geving, NTNU*
- 13.35: Iterative analyser av geometri *Kristian Edward, Snøhetta*
- 14.00: Dagslysberegninger – Typiske utfordringer i boligbygninger samt eksempler på løsninger *Line Karlsen, Erichsen & Horgen AS*
- 14.25: Analyse av luftstrømminger i en ishall *Casestudie fra Jordal Amfi Johnny Holst, Erichsen & Horgen AS*

Session 3: Fokus på andre typer utfordringer
- 15.10: Retningslinjer for valg av energiforsyning i en tidlig fase i prosjekteringen av ZEB, basert på systemanalyse og kostnadsoptimalitet *Kristian Skeie, SINTEF Byggforsk*
- 15.35: Urban environmental analysis for new and existing neighborhood *Gabriele Lobaccaro, NTNU*
- 16.00: Forventet utvikling av simuleringsverktøy *Tomas Kyhlström, EQUA Simulation AB*
- 16.25: Avslutning.

03-06 December 2017

Las Vegas, Nevada, USA

www.wintersim.org

WSC 2017: Winter Simulation Conference

WSC TURNS 50: SIMULATION EVERYWHERE!

With 360 accepted papers, panels, special tracks, and an amazing venue, this 50th Anniversary Winter Simulation Conference promises to be a very exciting event. The deadlines for submissions of all types have now passed.

50th Anniversary Keynote

Barry L Nelson, Northwestern University: *What Are The Chances?*

> *At the November 1967* Conference on the Applications of Simulation Using GPSS *it seems unlikely that anyone was wondering if the conference would still be occupying a big hotel in 2017. Conferences persist for many reasons, but a technical conference like WSC has to remain relevant to users, vendors, researchers and consumers (not just hotels) to survive. If our kind of simulation vanished, then so (eventually) would WSC. What is required for simulation to "remain relevant" for the next 50 years? Without fear of having to answer for my crimes in 2067, I boldly speculate on what SHOULD matter for the next 10-20 years, if not the next 50, with a focus on our strength: dealing with uncertainty.*

50th Anniversary Titans

Robert G. Sargent, Professor Emeritus - Syracuse University: *A Prospective on Fifty-Five Years of the Evolution of Scientific Respect for Simulation*

Bernard P. Zeigler, Professor Emeritus of Electrical and Computer Engineering, University of Arizona

MASM Keynote

Stephane Dauzere-Peres, Professor, Ecole des Mines de Saint-Etienne: *Achievements and Lessons Learned from a Long-term Academic-Industrial Collaboration*

Military Keynote

Douglas Hodson, Associate Professor, Professor of Computer Engineering at the Air Force Institute of Technology (AFIT) Military Simulation: *A Ubiquitous Future*

50th Anniversary Track Keynote

Brian Hollocks, Professor, Bournemouth University, Faculty of Management: *History of Simulation in the United Kingdom*

You can find further information about the conference at **www.wintersim.org**, **www.facebook.com/wintersimulationconference/**, or via Twitter **@WSConf**. ■

09-10 May 2018
Montreal, Canada
www.ibpsa.ca

eSim 2018: 10th IBPSA-Canada Conference on Building Simulation

ESim 2018, the tenth conference on building simulation to be organised by IBPSA-Canada, will be held in Montreal, Canada on 9-10 May 2018 at the École de technologie supérieure (ÉTS). Its theme will be Building Simulation to Support Building Sustainability (La simulation énergétique pour un bâtiment durable).

IBPSA-Canada welcomes participants from architecture, engineering, universities, energy utilities, consulting, government R&D and from planners, developers and stakeholder organizations. The programme includes a track dedicated to practitioners.

The conference will cover a broad range of topics, including:

- Recent developments in modelling the physical processes relevant to building performance (thermal, air flow, moisture, lighting)
- Methods and algorithms for modelling conventional and innovative building systems (including envelope, lighting, controls, HVAC, renewable energy and distributed generation systems)
- Methods for modelling and characterizing whole building performance, including interactions between systems within the building, and interactions between the building and its surrounding neighbourhood and community
- Methods for modelling and characterizing occupant comfort and well-being
- Occupant behaviour in buildings
- Building simulation software development and quality control approaches
- Use of building simulation tools in building design, optimisation, code compliance, incentive programs and operation
- Use of building simulation tools in stock- and sector-modelling studies at neighbourhood, community, municipal and national scales
- Moving simulation into practice — case studies of innovative simulation approaches
- Validation of building simulation software
- User interface and software interoperability issues
- Architectural and engineering data visualisation and animation

The deadline for abstract submissions has now passed (15 October 2017). Authors of accepted abstracts will be invited to submit full papers (due date for papers: Jan 14, 2018). Papers (from International as well as Canadian authors) will be double-blind reviewed, and accepted papers will be published in the conference proceedings, which will be available via the IBPSA Canada (**www.ibpsa.ca**) and IBPSA (**www.ibpsa.org/?page_id=291**) web sites. Visit **http://esim2018.etsmtl.ca** for more information about the conference.

Montréal is renowned for its cultural effervescence and is host to many festivals and events. It is located in the middle of the St-Lawrence River, and is the second most populous city in Canada. Sustainable development is at the heart of several initiatives that have been taken by this bilingual city and its citizens as well as by various organizations that have chosen to establish their business in the city. ■
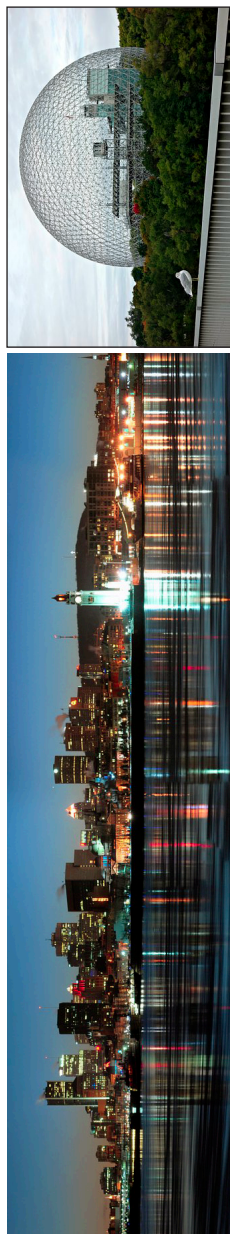
04-07 June 2018

Delft, The Netherlands

http://scs.org/simaud/

SimAUD 2018: Symposium on Simulation for Architecture + Urban Design

CALL FOR PAPERS

We invite you to submit original contributions to SimAUD2018 for peer-review and consideration by the Scientific Committee, either as Full Papers (up to 8 page), Short Papers (up to 4 pages), Projects or Videos. For more information about submissions please visit http://simaud.com/2018/call_for_submissions.php.

Key dates

Abstracts due:	20 October 2017 (Note that abstracts are optional)
Complete submissions due:	23 December 2017
Acceptance notification:	16 February 2018
Camera-ready copy due:	16 March 2018

The Symposium Committee may invite certain papers, projects, or videos to include in the symposium outside the formal peer-review process. To nominate research for consideration please email any of the chairs: Symposium chairs Tarek Rakha (**trakha@ syr.edu**) and Michela Turrin (**M.Turrin@ tudelft.nl**), or Scientific Chairs Daniel Macumber, Forrest Meggers and Siobhan Rockcastle.

SimAUD topics include, but are not limited to:

- Simulation-based Generative Design
- Simulation-based Design Tools and Methods
- Multidisciplinary and Collaborative Design and Design Optimization
- Simulation Performance and Scalability
- Simulation of Occupant Behavior
- Simulation of Building Controls
- Physics-Based Simulation in Design
- Whole Building Energy Simulation
- Thermal Comfort & Occupant Satisfaction
- Lighting and Daylighting
- Airflow In & Around Buildings
- Acoustics Modeling, Simulation & Design
- Visualization of Simulation Data
- Urban-Scale Modeling
- Uncertainty, Validation and Risk Management
- Augmented and Virtual Reality
- Design Agency & Multi-Agent Systems
- Intelligent Buildings & Building Lifecycle Management
- Sensor Networks & Building Performance Monitoring
- Interactive Environments
- Responsive Facades
- Robotic Fabrication in Design

You can find more information about SimAud 2018 at **http://simaud.com/2018/**, **www.facebook.com/simaud2018/** and via Twitter **@SimAUD2018**. ■

BSO18

11-12 September 2018

Cambridge University, UK

www.bso2018.event. cam.ac.uk

IBPSA-England

UNIVERSITY OF CAMBRIDGE
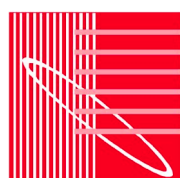
BSO18: Building Simulation & Optimization 2018

IBPSA-England's fourth conference, BSO18, will provide a forum for the exchange of knowledge on the development and application of building performance simulation to optimum design and operation of buildings.

The main themes in 2018 will be:

- New building performance simulation methods (e.g., energy, comfort, daylighting, airflow, air quality)
- New approaches for optimizing design and operation
- New decision support methods for real world applications (e.g., design, compliance, commissioning, predictive control, retrofit)
- Advances in model calibration, uncertainty analysis, and validation methods
- Occupant behaviour modelling
- Urban- and district-scale simulation of energy and environment
- Innovative applications of simulation in practice.

BSO18 will be held at Emmanuel College, University of Cambridge. Emmanuel was founded in 1584, on the site of a Dominican priory, by the Chancellor of the Exchequer to Queen Elizabeth I. Parts of the monastic buildings remain today, and the Hall is built on the foundations of the nave of the Dominicans' church. The pond in the Paddock is on the site of the friars' fishpond. Registration for the conference opens on 01 July 2018.

CALL FOR PAPERS

We are now welcoming abstract submissions for the conference on any of its main themes. You are asked to include:

1. Objectives of your paper (up to 150 words)
2. Methods & Key Outcomes (up to 200 words), and
3. Novelty (up to 150 words)

Abstracts will be evaluated on the relevance of the topic to BSO18 themes, the significance of the work in the targeting context, the technical merit of investigative method(s), and the novelty of the work.

All abstracts should be submitted online via the BSO 2018 ConfTool at **www.conftool. pro/bso2018/**.

Key dates

Abstracts due:	01 December 2017
Abstract review notification:	15 January 2018
Full paper submission:	16 March 2018
Paper review notification:	27 April 2018
Final paper submission:	01 June 2018
Final decision to authors:	29 June 2018.

IBPSA USA
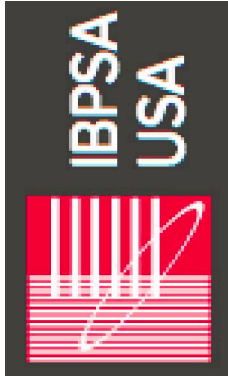
26-28 September 2018
Chicago, Illinois, USA
www.ashrae.
org/membership-
-conferences/
conferences/ashrae-
conferences/2018-
ashrae-building-
performance-
analysis-conference-
and-simbuild

SimBuild & ASHRAE Building Performance Analysis Conference 2018

CALL FOR PAPERS

ASHRAE and IBPSA-USA have announced a call for papers for the 2018 ASHRAE Building Performance Analysis Conference and SimBuild. It will be the third co-organized conference between the two organizations and will take place at the Hilton Chicago on 26-28 September 2018.

"Building performance modeling is transforming the industry to meet the net zero and Architecture 2030 design goals, improving operational efficiency and occupant comfort," said Krishnan Gowri, conference chair. "Recent advancements in machine learning, data science and sensor technologies are opening up new avenues to advance the analysis and modeling techniques to meet the challenges faced by designers and modelers. This conference seeks to connect the researchers and industry practitioners to facilitate the adoption of these new techniques and workflows to make better decisions through the application of simulation and modeling over the entire building life cycle."

Modelers, architects, software developers and researchers will address the use of existing simulation tools in building performance analysis, energy modeling and building performance simulation, software development and future research and applications.

The conference seeks papers on the following topics:

Buildings and Information Technology Nexus
- Case-based learning and machine intelligence
- Internet of Things
- Virtual and Augmented Reality Modeling
- Web-based modeling

Modeling Advances
- New techniques and algorithms
- Scripts and hacks for modelers
- Non-traditional programming tools
- HVAC component modeling and load analysis

Early Design

■ Parametric modeling for early design

■ Modeling for Resilient Buildings

■ Learning from Nature

■ High Performance and Zero Carbon Building design modeling

■ Benchmarking and goals setting

■ Opportunity assessments: Climate, Resources, and Program

Multiple Systems Modeling

■ Buildings to Grid Interoperability

■ The Community of Buildings / Urban scale modeling

■ Renewable energy technologies

Big Data

■ Real time modeling for building operation

■ Visualization

■ New Technology for Recording Data

■ Data mining for fault detection and diagnosis

Health, Wellness and Comfort

■ IEQ

■ Thermal comfort

■ Occupant behavior

■ Lighting and daylighting

■ CFD and Airflow modeling

Energy Performance and System Simulation

■ Model calibration strategies

■ Model validation and quality assurance

■ Weather and climate data

■ Performance Gap: Real versus Modeled

■ Auditing and retrofit strategies

■ Operational improvements

Codes, Standards and Compliance

■ Modeling for evolving codes and standards

■ Architecture 2030 and high performance building design

■ LEED, WELL, Green Globes, Living Building Challenge, BREEAM

■ Modeling for compliance

■ Compliance Metrics for High Performance and Net Zero Buildings

Key dates

Abstracts due (250 words or less):   23 October, 2017

Full papers due (8 pages maximum):   2 February 2018

To submit an abstract please go to **www.conftool.net/bpacs2018/.** To learn more about the conference go to **www.ashrae.org/membership--conferences/ conferences/ashrae-conferences/2018-ashrae-building-performance-analysis-conference-and-simbuild.** ■
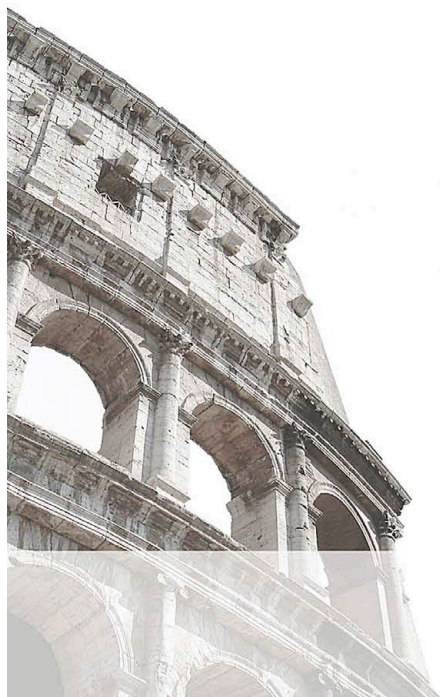
BS 2019
2 - 4 SEPT
ROME

16th IBPSA INTERNATIONAL CONFERENCE AND EXHIBITION

Location

Angelicum Congress Centre

Largo Angelicum, 1
Rome

IBPSA *Italy*
International Building Performance Simulation Association

Chair:
Prof. Vincenzo Corrado
Politecnico di Torino

Co-Chair:
Prof. Andrea Gasparella
Free University of Bozen-Bolzano

www.buildingsimulation2019.com

BS 2019
2-4 SEPT ROME

16th IBPSA INTERNATIONAL CONFERENCE AND EXHIBITION
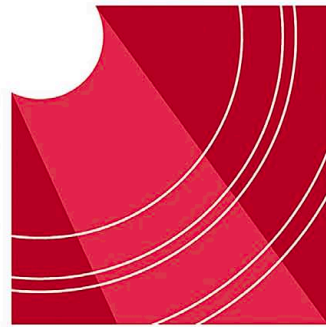
BUILDING SIMULATION IS THE PREMIER INTERNATIONAL EVENT IN THE FIELD OF BUILDING PERFORMANCE SIMULATION. TOPICS INCLUDE THERMAL ENERGY SIMULATION, AIRFLOW, NATURAL VENTILATION, LIGHTING AND DAYLIGHTING, ACOUSTICS, INDOOR ENVIRONMENTAL QUALITY, BUILDING INFORMATION MODELLING AND MORE.

WHO SHOULD ATTEND

The target audience is:

- Public and private researchers
- Practitioners and building industry professionals
- Public agencies, utilities and policy makers involved in the quality and efficiency of the indoor environment
- Private firms including manufacturers, management companies, utilities and software houses.

WHY ATTEND

Building Simulation conferences are exceptional opportunities to:

- Share information about simulation tools and applications.
- Present and get updates about recent achievements and new developments in the research.
- Illustrate case studies and share best practices.
- Join special programs for students and practitioners.
- Network during sessions and social programs.

WHERE AND WHEN

ROME, SEPTEMBER 2-4, 2019

The Angelicum Congress Center is the seat of the Pontificia Università S. Tommaso d'Aquino.
The venue is close to the Colosseum, the Quirinal Palace and the Roman Forum.

HOW TO REACH AND STAY

Rome can be easily reached by train or plane. The international airport Roma Fiumicino is well connected with the railway station. Roma Termini railway station is located about 20 minutes walk from the Angelicum Congress Center. There are a range of accommodation options within walking distance.
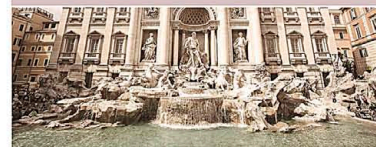
Organizing Secretariat: **symposia** Tel. +39 06 39725540 | info@grupposymposia.it | www.grupposymposia.it

Software news
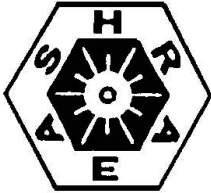
ASHRAE Standard 205P

ASHRAE Standard 205P (Standard Representation of Performance Simulation Data for HVAC&R and Other Facility Equipment) is now available for advisory public review and comment. The Standard 205P draft is available at **https://osr.ashrae.org/default.aspx** .

This is an advisory public review for Standard 205P, intended to capture feedback from key stakeholder groups to allow refinement of the Standard. That will subsequently lead to a formal public review and ultimately publication of the first edition of the Standard.

The review draft establishes the foundation and framework for creating neutral, industry-standard equipment data formats. It also includes the first three specific instances of those data formats: unitary cooling equipment, water cooled chillers, and fans. Subsequent editions of the standard will progressively build on the foundation to define data formats for further types of HVAC equipment such as air-cooled chillers, unitary heat pumps, variable refrigerant flow systems, boilers, pumps, and many others.

Standard 205P is intended for use by data publishers (typically equipment manufacturers) and developers of simulation and other analysis software. It will allow them to implement data writing and reading methods supporting direct transfer of detailed performance data. The goal is to improve the accuracy and efficiency of equipment modeling in simulation software.

Standard 205P specifies detailed performance map formats that include information such as capacity and input power for all operating conditions.

Manufacturers and other data producers are asked for comment on the practicality of reporting data of this type. Similarly, application software developers should assess the implementation burden required to exploit performance map data.

End users of simulation software may also have an interest in reviewing the draft, since adoption of the proposed approach will impact their workflows.

Comments should be submitted via the ASHRAE online system — see **www.ashrae.org/standards-research--technology/public-review-drafts**.

The review period will end on 31 October 2017. ■
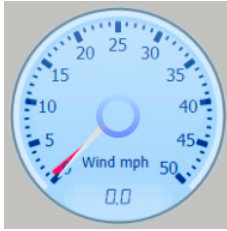
New weather data set for Canada available and updated design conditions from Climate.OneBuilding.Org

Climate.OneBuilding.org is pleased to announce the availability of a new weather data set for Canada: CWEC 2016. Developed by Environment Canada (EC), the CWEC 2016 dataset is derived from up to 30 years of data through 2014. Because EC was able to use satellite solar radiation, this data set includes many new locations not available before, where stations don't record cloud cover.

All weather data on our web site incorporates the new 2017 ASHRAE design conditions (2017 Fundamentals). With the addition of CWEC 2016, Climate. OneBuilding.org now provides free data for more than 3,000 locations worldwide. All data have been through extensive quality checking to identify and correct data errors and out of normal range values where appropriate.

In addition, we have expanded the STAT (statistics) reported on each weather file to include: UTCI (universal thermal climate index), additional wind reporting, psychrometric chart data, and sunshine/daylight averages.

Each weather location .zip contains: EPW (EnergyPlus weather format), CLM (ESP-r weather format), and WEA (Daysim weather format) along with DDY (ASHRAE design conditions in EnergyPlus format), RAIN (hourly precipitation in mm, where available), and STAT (expanded EnergyPlus weather statistics).

For more information or to download any of the weather data (at no cost), go to **http:// Climate.OneBuilding.org**. ■
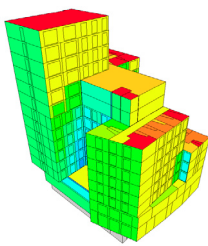
DesignBuilder v6.2

New and enhanced capabilities in DesignBuilder v5.2
The next release of DesignBuilder is due at the end of October. The new version will include a substantial number of new and enhanced capabilities, all of which are available to customers with the relevant version 5 licence at no extra cost. Some of the most significant improvements are summarised below:

Compliance and Certification
- UK DSM compliance and certification tool Level 5 Building Regulations and EPC reports for England, Wales and Scotland.
- Major additions to the LEED module including:
  - Fully automated baseline building generation with improvements in support for complex surface and window shapes.
  - Support for LEED 2009 and v4.
  - Online submission documentation preparation system for LEED 2009.

- Increased automation of baseline HVAC systems, including auto-assignment of AHUs and single-zone systems.
- Energy and cost comparisons between proposed and baseline building displayed.
- DIN 4108-2 utilities to assess models against the "Wärmeschutz im Hochbau" German standard. Beta.

Simulation

- Improved links with the JESS cloud simulation service.
- Multi-state SageGlass electrochromic windows with a range of glare control options.
- Thermochromic glazing.
- Occupant behaviour modelling using an agent approach for realistic treatment of window opening, lighting, movement within the building, blind control etc (*Beta)*.

Optimisation

- New option for custom design variables based on EMS, allows user-defined system models to be optimised.

Daylighting

- Climate-based daylighting assessment based on Spatial Daylight Autonomy (sDA) and Annual Sun Exposure (ASE) via the Daysim simulation engine.
- Zone margin daylight options for more accurate BREEAM daylighting reports.
- Specular reflection of daylight now allows modelling of light shelves etc.
- New "Perez all weather" options for defining sky illuminance distribution.
- Diffusing glazing can now be modelled in Radiance and Daysim.
- More flexible and accurate modelling of working planes.

Outputs

- New graphical output of annual, monthly, daily or hourly simulation results rendered onto the 3-D model using false colours.
- Generate movies of the new graphical data plots to show time-varying outputs over the model
- Thermal comfort reports for CIBSE TM52 and TM59.

Modeller

- Import 2-D elevations to help with drawing facades.
- New gbXML export capability allows DesignBuilder models to be opened in other simulation tools.
- New stretch and rotate tools allow existing openings to be easily modified at both building and surface levels.
- Selective ghosting of blocks allows "buried" blocks to be accessed for geometric editing.
- New option to show the current block/zone in the context of the rest of the building.
- Direct input options for internal gains and number of occupants without reference to floor area.
- Improved filters for fast data loading from templates.

Databases
- Update to International Glazing Database (IGDB v52).

Visualisation
- Various improvements and fixes to ensure that the rendered view accurately represents the data used in the simulation.
- Faster performance with less delay when moving to the Visualisation screen.

HVAC
- Several new components and options have been added for Detailed HVAC including: Radiant surfaces with option for reversible heating/cooling in same surface; Absorption chillers; Reformulated EIR; Indirect absorption; Zone water to air heat pump; VAV Outdoor air terminal unit; Dedicated outdoor air sizing options for HVAC zones and zone groups.
- New options for mechanical ventilation modelling in heating and cooling sizing calculations.

Natural Ventilation
- Options to model two new adaptive comfort natural ventilation control modes: CEN 15251 Adaptive and ASHRAE 55 Adaptive.

Cost Modelling
- Construction cost calculations and reports using NRM1 or UNIFORMAT II standards.
- HVAC systems can be costed based on heating/cooling capacity as well as by floor area.
- Additional capital cost KPIs for use in design optimisation studies.

LCA
- Direct link to the One Click LCA (**www.oneclicklca.com**) tools for advanced long term environmental impact analysis.

Scripting
- New API with scripting tools, including an IDF parser which allows DB IDF to be easily modified by writing code.
- Several new DesignBuilder extensions to EMS scripting syntax allow looping through zones, surfaces and openings with optional arguments providing various ways to filter.

DesignBuilder simulation training, Loughborough University

The next two DesignBuilder classroom-based simulation training courses start on 8 November (2 days, de-risking overheating) and 27 November 2017 (5 days, general training). Both are run at Loughborough University.

The 2-day course aims to give attendees the knowledge and skills required to understand the building physics underlying overheating, to assess thermal comfort and quantify the risk of overheating with DesignBuilder software, and to use the results to solve problems and make informed design decisions. It is delivered in collaboration with staff from Loughborough University and endorsed by IBPSA-England.

In the 5-day general course, DesignBuilder trainers help attendees get quickly up to speed with the software and teach efficient ways to create model geometry, input model data, run a range of different analyses and generate the outputs needed for schemes such as BREEAM. The course aims to help users to maximise their productivity and uses an interactive format with lots of hands-on exercises providing ''learning by doing''. Free 30-day licences are provided. 95% of previous attendees at Design Builder training courses would recommend them to a friend or colleague.

This course is modular and each day builds on knowledge learnt earlier, so attendees can choose whichever day(s) best meet their needs. Over the 5 days it covers model geometry, efficient data entry, simulation, daylighting, simple HVAC and natural ventilation, renewables, detailed HVAC and CFD.

More detailed information about both courses and their content is available on the training pages of the DesignBuilder website, **https://designbuilder/training/ overheating** and **https://designbuilder.co.uk/training/simulation-training- loughborough-university**. ∎
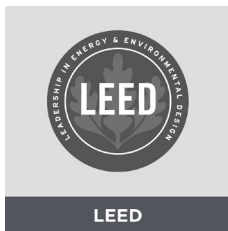
LEED Pilot Alternative Compliance Paths (ACPs)

Several LEED Pilot Alternative Compliance Paths (ACPs) may be of interest to BLDG-SIM Users relevant to LEED BD&C (and in some cases ID&C) EA Prerequisite: Minimum Energy Performance and EA Credit: Optimize Energy Performance. LEED Pilot ACPs provide an alternate method for complying with the LEED requirements for the specified credit. Projects must register for each Pilot ACP in order to use it on the project; however, there is no obligation for projects to use the alternative path once registered.

1 Alternative Energy Performance Metric (**www.usgbc.org/credits/eapc95v4**).

This Pilot ACP was recently updated to address market feedback (Advocacy letters are no longer required). Project teams may use performance metrics other than cost (Source or Primary energy, Greenhouse Gas Emissions, and Time Dependent Valuation) to document performance improvement, as long as all required metrics are reported. The top two performance metrics are averaged to determine the performance improvement for the project.

2 Energy Performance Metering Path (**www.usgbc.org/credits/new- construction-core-and-shell-schools-new-construction-retail-new- construction-healthca-95**).

This allows projects to use one year of post-occupancy metered data to document performance for newly constructed buildings in lieu of ''validation'' energy models. Design phase analysis and compliance with mandatory ASHRAE provisions is still required in order to pursue this ACP.

3   Alternative Performance Rating Method (**www.usgbc.org/credits/new-construction-core-and-shell-schools-new-construction-retail-new-construction-healthc-110**).

This allows projects to use the new stable baseline methodology established in the ASHRAE 90.1-2016 Performance Rating Method to document building performance. ASHRAE 90.1-2016 includes all details for the baseline model in the body of Appendix G (rather than referencing other sections of ASHRAE 90.1); and allows local code authorities or above-code programs (such as LEED or utility incentive programs) to establish Building Performance Factors that align with the targeted performance for the project application. LEED has established these thresholds to be roughly equivalent to the PNNL Building Performance Factors (BPF) aligning with ASHRAE 90.1-2010, averaged across all ASHRAE climate zones for each rating system.

4   District Energy (**www.usgbc.org/credits/new-construction-core-and-shell-schools-new-construction-retail-new-construction-healthca-48**).

This allows projects to seek a single PEER certification for a District Energy System (DES), and then quickly document Optimize Energy Performance points for LEED project buildings served by the DES. This eliminates the requirement for detailed upstream modeling, and individual review of DES performance for each LEED building project.

Please direct any questions about these Pilot ACPs to the USGBC Contact Us page, **www.usgbc.org/contactus**. ■

EQUA Breakfast Seminar

EQUA Simulation Finland Oy held a breakfast seminar in Espoo, Finland on 24 October 2016 to promote the newly released ASHRAE 90.1 extension for IDA ICE 4.71. After the seminar a short introductory course for the extension was held. Per Carling from Equa Simulation AB came to present the extension, and show how it can be used in LEED certification. Eric Larsson of Sweco Talotekniikka gave a talk from the customer's point of view. The program was as follows:

■ Opening of the seminar by Mika Vuolle
■ IDA ICE extension ASHRAE 90.1 by Per Carling
■ Customer's talk, by Eric Larsson
■ Hands-on session for ASHRAE 90.1 extension

The seminar was a success having 25 participants for the seminar portion and 8 for the hands-on session. ■

Sefaira updates daylight rendering parameters, looking for peer reviewers

Sefaira employs Radiance and Daysim to help architectural designers assess daylighting performance as they design, thus making it easier for them to meet their projects' performance goals.

Most architectural designers who seek to incorporate analysis into design don't need or want full control over every possible simulation input and setting. Sefaira also runs in the cloud, aims to complete all simulations within 5 minutes and is not able to support models that run longer than this.

This means Sefaira does not make rendering parameter controls visible to customers - instead we have been iterating on parameters that provide enough accuracy to do a good daylight study and that also support rapid daylight analysis.

We recently updated our rendering parameters and presented them at the Radiance Conference in Portland. Here is a summary of our presentation.

Methodology

We carried out tests on a range of typical models, some of which are shown below:
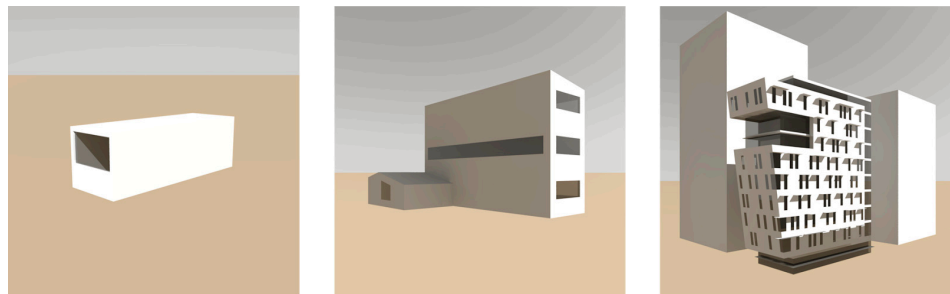
We generated a point array for results and compared Sefaira rendering parameters with:

- ■ "Medium" settings in Radiance
- ■ Daysim Tutorial settings
- ■ Professional Consultant settings
- ■ Radsite "Accurate" settings

For each set of arrays we plotted the following results:

- ■ Daylight factor
- ■ Illuminance with a sunny sky on March 31

Example of results

The graph shows a typical plot of results comparing the 5 parameter settings with the largest of the three models, and the chart below it shows simulation times for the same

5 settings and model:
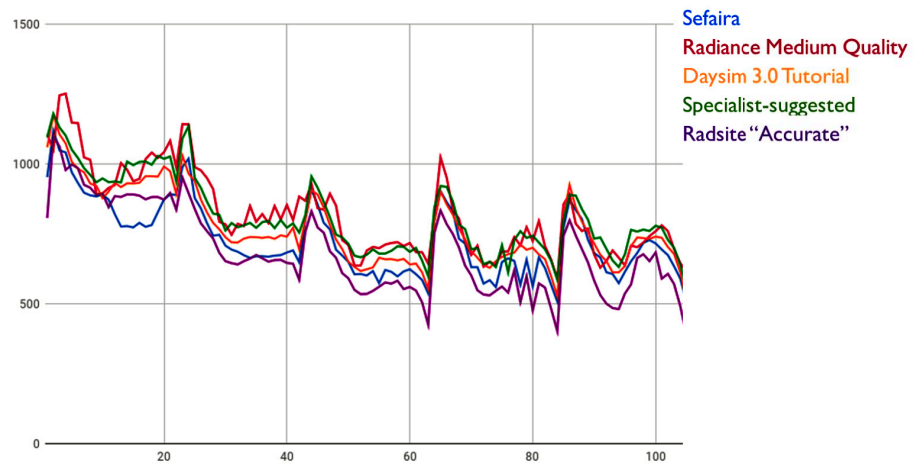
Settings Summary					
	Sefaira	Radiance "MEDIUM"	Daysim 3.0 Tutorial	Specialist-suggested	Radsite "Accurate"
-aa	0.15	0.15	0.1	0.15	0.15
-ab	4	4	5	6	2
-ad	256	800	1000	1024	512
-ar	32	1904	300	96	128
-as	20	128	20	2	256
-st	1	0.1	0.15	0.05	0.15
-lw	0.05	0.0001	0.004	0.000001	0.002
-dc	0	0.5	-	0	0.5
-lr	-	8	6	6	8
-dj	0.7	0	0	0	-
-dp	32	4096	512	4096	-
-dr	0	1	2	3	-
-ds	0	0.3	0.2	0.01	-
-ms	-	0.01	-	1.1	-
-ss	-	1	-	32	-
-av	-	0.01 0.01 0.01	-	0 0 0	-
-dt	-	0.1	-	0	-

Sefaira simulation times with these parameters were under 30 seconds per simulation compared with over 800 seconds with consultant settings and other tools. You can read about our test in greater detail at **https://sefaira.zendesk.com/hc/en-us/articles/115001644071-Default-Radiance-Parameters-for-Sefaira-Daylighting-Visualization**.

We are interested in talking with researchers to get a peer review of our settings published. If you would like to participate, please contact Andrew Corney, (**andrew_corney@sefaira.com**) or Kerger Truesdell (**kerger_truesdell@trimble.com**). ∎

IBPSA announcements

IBPSA Project 1

Michael Wetter (LBNL) and Christoph van Treeck (RWTH Aachen)

Project 1 started officially on August 5, 2017

On August 5, 2017, prior to the Building Simulation 2017 conference, the IBPSA project 1 had its kick-off meeting to start the 5-year research phase. The meeting was attended by about 40 participants who further refined the workplan.

In addition to Mitsubishi Electric Research Laboratory, which committed to sponsoring the project this spring, the French company ENGIE also contributed to funding the project as a sponsoring participant. The sponsorships will be used to offset costs for semi-annual coordination meetings that allows the 24 organizations and 18 individual participants to coordinate joint R&D on building and city-scale modeling, simulation and optimization.

For more information about IBPSA Project 1 and how to join, visit **https://ibpsa.github.io/project1/**.

For upcoming meetings, visit **https://github.com/ibpsa/project1/wiki/Meetings** .

Overview of IBPSA Project 1

Kickoff meeting in San Francisco, CA

About IBPSA Project 1

IBPSA Project 1 is a collaboration to build the basis of next generation computing tools for the design and operation of building and district energy and control systems. It extends work conducted under the IEA EBC Annex 60. All work is open-source, will be available free. It will be built on three open standards:

- ■ IFC and further classification schemes for data modeling at the building scale,
- ■ CityGML for data modeling at the district scale including application domain extensions (ADEs), and
- ■ Modelica and FMI technologies for modeling and optimization of the performance of building and district energy systems.

The project will be conducted from summer 2017 to summer 2022. It includes three tasks that:

- develop Modelica model libraries for simulation and for model predictive control,
- map IFC and CityGML to Modelica, and
- demonstrate through applications the capabilities enabled through Modelica, and identify research needs and test research results. ■

Building Performance Simulation for Design and Operation

Jan L.M. Hensen and Roberto Lamberts

Effective building performance simulation can reduce the environmental impact of the built environment, improve indoor quality and productivity, and facilitate future innovation and technological progress in construction. It draws on many disciplines, including physics, mathematics, material science, biophysics and human behavioural, environmental and computational sciences. The discipline itself is continuously evolving and maturing, and improvements in model robustness and fidelity are constantly being made. This has sparked a new agenda focusing on the effectiveness of simulation in building life-cycle processes.

Building Performance Simulation for Design and Operation begins with an introduction to the concepts of performance indicators and targets, followed by a discussion on the role of building simulation in performance-based building design and operation. This sets the ground for in-depth discussion of performance prediction for energy demand, indoor environmental quality (including thermal, visual, indoor air quality and moisture phenomena), HVAC and renewable system performance, urban level modelling, building operational optimization and automation.

Produced in cooperation with the International Building Performance Simulation Association (IBPSA), and featuring contributions from fourteen internationally recognised experts in this field, this book provides a unique and comprehensive overview of building performance simulation for the complete building life-cycle from conception to demolition. It is primarily intended for advanced students in building services engineering, and in architectural, environmental or mechanical engineering; and will be useful for building and systems designers and operators.

Selected Table of Contents

1. The Role of Simulation in Performance Based Building 2. Weather Data for Building Performance Simulation 3. People in Building Performance Simulation 4. Thermal Load and Energy Performance Prediction 5. Ventilation Performance Prediction 6. Indoor Thermal Quality Performance Prediction 7. Room Acoustics Performance Prediction 8. Daylight Performance Predictions 9. Moisture Phenomena in Whole Building Performance Prediction 10. HVAC Systems Performance Prediction 11. Micro-cogeneration System Performance Prediction 12. Building Simulation for Practical Operational Optimization 13. Building Simulation in Building Automation Systems 14. Integrated Resource Flow Modelling of the Urban Built Environment 15. Building Simulation for Policy Support 16. A View on Future Building System Modelling and Simulation
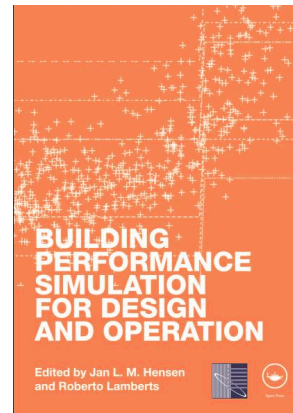
January 2011 |536pp | Hb: 978-0-415-47414-6 | £65.00

About the Authors

Jan L. M. Hensen (Ph.D. & M.S., Eindhoven University of Technology) has his background in building physics and mechanical engineering. His professional interest is performance-based design in the interdisciplinary area of building physics, indoor environment and building systems. His teaching and research focuses on the development and application of computational building performance modelling and simulation for high performance.
Roberto Lamberts is a Professor in Construction at the Department of Civil Engineering of the Federal University of Santa Catarina, Brazil. He is also currently a board member of the IBPSA, Vice-President of the Brazilian Session and Counsellor of the Brazilian Council for Sustainable Buildings.

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News from IBPSA affiliates

IBPSA affiliates are asked to submit a report to the IBPSA Board each year to keep Board members informed about their activities and membership. These are too detailed to include in ibpsaNEWS, so affiliates have been asked to make their latest annual report available through their web sites, and this section includes only selected, recent news. Other news from affiliates may be available from their websites; the URLs for these are available on the IBPSA Central web site at www.ibpsa.org/?page_id=29.

IBPSA-Australasia

Events in Brisbane and Sydney

We had around 30 people attend a session in Brisbane on 28 March 2017. Bianca Toth from Woods Bagot presented recent projects in which they have incorporated simulation into the design process, along with a current development initiative for a customisable building performance application that she is working on in collaboration with colleagues globally. Quentin Jackson from Aurecon discussed environmental modelling and discussed examples of successes and missed opportunities where modelling has been used to develop a building and support the design teams' decisions. Nicki Parker from NDY discussed AIRAH's approach to Resilient HVAC Design, and how the industry can use future climate projections to understand how buildings will perform throughout their intended design life.

We also held a seminar forum in Sydney on 27 July 2017. The forum featured 3 speakers with a diverse spectrum of topics. The topics included 'Parametric Design Testing and Optimisation', 'Lessons Learnt from Commissioning' and 'Proposed Changes to National Construction Code Section J Energy Efficiency 2019'. The forum was well attended and has increased IBPSA Australasia's presence amongst Sydney's energy and sustainability professionals, with some attendees having expressed interest in becoming members of IBPSA Australasia.

All attention is now focussed on the big event – Australasian Building Simulation 2017, on 15-16 November, in Melbourne, being held with the Australian Institute of Refrigeration, Air-conditioning and Heating (AIRAH). We have over 40 fully referred papers from local and international authors being presented across 2 days. Our keynote speakers will be IBPSA President Chip Barnaby, and Robert Cohen from the UK. For more information and registration details, go to **www.airah.org.au**. Why not come to the conference and schedule in a holiday exploring Melbourne (voted the world's most liveable city for the seventh time in a row last month)? ■

IBPSA-Nordic

Breakfast seminar on 17 August in Tallinn, Estonia

IBPSA-Nordic and EQUA Simulation Finland Oy held a breakfast seminar in Tallinn, Estonia on 17 August 2017 to present the new Estonian localization of the IDA ICE simulation program and to promote IBPSA-Nordic in Estonia.

The program included presentations about IBPSA-Nordic by Mika Vuolle and on Estonian localization by Jouko Niemelä, and talks by Jarek Kurnitski on *Requirements for computer software in energy calculations and new opportunities in simulation* and by Teet Tark on *Practical experience in using IDA ICE in consultancy work*.

With nearly 40 participants — double the expected number — the seminar was a big success. People came from the local university, professors and students alike, as well as designers and directors from various companies.

BuildSim-Nordic 2017 on 21 & 22 September in Lund, Sweden

IBPSA-Nordic also organised the 2017 BuildSim-Nordic conference, which was held on 21 and 22 September at Lund University, Sweden. This event was another great success.

BuildSim-Nordic aims to create a platform for the exchange of ideas and research, and to establish cross-country collaboration on research in the field of building performance simulation among all Nordic countries.

15 presentations about ongoing research were divided between sessions devoted to energy, thermal comfort, energy and costs and daylight, and the conference attracted 20 participants. Two workshops were run on the second day.

The first workshop gave attendees an opportunity to advance their skills in daylight simulation by learning how to set up a daylight simulation using Honeybee in Grasshopper through a guided hands-on example. (Honeybee connects building geometry to Radiance, the most rigorously validated daylight simulation engine.) In the second workshop Mika Voulle from Equa shared his insights, suggested suitable approaches and distributed the latest models he has made to tackle simulation challenges. He finished by sharing tips and tricks, and showing some new features of IDA ICE v4.8, including parametric runs, which promise to be a 'dynamite' feature — especially for researchers. It was particularly interesting to see him present a new link between IDA-ICE and free fully fledged CFD software.

Breakfast seminar in Tallinn

BuildSim-Nordic 2017 in Lund

Conference organizer Prof Åke Blomsterberg, LTH, Sweden at work

Iason Bournas, LTH, shows his IBPSA-Nordic Simulation Award

During the conference the IBPSA Nordic Simulation Award (2017) was presented to Iason Bournas of LTH and announced to all IBPSA-Nordic members by email and on the IBPSA-Nordic web page. The criterion for receipt of the award is to have carried out an outstanding piece of research or implementation work in the field of building simulation, and the selection of the award recipient is made by the IBPSA-Nordic board. Former awardees include Sunliang Cao (2014), Marc Azar (2015) and Zsófia Bélafi (2016). ■
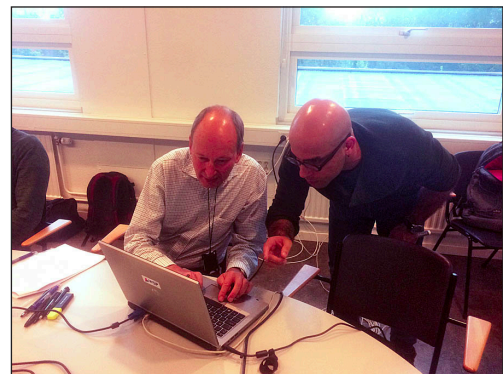
## IBPSA-Switzerland

Achim Geissler

2017 has proven to be another difficult year for the Swiss IBPSA affiliate. We lost two board members and have been unable to replace them, and the drive of the previous years has slipped. The status of "partner institution" to the newly formed association "bauen digital schweiz" has not (yet?) led to any notable collaboration. However, we do hope to be able to change this.

IBPSA-CH was again a scientific partner for CISBAT 2017 which was held on 6-8 September at EPFL in Lausanne. This included participation in the scientific committee and session chairs. Abstract and paper review were moved up a notch due to the new partnership of CISBAT with Elsevier. On 6 September, IBPSA-CH had two very well attended embedded sessions at the conference with a total of 11 papers and 21 posters.

The membership count has kept stable close to 60 members. We are still hopeful that this number will increase — provided we manage to initiate some activities in the near future. ∎

Captivated audience at CISBAT
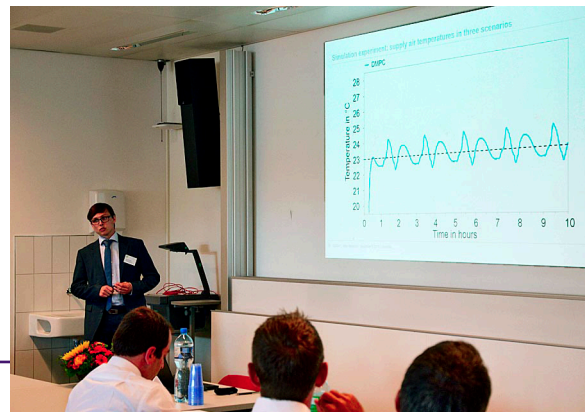
... and Marc Baranski RWTH Aachen, presents simulation results for developed DMPC *(photos Alina Walch, EPFL)*

IBPSA-USA

IBPSA-USA Summer Meeting in Long Beach

On 24 June 2017 IBPSA-USA mustered in Long Beach, California aboard the RMS Queen Mary (**www. queenmary.com**). Peter Simmonds (**www.ashrae.org/education-certification/all-instructor-led-courses/ ashrae-instructors/peter-simmonds**) piloted the group on an entertaining voyage along the path of his career designing radiant systems and providing passengers with thermal comfort. Peter's talk was followed by a happy hour (thank you Autodesk) and dinner, with plenty of opportunities for meeting new simulationists and catching up with some of the old ones. Many were subsequently seen wandering the decks after the meeting, enjoying the fresh sea air (and grog in the Observation bar).

Please keep on the lookout for an announcement of the next gathering, January 2018 in Chicago.

See more photos at **www.ibpsa.us/news/ibpsa-usa-summer-meeting-long-beach-report** and on Dropbox at **www.dropbox.com/sh/zhhzpitecer9esb/AAC_Rhd3dU7yvZocS8nSYGHwa/2017%20Long%20Beach?dl=0**. ■

IBPSA affiliates

See the IBPSA Central web site at **http://www.ibpsa.org/?page_id=29** for details of affiliate websites and contacts. Affiliate representatives are voting members of the IBPSA Board except where marked *.

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For additional information about IBPSA, please visit the Association's web site at **www.ibpsa.org**. For information on joining, contact your nearest regional affiliate.

IBPSA's mailing list has been consolidated into another listserver known as BLDG-SIM, which is a mailing list for users of building energy simulation programs worldwide, including weather data and other software support resources. To **subscribe** to BLDG-SIM, to unsubscribe or to change your subscriber details, use the online forms at **http://lists.onebuilding.org/listinfo.cgi/bldg-sim-onebuilding.org**.

To post a message to all members, send email to **bldg-sim@lists.onebuilding.org**.

The BLDG-SIM list is provided by GARD Analytics. If you have any questions, please contact the list owner Jason Glazer at **jglazer@gard.com** or +1 847 698 5686. ■

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Building Performance Simulation

Official journal of the International Building Performance Simulation Association (IBPSA)

EDITORS:
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Taylor & Francis would like to invite you to submit your article to *Journal of Building Performance Simulation*

The *Journal of Building Performance Simulation* (*JBPS*) is the official journal of the International Building Performance Simulation Association (IBPSA). IBPSA is a non-profit international society of computational building performance simulation researchers, developers, practitioners and users, dedicated to improving the design, construction, operation and maintenance of new and existing buildings worldwide.

The *JBPS* is an international refereed journal, publishing only articles of the highest quality that are original, cutting-edge, well-researched and of significance to the international community. The journal also publishes original review papers and researched case studies of international significance.

The wide scope of *JBPS* embraces research, technology and tool development related to building performance modelling and simulation, as well as their applications to design, operation and management of the built environment. This includes modelling and simulation aspects of building performance in relation to other research areas such as building physics, environmental engineering, mechanical engineering, control engineering, facility management, architecture, ergonomics, psychology, physiology, computational engineering, information technology and education. The scope of topics includes the following:

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- Uncertainty, sensitivity analysis, calibration, and optimization.
- Methods and algorithms for performance optimization of building and the systems which service them.
- Methods and algorithms for software design, validation, verification and solution methods.

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