



Smart Living Lab  
Activity Report 2018  
University of Fribourg



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FR**  
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UNIVERSITÉ DE FRIBOURG  
UNIVERSITÄT FREIBURG

# Preface

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Dear Members and Partners

Dear Ladies and Gentlemen

The Smart Living Lab is an interdisciplinary, cross-institutional research and development centre unifying cutting-edge research and real-life experimentation in multiple research areas: construction technologies, well-being and behaviours, interactions and design processes and energy systems.

Bringing together over 80 researchers in 11 research teams from three institutions, the Smart Living Lab is a unique and renowned competence centre in Switzerland and abroad. The University of Fribourg (UNIFR), the EPFL and the School of Engineering and Architecture Fribourg - University of Applied Sciences Western Switzerland (HEIA-FR) combine their expertise in order to create a tangible impact for the future built environment.

The present activity report provides an insight into the research activities carried out in 2018 by the University of Fribourg. The uniqueness of the Smart Living Lab, as well as the successful cooperation between its three founding institutions, is demonstrated in its outputs: research projects, publications, conferences, workshops and public engagement events, as well as several flagship projects which are already underway and set to take shape over the coming few years.

We are humbled and grateful to all partners and stakeholders of the Smart Living Lab - you have made many of our activities possible with your invaluable active participation and support. We would like to take this opportunity to thank you for the continuous trust you place in us.

With best regards,

Prof. Dr. Astrid Epiney, Rector of the University of Fribourg, Member Joint Steering Committee

Prof. Dr. Stephanie Teufel, Smart Living Lab UNIFR Manager, Member Executive Committee

# The three research groups

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The University of Fribourg is showcased through three different research groups within the Smart Living Lab.

## iimt

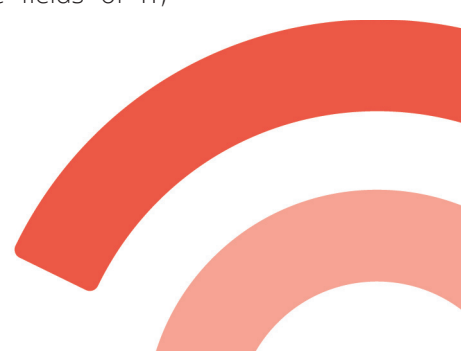
The international institute of management in technology (iimt) is a leading Swiss competence centre for Management in Technology and is committed to excellence in continuous education and research. Its research activities are focused on analysing consumer behaviour studies, as well as energy system management, cybersecurity, innovation, and technology.

## Institute of Swiss and International Construction Law

The Institute of Swiss and International Construction Law is active in research and teaching on all fields of law concerned by the design, construction and exploitation of construction works. Within the Smart Living Lab, the Institute is in particular examining the legal aspects of the computerization of design, construction, and works, as well as conflict prevention and resolution.

## Human-IST

Researchers at the Human-IST Institute are working on built environment-human interaction. They are developing new, human-centred technologies in order to understand and improve our interactions with the built environment, as well as enhancing user comfort through data visualization and multimodal interfaces, bringing together expertise from the fields of IT, psychology, and sociology.



# The people active in the Smart Living Lab

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## iimt

■ Prof. Dr. Stephanie Teufel	Professor	01. - 12.2018
■ Dr. Anton Sentic	Senior Researcher	01. - 12.2018
■ Dr. Christian Ritzel	Senior Researcher	01. - 09.2018
■ Manuel Drazyk	Junior Researcher	12. - 12.2018
■ Yanina Iskhakova	Junior Researcher	01. - 12.2018
■ Fabienne Jungo	Junior Researcher	09. - 12.2018
■ Joëlle Simonet	Junior Researcher	03. - 12.2018
■ Kirstin Stadelmann	Communication	01. - 12.2018

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People

## Institute of Swiss and International Construction Law

■ Prof. Dr. Martin Beyeler	Professor	01. - 12.2018
■ Prof. Dr. Arnold F. Rusch	Professor	01. - 12.2018

## Human-IST

■ Prof. Dr. Denis Lalanne	Professor	01. - 12.2018
■ Hamed Alavi	Senior Researcher	01. - 12.2018
■ Himanshu Verma	Senior Researcher	01. - 12.2018
■ Julien Nembrini	Senior Researcher	01. - 12.2018
■ Michel Papinutto	PhD	01. - 12.2018
■ Raphaël Tuor	PhD	01. - 12.2018

## University of Fribourg

■ Prof. Dr. Astrid Epiney	Member Joint Steering Committee	
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# Highlights of the year

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July 2018: 5<sup>th</sup> Smart Urban Policy Futures (SUPF) Workshop and the Exploratory Workshop on the Technology/Culture Interrelationship at the University of Greenwich, London, UK. At the SUPF, Yves Hertig and Anton Sentic presented current findings on prospects for prosumer cooperation in Crowd Energy systems. Additionally, Anton Sentic presented initial findings from an ongoing analysis of the Smart Living Lab, conceptualised as an innovation niche containing a network of actors (researchers).

Swiss-US Energy Innovations Days (SUEID): Prof. Dr. Stephanie Teufel presented the Crowd Energy concept to an international audience and Kirstin Stadelmann was subsequently interviewed by Radio Fribourg in regards to the Crowd Energy concept.

December 2018: Interactive Crowd Energy Simulation Model. The new model was presented during the smart living lunch on December 5<sup>th</sup> and the meeting of the steering committee of the Smart Living Lab.



Other Highlights:

- Presentation «The Authentication Dilemma» (A. Wiercioch) at the International Conference on Integrated Intelligent Computing, Singapore
- Co-organization of the ARC-hest teaching exchange with South Korea

## Institute of Swiss and International Construction Law

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Publication “Computergestütztes Planen, Bauen und Betreiben als Gegenstand des Planervertrags”, in: Stöckli/Siegenthaler (Hrsg.), Die Planerverträge, 2<sup>nd</sup> ed., Zurich 2019: Basic research on computerised instruments and results in construction design and supervision contracts. Attempt of apprehension of these instruments and results by existing legal concepts. Detection and analysis of crucial points in construction design and supervision contracts concluded in projects with shared computerized instruments and results.

Highlights

Publication “Adjudikation von Baustreitigkeiten in der Schweiz”, in: “Baurecht/Droit de la construction” 3-6/2018 (co-authorship with Prof. Tarkan Göksu). Analysis of the British construction contracts adjudication legislation, case law and practice; basic research on the feasibility of implementation of the adjudication procedure between two parties under existing Swiss law.

Conference “Vergabetagung 18” (more than 400 participants; lawyers and procurement practitioners), 22<sup>nd</sup> June 2018, Zurich. Lectures and workshops regarding public procurement law and its practical consequences. Publication of “Aktuelles Vergaberecht 2018” (conference contributions) and “Vergaberechtliche Entscheide 2016/2017” (synopsis of and commentary to newsworthy procurement law court decisions).



# Highlights of the year

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## Human-IST

The Human-IST Institute of the University of Fribourg has developed a ComfortBox. ComfortBox is a 10cm cube equipped with various sensors that monitors the quality of indoors environment and alerts users when the quality deteriorates. Studies have shown that the occupants in a room generally react too late to the deterioration of their environment. For example, when several people work in the same room, the ambient CO2 level can quickly drop. Odourless, the gas goes unnoticed. Its effects, however, are not insignificant – increased levels of CO2 can cause concentration problems and, in some cases, even headaches. Researchers at the Human-IST institute have developed a box that alerts users as soon as the CO2 level exceeds a certain threshold. Equipped with about ten sensors, ComfortBox can also measure temperature, ambient light and noise levels. By actively tracking and alerting, it enables the users (or the building itself) to act before the quality of the environment drops even further. Thanks to the ComfortBox, in a blink of an eye, comfort is in the box!

Links & other Highlights:

- <https://www3.unifr.ch/alma-georges/articles/2017/comfortbox-le-confort-est-dans-la-boite>
- International patent 2018 no. PCT/EP2017/078946 and P0423WO entitled “Device, System and Method for Assessing and Improving Comfort, Health and Productivity”.
- Innosuisse project 30076.1 “Preventing “Comfort Degradation” with Logitech
- Co-organization of the ARC-hest teaching exchange with South Korea
- Special issue ACM TOCHI: Alavi, Hamed. S., Churchill, E. F., Wiberg, M., Lalanne, D., Dalsgaard, P., Schieck, A. F. G., & Rogers, Y. (2019). Introduction to Human-Building Interaction (HBI)



# The fields of research

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The three University research groups, are active in the following fields of research:

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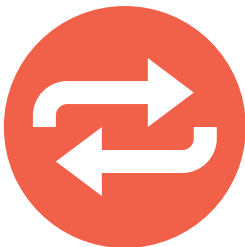
## Well-being & and behaviours

Improve human health and comfort by optimizing indoor environmental quality and influencing behaviours in a positive way.



## Energy systems

Develop smart energy-efficient systems and technologies, improve their management, and anticipate legal and economic impacts.



## Interaction and design processes

Understand and structure dialogue among stakeholders in the building lifecycle to develop the tools to design, model and operate buildings.



# The research projects

Name of the project	Project member(s)	Starting date	End date	Description	In cooperation with
Interactive Model Crowd Energy Model	Anton Sentic (iimt), Joëlle Simonet (iimt), Manuel Drazyk (iimt), Jonathan Parrat (Transform), Ilse Bahnsen (Transform) Andéol Demierre (ROSAS)	02.2018	ongoing	The iimt's Crowd Energy research focus is extended further by developing an interactive model enabling participants to take part in investment and energy trading experiments.	Transform ROSAS
Niche Analysis and Actor Network Mapping of the Smart Living Lab	Anton Sentic Yanina Iskhakova Fabienne Jungo	11.2017	ongoing	The Smart Living Lab is conceptualised as a niche in the understanding of Transition Studies, allowing iimt scholars to investigate its institutions, structure and functions.	
System analysis tool for socio-spatial innovation networks (SATIN)	Anton Sentic (iimt), Yanina Iskhakova (iimt), Jonathan Parrat (Transform), Florinel Radu (Transform)		ongoing	In this research project iimt and TRANSFORM researchers combine social networks in the Smart Living Lab with its spatial structure in order to develop novel analytical tools for reviewing innovation spaces.	Transform
Architecture for Human Environment with Smart Technologies (Arc-HEST)	Anton Sentic (iimt), Stephanie Teufel (iimt), Denis Lalanne (Human-IST), Dolaana Khovalyg (TEBEL), Dusan Licina (HOBEL) Raphaël Compagnon (Transform)		ongoing	SWISS-KOREAN ACADEMIC EXCHANGE PROGRAM ARC HEST: Architecture for Human Environment with Smart Technologies.  Six universities from Switzerland and South Korea have developed an exchange program focusing on studying the working environment in both countries in conjunction with local culture and architecture.	



# The research projects

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Projects

Name of the project	Project member(s)	Starting date	End date	Description	In cooperation with
Incorporation of SIA terms and conditions in construction contracts	Arnold F. Rusch	02.2018	11.2018	Research on the premises of a legally effective incorporation of SIA terms and conditions in Swiss construction contracts.	
Computergestütztes Planen, Bauen und Betreiben als Gegenstand des Planervertrags	Martin Beyeler	07.2018	09.2018	Basic research on computerised instruments and results in construction design and supervision contracts.	
Adjudikation von Baustreitigkeiten in der Schweiz	Martin Beyeler	02.2016	12.2018	Analysis of the British construction contracts adjudication legislation, case law and practice; basic research on the feasibility of implementation of the adjudication procedure between two parties under existing Swiss law.	Prof. Dr. Tarkan Göksu (UNI-FR); co-authorship
Vergaberechtliche Urteile 2016/2017	Martin Beyeler	06.2017	06.2018	Systematic analysis of and commentary to all publicly available court decisions (Swiss courts and ECJ) in public procurement law of the years 2016 and 2017 (book publication).	
La médiation dans le Code de procédure civile	Martin Beyeler	12.2018	ongoing	Commentary to articles 213–218 of Swiss Civil procedures Code (mediation during court proceedings).	
Ouvrages publics et transports dans la Constitution fédérale	Martin Beyeler	07.2018	ongoing	Commentary to articles 81 (public works), 81a (public transportation), 82 (roads) and 88 (pedestrian ways and cycling paths) of Swiss federal constitution.	Prof. Dr. Nicolas Diebold (UNI-LU); MLaw Martin Ludin (UNI-LU) (co-authorship)
Öffentliche Beschaffungen und Finanzvermögen	Martin Beyeler	09.2018	12.2018	Analysis of the legal status of public procurement conducted in the context of unbound public assets.	



# The research projects

Name of the project	Project member(s)	Starting date	End date	Description	In cooperation with
Spatial Sustainability in Shared Office Spaces	Hamed S. Alavi Himanshu Verma Denis Lalanne	05.2018	05.2018	The project has sought to examine how the study of space perception and its impact on space-use behaviour can inform sustainable architecture, specifically in the context of shared office spaces.	Building 2050 Atelier Oi
Space-use behavior in Smart Living Lab	Hamed S. Alavi Himanshu Verma Denis Lalanne	09.2016	02.2018	Using Bluetooth wearables we recorded the movement of building occupants over 8 weeks and analysed the correlation between space-use routines and professional profile of the occupants.	Building 2050 LASUR
Literature analysis of living lab methods in Human-Computer Interaction literature	Hamed S. Alavi Denis Lalanne	05.2018	09.2018	152 papers in the domain of Human-Computer Interaction that describe a living lab study are analyzed to create a structured understanding of how living lab methods have evolved in this domain.	University College London
Mobile User Building interaction	Julien Nembrini Denis Lalanne	12.2017	12.2018	Development of a mobile application connected to the BBData database allowing (1) to communicate visually building data information to the user, (2) to record perceived comfort data at the user's own initiative or at the request of the application. The application was tested for a sample of the "Halle Bleue" users.	Jean-Philippe Bacher ENERGY-HEIA-FR
Insolight smart luminaire	Jérôme Kaempf Julien Nembrini Denis Lalanne	05.2017	05.2018	Measuring and assessing the benefits, from both technical and users' perspective, of using an innovative dynamic luminaire, consisting of a LED array capable to dynamically change its light beam output (direction and intensity).	Jérôme Kaempf ENERGY-HEIA-FR
ECABO	Raphael Tuor Denis Lalanne	11.2017	04.2019	Assessing the energy use and carbon emissions of buildings during their operation phase.	Didier Vuarnoz Building 2050
ELSA (CO2 tool)	Raphael Tuor Denis Lalanne	10.2015	12.2018	Exploring design alternatives in the early design stages of the building and assess the environmental impact of parameters.	Thomas Jusselme Building 2050

## Publications

Alavi, Hamed S./Churchill, Elizabeth/Kirk, David/Bier, Henriette/Verma, Himanshu/Lalanne, Denis, and Schnädelbach, Holger, «From Artifacts to Architecture.» In Proceedings of the 19<sup>th</sup> International ACM SIGACCESS Conference on Computers and Accessibility, pp. 387-390. ACM, 2018.

Alavi, Hamed S./Verma, Himanshu/Mlynar, Jakub, and Lalanne, Denis, «On the Temporality of Adaptive Built «Accepted to be published in the Springer book of Adaptive Built Environments 2018.

Alavi, Hamed S./Verma, Himanshu/Mlynar, Jakub, and Lalanne, Denis, «Space-Use Behavior Studies in the Swiss Smart Living Lab» 2018 Conference on Human Factors in Computing Systems CHI'18. Workshop Living Labs: Measuring Human Experience in the Built Environment.

Alavi, Hamed S./Verma, Himanshu/Mlynar, Jakub, and Lalanne, Denis, «The Hide and Seek of Workspace: Towards Human-Centric Sustainable Architecture». In Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems, p. 75. ACM, 2018.

Beyeler, Martin, «Alle Preise sind plausibel», in: BR/DC 2018, S. 34 ff.

Beyeler, Martin, «Ausschluss vom Vergabeverfahren wegen beruflichen Fehlverhaltens», Bemerkungen zum Urteil des Verwaltungsgerichts des Kantons Bern vom 18. Dezember 2017 (VGE 100.2017.228, BVR 2018 S. 206), in: BVR 2018, S. 217 ff.

Beyeler, Martin, «Der Private wählt, der Staat bezahlt», in: BR/DC 2018, S. 230 ff.

Beyeler, Martin, «Vergaberechtliche Entscheide 2016/2017», Zürich 2018.

# Publications

## Publications

Beyeler, Martin/Göksu, Tarkan, «Adjudikation von Baustreitigkeiten in der Schweiz», in: BR/DC 2018, S. 141 ff., S. 209 ff., S. 277 ff., S. 329 ff.

Cozza, Stefano/Tuor, Raphaël/Jusselme, Thomas/Lalanne, Denis and Andersen, Marilyne, «Usability assessment of building performance simulation tools: A pilot study», In Press. SDBE 2018.

Hertig, Yves/Teufel, Stephanie, «The 'Energy Community Management' Framework for Energy Service Providers». Proc. 2018 International Conference on Smart Grid and Clean Energy Technologies, Kuala Lumpur, 38-42, doi 0.1109/ICSGCE.2018.8556675.

Lindley, Siân/Alavi, Hamed S./Raval, Noopur/Wang, Ding/Lindtner, Silvia, Accepted for the 2018 CHI Conference Extended Abstracts on Human Factors in Computing Systems.

Mlynar, Jakub/Alavi, Hamed S./Verma, Himanshu, «Towards a Sociological Conception of Artificial Intelligence». Accepted to appear in AGI'18: Eleventh Annual Conference on Artificial General Intelligence.

Ritzel, Christian/Sentic, Anton, «Investigating Energy Prosumer Behaviour in Crowd Energy Using an Interactive Model/Diorama». Journal of Electronic Science and Technology 16 (4), p. 341–350. <https://doi.org/10.11989/JEST.1674-862X.80727104>.

Rusch, Arnold F., «Aliud beim Werkvertrag», in: BR/DC 2018, S. 89 ff.

Rusch, Arnold F., Art. 740a ZGB – Erfahrungen und Erkenntnisse, in: AJP 2018, S. 1075 ff.

Rusch, Arnold F., BGer 4A\_602/2017: «Regress des privaten Schadensversicherers auf Kausalhaftpflichtige», in: AJP 2018, S. 905 ff.

Rusch, Arnold F., «Haftpflichtrecht – Wichtige Urteile», in: Probst Thomas/Werro Franz (Hrsg.), Strassenverkehrsrechtstagung, 21. Juni 2018, Bern 2018, S. 129 ff.

## Publications

Sentic, Anton, «Challenges for combined heat and power in highly developed urban settings: A transitions-based review of the factors influencing urban CHP development in London». Presented at the 3<sup>rd</sup> NEST Conference, University of Utrecht, Utrecht, Netherlands, March 15<sup>th</sup>-16<sup>th</sup> 2018.

Sentic, Anton/Hertig, Yves, «Crowd Energy –Prosumer Networks in Smart Urban Environments». Presented at the 5th Smart Urban Policy Futures Workshop (SUPF V), University of Greenwich, London, UK, July 9<sup>th</sup>-11<sup>th</sup> 2018.

Sentic, Anton/Iskhakova, Yanina, «Expectations, visions and structures in living lab environments: Insights from a Swiss case study». Presented at the Exploratory Workshop on the Technology/Culture Interrelationship, University of Greenwich, London, UK, July 12<sup>th</sup> 2018.

Thalmann, Lara/Hertig, Yves. «Profitability of RE-Technology Regarding the Economic Environment: A Case Study of Swiss SMEs». Journal of Electronic Science and Technology, 16, 351-366, doi 10.11989/JEST.1674-862X.80716129.

Tuor, Raphaël/Evéquoz Florian, and Lalanne, Denis, «Parallel Bubbles - Evaluation of Three Techniques for Representing Mixed Categorical and Continuous Data in Parallel Coordinates». In VISIGRAPP (3: IVAPP) (pp. 252-263).

Vanhulst, Pierre/Evéquoz, Florian/Tuor, Raphaël and Lalanne Denis, «Designing a Classification for User-authored Annotations in Data Visualization». In VISIGRAPP (3: IVAPP) (pp. 85-96).

Verma, Himanshu/Alavi, Hamed S., and Lalanne, Denis, «From Substitution to Augmentation: directions for Human-Interaction Design», Chapter proposal, Springer Series of Adaptive Environments, People, Personal Data and the Built Environment.

Wiercioch, Antoni/Teufel, Stephanie/Teufel, Bernd, «The Authentication Dilemma». Proc. 2018 International Conference on Integrated Intelligent Computing, Singapore. Also published in (1) Journal of Communications. 13. 443-449, doi 10.12720/jcm.13.8.443-449. and (2) Journal of Software. 13. 277-286, doi 10.17706/jsw.13.5.277-286.

Zufferey, Jean-Baptiste/Beyeler, Martin/Scherler, Stefan (Hrsg.), «Aktuelles Vergaberecht 2018», Zürich 2018.

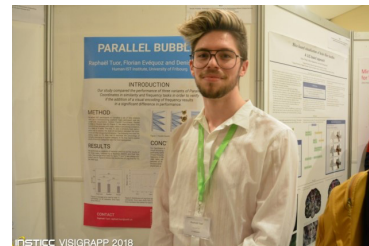
# Conferences

## Human-IST

The Smart Living Lab team comprised of Professors Dolaana Khovalyg (EPFL), Dusan Licina (EPFL), Raphaël Compagnon (HEIA-FR), Denis Lalanne (University of Fribourg), and Industry liaison officer Martin Gonzenbach (EPFL) travelled to Seoul, South Korea, for the kick-off meeting on 3<sup>rd</sup>-4<sup>th</sup> September to develop the Swiss-Korean Academic Exchange Program on the topic of sustainable and comfortable built working environment. South Korean partners were represented by Professors Thorsten Schuetze (SungKyunkwan University), Yoonhie Lee (Ewha University), Sung-Taeg Nam (Hanyang University). The program was initiated by the Science and Technology Office (STO) of the Embassy of Switzerland in the Republic of Korea, led by Alessandra Apicella, as the cooperation in science and education between the two countries.

Along with the kick-off meeting, the Smart Living Lab team attended the Open Talk “Technology meets Architecture – Designing Together the Living Environment of Tomorrow” organized by STO Seoul and opened by the Ambassador of Switzerland in the Republic of Korea, Mr. H.E. Linus von Castelmur. The event aimed to bring together experts and innovators from academia and the private sector from Switzerland and South Korea to present concrete examples of projects and visions to design together with the living environment of tomorrow. The Smart Living Lab was presented by two talks: “Interdisciplinary experimental platform for the built environment of the future – Smart Living Lab” by Prof. Dolaana Khovalyg and “Human-Building Interaction” by Prof. Denis Lalanne.

In addition, researchers from Human-IST attended multiple conferences among which ACM CHI, IVAPP and SDBE.



## Institute of Swiss and International Construction Law

- Vergabetagung 2018, Zurich (Martin Beyeler: Host/Opening Conference/Discussion Workshop)
- Marchés publics 2018, Fribourg (Martin Beyeler: Discussion Workshop)
- ALUMNI IUS FRILEX, Freiburg (Martin Beyeler: Short Conference about public procurement law)
- Journée romande de la géoinformation, Lausanne (Martin Beyeler: Conference about computerized instruments and results in construction)
- Workshop Alpiq SA, Lausanne (Martin Beyeler: Conference and Workshop about public procurement law)
- Journée CMAI, Genève (Martin Beyeler: Workshop about public procurement law)
- CRB Académie d'été, Fribourg (Martin Beyeler: Conference about computerized instruments and results in construction)

## iimt

- International Conference on Integrated Intelligent Computing, National University of Singapore, Singapore, March 1<sup>st</sup> – 3<sup>rd</sup> 2018
- 3<sup>rd</sup> NEST Conference, University of Utrecht, Utrecht, Netherlands, March 15<sup>th</sup> - 16<sup>th</sup> 2018
- International Conference on Smart Grid and Clean Energy Technologies, Universiti Tunku Abdul Rahman, Sungai Long Campus, Kuala Lumpur, Malaysia, May 29<sup>th</sup> – June 1<sup>st</sup> 2018
- 9<sup>th</sup> International Sustainability Transitions Conference (IST2018), The University of Manchester, Manchester, UK, June 12<sup>th</sup>-14<sup>th</sup> 2018
- 5<sup>th</sup> Smart Urban Policy Futures Workshop (SUPF V), University of Greenwich, London, UK, July 9<sup>th</sup>-11<sup>th</sup> 2018
- Exploratory Workshop on the Technology/Culture Interrelationship, University of Greenwich, London, UK, July 12<sup>th</sup> 2018
- Swiss-US Energy Innovation Days, Fribourg, August 21<sup>st</sup> 2018



# Teaching Activities

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## Institute of Swiss and International Construction Law

- Lecture “Résolution de conflits dans la construction” (Master Course; law faculty; University of Fribourg): Martin Beyeler/Arnold F. Rusch
- Lectures and seminars regarding public procurement law (University of Fribourg): Martin Beyeler
- Several CAS lectures on the topic of public procurement law/computerized instruments and results in construction law and other branches of law (UNI-FR/HEIA/FHNW): Martin Beyeler

## iimt

- Master Course: Digital (R)evolution - Strategic Niche Management (Master/FS 18). This course focused on the Strategic Niche Management (SNM) approach in the context of digitalization and the digital revolution. The students have an opportunity to gain a general understanding of socio-technical transitions, followed by a range of SNM tools and analytical approaches.

## Human-IST

- User Centred Design course (Master Informatics) at the University of Fribourg, D. Lalanne
- Multimodal Interfaces course (Master Informatics) at the University of Fribourg, D. Lalanne
- Robotics Course (1st year Bachelor Informatics) at the University of Fribourg, J. Nembrini
- Review expert for Architecture et Perception (Master level seminar held by Muriel Waldvogel) at HEIA-FR, J. Nembrini
- Human Building Interaction seminar (Master level research seminar) at the University of Fribourg, D. Lalanne and J. Nembrini
- Building Data Visualization (Master level research seminar) at the University of Fribourg, D. Lalanne and J. Nembrini

Did you know that the iimt Crowd Energy Model 2.0 is based on an actual, real-life neighbourhood in the quarter of Schönberg, Fribourg? We used a real city map, however, we can't guarantee that all the houses look the same, or that they actually do produce energy! Also, the model's development was a rocky ride at times – the first Raspberry computer literally caught fire and had to be replaced.

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Fun Fact



# Committees & Commissions

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## Institute of Swiss and International Construction Law

- Scientific Commission Smart Living Lab, Prof. Dr. Martin Beyeler
- Visitor to SIA BK 442 (SIA Commission accompanying the creation of new ISO and EN standards about computerized construction and computerized construction works); Prof. Dr. Martin Beyeler

## iimt

- Comité Directeurs Smart Living Lab, Prof. Dr. Stephanie Teufel
- Scientific Commission Smart Living Lab, Prof. Dr. Stephanie Teufel
- Scientific Commission Smart Living Lab, Dr. Anton Sentic
- Team Communication Smart Living Lab, Kirstin Stadelmann
- Commission de construction Smart Living Lab, Kirstin Stadelmann

## Human-IST

- Scientific Commission Smart Living Lab, Prof. Dr. Denis Lalanne
- Hotel du Futur, Prof. Dr. Denis Lalanne

## University of Fribourg

- Joint Steering Committee, Prof. Dr. Astrid Epiney



- Workshop “Digitales Bauen, aber Recht!” (3rd September 2019, Olten). Exchange of knowledge and experiences between professionals within legal and non-legal departments who are active in construction or facility management businesses.
- Conference “Forum Neues Vergaberecht 2019” (10th December 2019, Basel). Presentation and discussion about the new Federal Act on public procurement.
- In 2019 the iimt Smart Living Lab team will continue to engage in projects that are currently active, as well as extend its research portfolio. This will include the implementation of the SATIN project and participation in the Arc-HEST programme, as well as the second iteration of the Strategic Niche Management Master’s study course.
- Results of the current projects will be presented at international conferences: the 4<sup>th</sup> NEST in Lisbon, the 18<sup>th</sup> STS Conference Graz, the 34<sup>th</sup> IFIP-SEC in Lisbon, the 2<sup>nd</sup> ICSSM in Beijing and the IST2019 in Ottawa. Furthermore, our research on blockchain in the energy sector will be published by Springer-Verlag. We are also aiming to expand our research team and scope, and hope to broaden partnerships with commercial entities and civil society.



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smart  
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