EBC

Energy in Buildings and Communities Programme

International Energy Agency

Occupant-centric building design and operation EBC Annex 79

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PREAMBLE

This annex text has been developed since the concept was first proposed in June 2017. It benefitted from a first brainstorming at the Annex 66 expert meeting at DTU in Lyngby, Denmark (June 2017), where ideas for future topics were collected, and from intensive discussions over 1.5 days at the final Annex 66 expert meeting in Beijing (September 2017). On this basis, a concept proposal was developed for the Ottawa IEA EBC ExCo meeting (November 2017), and after approval, talks started with potential subtask leaders who then helped to prepare and invite for a workshop which was held in London in April 2018. With the results of this workshop, the feedback received from the Annex Advisor, Per Heiselberg, and the contributions from the Subtask leaders, the final proposal was presented at the IEA EBC ExCo meeting in Stockholm in June 2018 where it was approved and listed as EBC Annex 79.

Note: With the unanimous support of the Operating Agents and Subtask Leaders, the original name of Annex 79 ("Occupant behaviour-centric building design and operation") has been modified to "Occupant-centric building design and operation".

ANNEX 79 IN BRIEF

With the overall goal to integrate and implement occupancy and occupant behaviour into the design process and building operation in order to improve both energy performance and occupant comfort, the Annex will focus on:

- developing new scientific knowledge about interdependences between thermal, visual, aural and olfactory influences on perception and occupant behaviour in indoor environments,
- understanding interactions between occupants and building systems by using interfaces, e.g. how interfaces en-/discourage occupants taking advantage of adaptive opportunities for improving their comfort situation, as well as the impact on building energy use,
- deploying 'big data' (e.g. data mining and machine learning) for the building sector based on various sources of building and occupant data as well as sensing technologies,
- developing methods and guidelines and preparing recommendations for standards to integrate occupant models in building design and operation, and
- performing focused case studies to test the new methods and models in different design and operation phases in order to obtain valuable feedback for the researchers and practitioners.

The purpose of the Annex is to provide new insight into comfort-related occupant behaviour in buildings and its impact on building energy performance. An open collaboration platform for data and software will support the use of data-mining methods and advanced occupant behaviour models. It will further promote the usage of this knowledge in building design and operation processes by giving policy support, preparing proposals for standards and providing guidelines for practitioners. Results of the Annex will be widely disseminated through conference and journal publications, journal special issues, panel discussions, presentations, books, technical reports, and guidelines.

1. BACKGROUND AND JUSTIFICATION

Recent research (e.g., resulting from IEA EBC Annex 66 (2014-2017)) identified the strong influence of occupants on building performance and provided a sound framework for experimentally studying and modeling different behavioural actions, including the implementation of these models into simulation platforms. Some of the key discoveries, developments, and outcomes of Annex 66 include:

- A detailed review of, and best practices guide, for data collection methods (sensors, research methods) using four main research methods in-situ, lab, survey, virtual reality. Development of building data ontology to structure and describe all building data (including occupant-related)
- Rigorous comparison of occupant modeling methods (e.g., Markov chains, Bernoulli) with theoretical explanations for all common occupant modeling forms. The issue of modeling inter-occupant diversity was explored with recommendations made and methods for evaluating occupant model performance were developed. Occupant model implementation into simulation tools was explored using various approaches, including obFMU (occupant behaviour functional mock-up unit)
- Investigation of relationship between model application and model complexity ("fit for purpose"). Surveys were performed to gain a better understanding of industry's attitudes and practice about occupant modeling and 30 case study buildings were documented to understand the role of occupant behaviour in buildings

However, design and building operation practice shows that many of the models do not represent the manifold human interactions with a building appropriately enough, and that there is no guidance for designers and building managers on how to apply occupant behaviour models in standard practice.

The new Annex builds upon IEA EBC Annex 66, focusing on the following research questions (amongst others):

- What are the relationships and interdependencies between different indoor environmental parameters (thermal, visual, olfactory, and aural comfort) and their impact on perception and behaviour?
- How do building controls' interfaces and their underlying logic affect behaviour? How can and should interfaces be systematically tested in experimental, in situ, immersive environments, and simulation approaches?
- How can we systematically leverage building automation systems and other readily-available data sources (e.g., using data-mining and artificial intelligence methods) to develop occupant models, inform building design, and optimize building controls and operations?
- How should experimental and occupant modeling findings be used to influence building codes and standards?
- How much impact does occupant behaviour have across building types, climates, and against other agents (e.g., building operators)?
- How can uncertainty and risks from occupants be managed and exploited in building design?

2. OBJECTIVES AND SCOPE

2.1. Objectives

The overall goal to which Annex 79 is to contribute is:

Developing, demonstrating, and deploying methodologies, technologies, and policies to design and operate buildings that are comfortable, usable, adaptable, and energy-efficient – particularly in the context of occupancy and occupant behaviour.

To achieve the above goal, the following objectives will be addressed:

- Improvement of knowledge about occupants' interactions with building technologies. A specific focus will be on comfort-driven (thermal, olfactory, visual, aural) actions caused by multiple and interdependent environmental influences which are not yet covered by current models.
- Understanding of building technologies' interfaces which play an important role on whether occupants take advantage of adaptive opportunities for improving their actual comfort situation at all. As most behavioural actions relate to building energy consumption, special emphasis will be given to energy-saving strategies with regard to the use of building technologies.
- Deployment of 'big data' for the building sector as the availability of various data related to occupants' behaviour in buildings increases rapidly. It will be investigated whether techniques as data mining and machine learning offer new modeling strategies which are suitable to represent occupant behaviour in an improved manner.
- Sustainable implementation of occupant behaviour models in building practice by developing guidelines and preparing recommendations for standards and codes for applying occupant behaviour models during building design and operation. Focused case studies will be used to implement and test the new models in different design and operation phases in order to get valuable feedback for the researchers.

2.2. Scope

As per the above objectives, Annex 79 will focus on studying, designing, and operating occupiable spaces at the room, zone, and building scales. The Annex will build up a solid framework in which the main influencing factors of occupancy and occupants' actions in buildings will be systematically identified and described – first independently from the building type. Then, depending on available data and case study buildings, exemplary use cases will be investigated starting most likely with office and residential buildings, though the developed methodologies can also be applied to other building types. The Annex is not focused on the community and city scales.

All topics are focused on occupants, occupancy (i.e., presence), occupant behaviour, occupant comfort, and usability. These are the current pillars for the overarching goal to significantly reduce operating energy of buildings, while improving occupant comfort. We dispute the notion that excellent comfort and energy performance are mutually exclusive. Instead, this Annex will demonstrate that a comfortable and usable building is an energy-efficient building.

Focused case studies, whereby the members are actively involved in real building projects (not passive reporting of case studies), will be a major emphasis of the Annex. They will serve as a platform to implement, test and demonstrate new models, standards and guidelines emerging from Annex research in a real building context during different design

and operation phases. Feedback and optimization loops ensure a fit for actual needs in building practice.

The Annex will not be focused on simulation tool development, hardware development, building energy rating schemes or specific policy development; however, it will provide recommendations and guidance for further development of standards and codes. Particularly the integration in modern digital planning environments will be considered.

The Annex will make use of research methods from various domains like engineering, architecture, information technology, psychology, social sciences, etc.

3. MEANS

In order to achieve the above objectives, the following research questions have been established. For each question, the Annex will: (1) review and develop methodological approaches, (2) develop new knowledge, (3) perform focused cases studies, where applicable, and (4) transfer new methods and knowledge to key stakeholders (policy makers, researchers, building designers, technology companies). To accomplish this, the Annex will be organized in 4 Subtasks; the corresponding Subtasks that the questions map, are indicated in brackets below and illustrated in Figure 1 which also shows the connections in between them.

- How do the different indoor environmental parameters (thermal, visual, olfactory, and aural comfort) relate to each other and influence occupants' perception and behaviours? (**ST1**)
- How do building interfaces**,** their context (e.g., placement), and their underlying logic affect behaviour? What interface features and characteristics are most effective at delivering a comfortable environment, outstanding perceived control, and reductions in energy consumption? (**ST1**)
- How can new and existing data sources (e.g., building automation systems, human resource databases, information technology networks, Internet of Things, etc.) and advanced data analytics (e.g., machine learning, artificial intelligence, statistical modelling) be exploited to develop new fundamental knowledge about occupant behaviour, indoor environmental quality, energy, and the relationship between them? (**ST2**)
- How can simulation-aided building design processes, energy code and standards be advanced to properly account for occupants in order to yield more comfortable, healthy, usable, and energy-efficient buildings? (**ST3**)
- How can building operations and controls be advanced to exploit new data sources and on-line learning methods to adapt to occupancy and occupant preferences to provide more comfortable environments using less energy? (**ST4**)

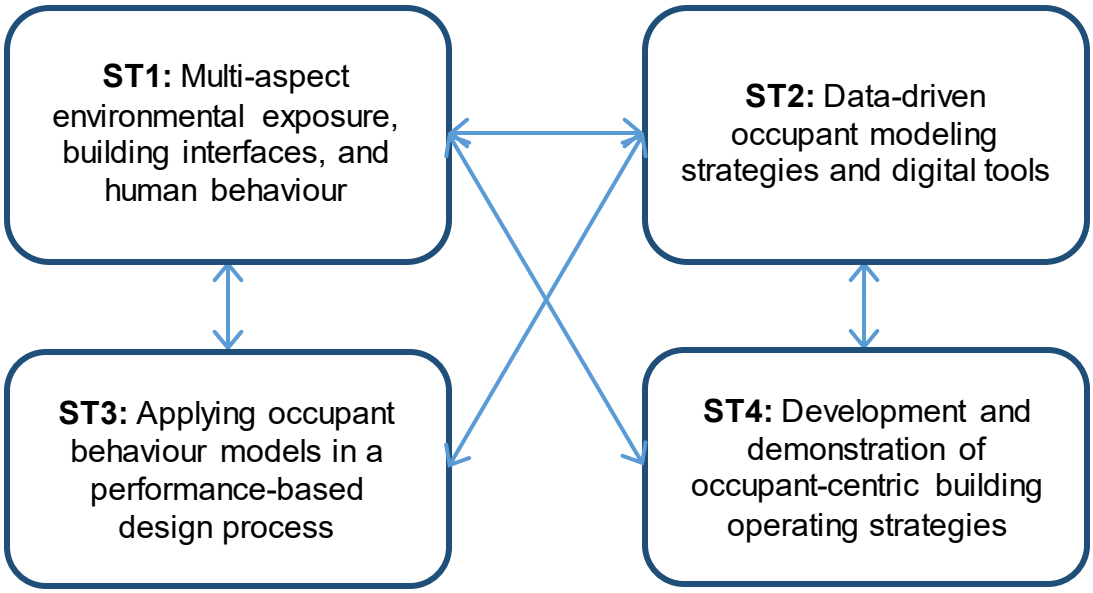

Figure 1: Structure of Annex 79 with 4 Subtasks

In Table 1 the interdependencies between research methods to be applied and the Annex's main topics are shown. New knowledge about multi-aspect environmental exposure and building interfaces which will be relevant for advanced models will be gained in ST1 by experiments in different settings. ST2 collects and deploys data sources of different kinds for applying data-driven modeling techniques. It will be informed by ST1 about necessary data points for taking into account relevant behavioural aspects. The implementation of advanced occupant behaviour models and strategies (emerging out of ST1 and ST2, but also existing ones) into building design and operation will be the main focus of ST3 and ST4. This shall be achieved by preparing guidelines and recommendations for standards. Finally, applications will be tested in case studies in order to challenge them in real design contexts and building environments.

Table 1: Interdependencies between research methods and topics (dark shaded areas are particularly emphasized, while lightly-shaded areas are still important)

	Occupant behaviour	**Technologies, interfaces**	**"Big data" from BMS etc.**	**Advanced models**
Experiments (lab / in situ)	**ST1**	**ST1**		
Data mining, machine learning			**ST2**	
Modeling and design guidelines, building policy (standard and code) recommendations				**ST3/4**
Field application - testing, monitoring and verification in case studies			**ST3/4**	**ST3/4**

4. RESULTS AND DELIVERABLES

4.1. Overview

Annex 79 will provide new insight into comfort-related occupant behaviour in buildings and its impact on building energy performance. It will further promote the usage of this knowledge in building design and operation by supporting standardization processes and providing guidelines for practitioners. With regard to the proposed activities in the four Subtasks, the following results are expected:

- Enhanced scientific knowledge on methodological approaches to examine multi-stressor effects by environmental influences on human subjects, as well as a better understanding of how interfaces are used to take advantage of adaptive opportunities for improving their comfort situation.
- Informed insight into the potential of various data sources and sensing technologies as well as applications of data-based methods for knowledge discovery and modeling of occupant behaviour.
- An open collaboration platform for data and software for supporting the use of data-mining methods and tools for applications within the area of occupant behaviour.
- A repository of advanced occupant behaviour models for digital planning environments.
- Proposals for standards and policy support for implementing occupant behaviour simulation in building design and operation practice. This also includes the integration of the models in modern digital planning environments (BIM).
- Guidelines of how to apply occupant models and questions of occupant behaviour and interactions with building technologies (interfaces) into everyday planning routines (how can the uncertainty of stochastic models be incorporated into code compliance, or what is the scope of applicability of various occupant models?).

4.2. Deliverables

The planned deliverables are outlined in Table 2. Additionally, journal and conference papers, as well as special issues of journals are envisaged.

Table 2: Planned Annex deliverables

No.	Description of deliverable
	Text-based deliverables:
1	**Comprehensive final Annex Report, summarizing most essential activities**: - The core of the report will consist of a set of four main chapters which will give an overview of the most significant contributions of each subtask (expected to be also published as open-access journal papers). - Cross-subtask activities will be filed in thematically closest subtask. - Corresponding chapters and sections will be tagged for the different audiences addressed in the previous deliverables plan (and listed in Section 1.4). - In addition, a comprehensive summary with conclusions and recommendations for future work, as well as all further relevant information about Annex 79 (participants, etc.) will be part of the final report.

2	**Open-access book: Occupant-centric building design** A comprehensive book that includes fundamentals on occupant comfort, consideration of occupants and occupant behavior in design processes, occupant modelling and simulation, and case studies focused on occupant centric design.
3	**Guideline on data collection and modeling of occupant behaviour for building controls** A guideline for technologies and best practices to collect occupant-related data for applications in occupant modelling for simulation and for occupant-centric controls
	Deliverables in digital format:
4	**ASHRAE Global OB Database** A centrally-coordinated database of occupancy and occupant behavior data. Currently available: www.ashraeobdatabase.com. (only if ASHRAE agrees to credit the database to EBC).
5	**Platform for sharing and evaluating OB models** A database with occupant behaviour models that is based partially on the ASHRAE Global OB Database.
6	**Online library of case studies on OCC projects** A large international collection of documented case studies of buildings or spaces that demonstrate occupant-centric controls

4.3. Annex beneficiaries and outreach activities

There are three main target groups which will benefit from the outcomes of Annex 79:

Science:
Building scientists, psychologists, sociologists, computer scientists, ergonomists who will gain new knowledge on multi-stressors-based occupant behaviour in buildings and data-based models.

Practice:
Architects, planners, energy consultants, HVAC engineers, building managers who will receive advanced models and tools as well as guidelines to consider occupant behaviour in energy-efficient building design and operation.

Industry:
Manufacturers of building technologies (HVAC and lighting systems, controls, controls interfaces, shadings, etc.) who will be able to incorporate occupants' demands into product development.

Policy-makers: persons responsible to formulate implement new standards and codes.

Outreach activities will include seminars and workshops during international conferences, involvement of practitioners and industry in Annex meetings and close cooperation with ASHRAE, REHVA, and other organizations representing building-related professionals. To enhance training of graduate students, summer school workshops on building controls training, data-mining with occupant data, adaptive comfort and behaviour modelling.

5. ANNEX MANAGEMENT

5.1. Operating Agents

The Annex is operated by two co-Operating Agents. They are responsible for the overall performance and the time schedule of the Annex, for reporting, and for information dissemination activities. The Operating agents are: Prof. Andreas Wagner of Karlsruhe Institute of Technology, Karlsruhe, Germany and Prof. Liam O'Brien, Carleton University, Ottawa, Canada.

5.2. Specific Obligations and Responsibilities of the Operating Agent

The Operating Agent is responsible for managing the overall performance, time schedule, reporting, knowledge transfer, etc., of this Annex. In addition, the co-Operating Agents shall:

- Provide the Operating Agent and the respective subtask leads with detailed reports on the results of the work carried out for each Subtask.
- Participate in the editing and reviewing of draft reports of the Annex and Subtasks.
- Prepare the detailed Program of Work for the Annex in consultation with the Subtask Leaders and the Participants and submit the Program of Work and time schedule for approval to the Executive Committee.
- Be responsible for the overall management of the Annex, including overall coordination, liaison between the Subtasks, and communications with the Executive Committee.
- Chair each of the Annex meetings and be responsible for setting the agenda. Assistance at each meeting will be provided by the Participant from the nation hosting the meeting.
- Prepare and distribute the results mentioned in Paragraph 4 above.
- Prepare joint assessments of research, development, and demonstration priorities when desired or necessary.
- At the request of the Executive Committee, organize workshops, seminars, conferences, and other meetings.
- Propose and maintain a methodology and a format for the submission of information that is collected by the Participants.
- Provide, at least semi-annually, periodic reports to the Executive Committee on the progress and results of the work performed under the Program of Work.
- Provide an annual technical report to the Annex Participants.
- Provide to the Executive Committee, within six (6) months after completion of all work under the Annex, a final report for its approval and transmittal to the Agency.
- Coordinate the efforts of all Participants and ensure the flow of information in the Annex.
- In coordination with the Participants, use best efforts to avoid duplication with activities of other related programs and projects implemented by or under the auspices of the Agency or by other competent bodies.
- Provide the Participants with the necessary guidelines for the work to be carried out under the Subtasks, for the reports to be made, and for information to be distributed.
- Perform such additional services and actions as may be decided by the Executive Committee, acting by unanimity.

5.3. Subtask leaders

The Subtask leaders shall be participants who bring a high level of expertise to the subtask they manage and who undertake substantial research and development in the field of the

subtask. It is noteworthy that each Subtask has three complementary subtask leaders because of the multidisciplinary nature of all Subtasks and because the case studies have been integrated as part of Subtask 3 and 4.

Table 3: List of Subtask leaders

ST	Subtask leaders
1	Ardeshir Mahdavi, TU Wien, Austria Marcel Schweiker, Karlsruhe Institute of Technology, Germany Julia Day, Washington State University, USA
2	Mikkel Kjaergaard, University of Southern Denmark, Denmark Bing Dong, University of Texas San Antonio, USA Salvatore Carlucci, Norwegian University of Science and Technology, Norway
3	Farhang Tahmasebi, TU Wien, Austria Tianzhen Hong, Lawrence Berkeley National Laboratory, USA Da Yan, Tsinghua University, China
4	Zoltan Nagy, University of Texas Austin, USA Burak Gunay, Carleton University, Canada Clayton Miller, National University of Singapore, Singapore

Duties of the Subtask leaders are:

- Co-ordinate the work performed under the subtask
- Convene and lead Subtask meetings, as required
- Provide semi-annual status reports on progress and results to the Operating Agent and other participants
- Assist in the coordination of the Annex and advise the Operating Agent on the performance of the Annex
- Prepare, edit, and organize the publication of technical reports resulting from the Subtask work
- Assist the Operating Agent in editing the final reports of the Annex

6. TIME SCHEDULE

The schedule is summarized below and in Figure . The formal work period will commence during preparation (approximately one month before) the first Experts' meeting.

Preparation phase: October 2018 – September 2019
Working Phase: October 2019 – September 2022
Reporting Phase: October 2022 – September 2023

First meeting: October 2018

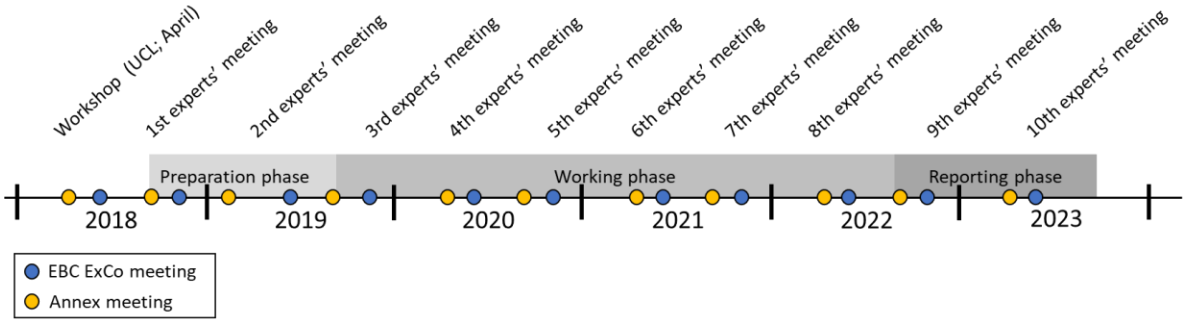

Figure 2: Annex timeline

7. FUNDING

Participation may partly involve funding already allocated to a national activity that falls substantially within the scope of work to be performed under this Annex. Aside from providing the resources required for performing the work of the Subtasks in which they are participating, all Participants are required to commit the resources necessary for activities that are specifically collaborative in nature and would not be part of a national program; for example, establishing common monitoring procedures, preparing for and participating in Annex meetings, coordinating with Subtask participants, and contributing to documentation and information dissemination. These activities are estimated to require at least 50% of the total required level of effort for participation in Subtasks.

The annual meetings shall be hosted in turn by the several Participants. The costs of organizing and hosting meetings shall be borne by the host Participant. Each Participant will bear his/her own costs to travel to the expert meetings. Attendance at expert meetings is mandatory.

The cost of publishing the reports and summary assessments shall be met by the Operating Agent.

All participating countries have access to the workshops and results of all subtasks. Each participating country must designate at least one individual (an active researcher, scientist or engineer, here called expert) for each subtask in which they decide to participate. It is expected that the same expert attends all meetings and acts as technical contact regarding the national subtask contribution. A minimum commitment of six person-months of labor for each year of the Annex term will be required for participation. For the subtask coordinators funding shall allow for six person-months and an extra two person-months per year for Annex activities. Between the two Operating Agents, funding shall allow a total for six person-months and an extra four person-months per year for Annex activities including the attendance at the two ExCo meetings per year.

8. PARTICIPANTS

The following table lists all countries and participants who want to contribute to the proposed Annex and indicates their tentative contributions within the Annex.

Table 4: List of persons who want to contribute to the proposed Annex and their tentative contributions

Australia	Astrid Roetzel	Deakin University	ST3

Australia	Richard de Dear	University of Sydney	ST1
Australia	Dong Chen	CSIRO	ST3
Australia	Flora D. Salim	RMIT, Melbourne	ST2
Austria	Ardeshir Mahdavi (STL1)	Technische Universität Wien	ST1 Leader
Austria	Farhang Tahmasebi (STL3)	Technische Universität Wien	ST3 Leader
Brazil	Roberto Lamberts	Universidade Federal de Santa Catarina	
Brazil	Leticia de Oliveira Neves	University of Campinas	ST1/3
Canada	Adam Rysanek	University of British Columbia	ST3/4
Canada	Azam Khan	Autodesk Research	ST3
Canada	Burak Gunay (STL4)	Carleton University	ST4
Canada	Liam O'Brien (OA)	Carleton University	ST3/OA
Canada	Lindsay McCunn	Vancouver Island University	ST1
Canada	Marianne Touchie	University of Toronto	ST1/3
Canada	Rhys Goldstein	Autodesk Research	ST3
Canada	Terri Peters	Carleton University	ST1/3
Canada	Omid Ardakanian	University of Alberta	ST2
Canada	Sebastian Carrizo	Rowan Williams Davies and Irwin Inc.	ST3
China	Da Yan (STL3)	Tsinghua University	ST3 Leader
China	Yixing Chen	Hunan University	ST2/3
China	Han Zhu	Tongji University	ST1/4
China	Zhengrong Li	Tongji University	ST1/4
Denmark	Mikkel Kjaergaard (STL2)	Southern University of Denmark	ST2 Leader
Denmark	Rune Korsholm Andersen	Technical University of Denmark	ST1/ST3
Germany	Andreas Wagner (OA)	Karlsruhe Institute of Technology	OA
Germany	Marcel Schweiker (STL1)	Karlsruhe Institute of Technology	ST1 Leader
Germany	Christoph van Treeck	RWTH Aachen University	ST3/4
Germany	Daniel Wölki (STL4)	RWTH Aachen University	ST4 Leader
Germany	Romana Markovic	RWTH Aachen University	ST2/4
Hungary	Zsófia Bélafi	DGNB Consultant	ST3
Italy	Verena Barthelmes	Polytechnical University of Torino	ST1
Italy	Marilena De Simone	University of Calabria	ST2
Italy	Stefano Corgnati	Polytechnical University of Torino	ST3/4
Italy	Valentina Fabi	Polytechnical University of Torino	ST3/4

Italy	Wilmer Pasut	Eurac Research	ST1/4
Japan	Yohei Yamaguchi	Osaka University	ST2/3
Netherlands	Ad van der Aa	Cauberg Huygen	ST3
Netherlands	Isabella Gaetani	Eindhoven University of Technology	ST3
Netherlands	Jan Hensen	Eindhoven University of Technology	ST3
Netherlands	Pieter-Jan Hoes	Eindhoven University of Technology	ST3
Netherlands	Peter Op't Veld	Huygen	ST3
Netherlands	Simona D'Oca	Huygen	ST3
Norway	Salvatore Carlucci	Norwegian University of Science and Technology	ST2 Leader
Norway	Vojislav Novakovic	Norwegian University of Science and Technology	ST3
Switzerland	Arno Schlueter	ETH Zurich	ST3/4
UAE	Elie Azar	Masdar Institute of Science and Technology	ST1
UK	David Shipworth	University College London	ST1
UK	Gesche Huebner	University College London	ST1
UK	Stephanie Gauthier	University of Southampton	ST1
UK	Shen Wei	University of Plymouth	ST3/4
UK	Steven Firth	Loughborough University	ST2/3
USA	Bing Dong (STL2)	The University of Texas at San Antonio	ST2 Leader
USA	Chien-fei Chen	University of Tennessee	ST1
USA	Clinton Andrews	Rutgers University	ST1
USA	Julia Day (STL1)	Washington State University	ST1 Leader
USA	Zoltan Nagy (STL4)	University of Texas San Antonio	ST4 Leader
USA	Tianzhen Hong (STL3)	Lawrence Berkeley National Laboratory	ST3 Leader
USA	Jie Zhao	Delos	ST1
USA	Joyce Kim	University of California Berkeley	ST3

9. INFORMATION AND INTELLECTUAL PROPERTY

9.1. Executive Committee's Powers

The publication, distribution, handling, protection, and ownership of information and intellectual property arising from this Annex shall be determined by the Executive Committee, acting by unanimity, in conformity with the Agreement.

9.2. Right to Publish

Subject only to copyright restrictions, the Participants shall have the right to publish all information provided to or arising from this Annex, except proprietary information.

9.3. Proprietary Information

The Participants and the Operating Agents shall take all necessary measures in accordance with this paragraph, the laws of their respective countries, and international law to protect proprietary information provided to or arising from this Annex. For the purposes of this Annex, proprietary information shall mean information of a confidential nature such as trade secrets and "know-how" (for example computer programs, design procedures and techniques, chemical composition of materials, or manufacturing methods, processes, or treatments) that is appropriately marked, provided such information:

- Is not generally known or publicly available from other sources;
- Has not previously been made available by the owner to others without obligation concerning its confidentiality;
- Is not already in the possession of the recipient Participant without obligation concerning its confidentiality.

It shall be the responsibility of each Participant supplying proprietary information, and of the Operating Agents for appraising proprietary information, to identify the information as such and to ensure that it is appropriately marked.

9.4. Arising Information

All information developed in connection with and during activities carried out under this Annex (arising information) shall be provided to each Participant by the Operating Agents, subject only to the need to retain information concerning patentable inventions in confidence until appropriate action can be taken to protect such inventions.

9.5. Production of Relevant Information by Governments

The Operating Agents should encourage the governments of all Agency Participating Countries to make available or to identify to the Operating Agents all published or otherwise freely available information known to them that is relevant to the Annex.

9.6. Production of Available Information by Participants

Each Participant agrees to provide to a Subtask Leader or to the Operating Agents all previously existing information, and information developed independently of the Annex that is needed by a Subtask Leader or by the Operating Agents to carry out its functions under this Annex, and that is freely at the disposal of the Participant and the transmission of which is not subject to any contractual and/or legal limitations:

- If no substantial cost is incurred by the Participant in making such information available, at no charge to the Annex therefore;
- If substantial costs must be incurred by the Participant to make such information available, at such charges to the Annex as shall be agreed between the Operating Agents and the Participant with the approval of the Executive Committee.

9.7. Use of Confidential Information

If a Participant has access to confidential information that would be useful to a Subtask Leader or to the Operating Agents in conducting studies, assessments, analyses, or evaluations, such information may be communicated to a Subtask Leader or to the

Operating Agents, but shall not become part of the reports, handbooks, or other documentation, nor be communicated to the other Participants, except as may be agreed, between the Subtask Leader or the Operating Agents and the Participant who supplies such information.

9.8. Reports on Work Performed under the Annex

The Operating Agents shall provide reports of all work performed under the Annex and the results thereof, including studies, assessments, analyses, evaluations, and other documentation, but excluding proprietary information; prepare the Annex Brochure and updates to EBC Website.

9.9. Copyright

Operating Agents may take appropriate measures to protect copyrightable material generated under this Annex. Copyrights obtained shall be the property of the Operating Agents for the benefit of the Participants provided, however, that the Participants may reproduce and distribute such material. However, if it shall be published for profit, permission should be obtained from the Executive Committee.

9.10. Authors

Each Participant will, without prejudice to any rights of authors under its national laws, take necessary steps to provide the co-operation from its authors required to carry out the provisions of this paragraph. Each Participant will assume the responsibility to pay awards or compensation required to be paid to its employees according to the laws of its country.