Agenda
ASHRAE 2021 Annual Meeting – Stay at home edition
Monday, June 21, 2021
TC 7.1 Integrated Building Design

Scope:
TC 7.1 is concerned with facilitating interaction among all building disciplines, from earliest concept development throughout the building life cycle, in order to achieve integration of design efforts and operation of the total building.

Code of Ethics
As members of ASHRAE or participants in ASHRAE activities, we pledge to act with honesty, fairness, courtesy, competence, integrity and respect for others in our conduct. We will avoid conflicts of interest and behavior that is discriminatory and/or harassing.

Subcommittee Meetings:
Research –Program-Handbook WEB meetings

Voting members

Name	Company	Membership	Voting
Elyse M Malherek	Willdan	Chair / Webmaster / Special Pub	Y
Russell D Taylor	United Technologies Research Center	Vice Chair / Research	Y
Joseph L Furman	Automated Logic	Secretary	Y
Lianne Cockerton	Martin Roy et Associés	Handbook Sub Chair	Y
Suzanne LeViseur	Haddad Engineering, Inc.	Standards Sub Chair	Y
Kevin L Amende	Montana State University	Member	Y
Jason A Atkisson	Affiliated Engineers	Member	Y
David Allen	Allen Consulting	Member, non quorum	
Marianna Vallejo		Program Sub Chair	N
Danielle Monfet		Research Sub Chair	N

1. Call to Order
2. Roll Call
3. Introductions
4. Review of Agenda
5. Approval of Minutes
6. Roster Review
7. Subcommittee reports
    a. Handbook –Lianne Cokerton
    b. Research –Danielle Monfet
        - 1801 - Standardizing and Utilizing ASHRAE Online BIM Data Exchange Protocols – completed before summer meeting
    c. Programs –Marianna Vallejo
    d. Special Publications – Malherek
        - ALI IBD course to align with handbook

- Publication proposed by Howard McKew, A Practitioner's Guide to Management in the Building Industry
- Project facilitator responsibilities/tools/tips/resources

e. Webmaster – Malherek

Old Business

8. TC Title Update
    a. Current Title: Integrated Building Design
    b. Current Scope: TC 7.1 is concerned with facilitating interaction among all building disciplines, from earliest concept development throughout the building lifecycle, in order to achieve integration of design efforts and operation of the total building.
    c. Proposed Title Option 1: Integrated Project Delivery and Building Design
    d. Proposed Title Option 2: Integrated Building Design and Project Delivery
    e. Unchanged Scope
9. TC 7.1 Liaisons to Other Committees:
    a. BIM MTG – Malherek
    b. 205 – (Standard Representation of Performance Simulation Data for HVACR and Other Facility Equipment)
    c. Section 9: TC7.1 liaison to the indicated TC of Section 9:
        - TC9.1 (Large Building Air-Conditioning Building): Romero
        - TC9.4 (Justice Facilities): LeViseur merged with 9.8
        - TC9.6 (Healthcare Facilities): Austin
        - TC9.7 (Educational Facilities): Hammelman
        - TC9.8 (Large building Air-Conditioning Applications): Austin merged with 9.4
        - TC9.10 (Laboratory Systems): Atkinson
        - TC9.11 (Clean Spaces): Mitchell
    d. 1.7 (General Legal Education): Mitchell
    e. 7.2 (Design-Build Lean): Joe Chin and Mitchell
    f. 2.5 – Global Climate Change
    g. 2.8 (Building Environmental Impacts and Sustainability): Julianna Pellegrini
10. ASHRAE reorganization update

New Business

11. Putting IPD requirements in codes (see email from 189.1 and appendix F from standard)
12. Open discussion on industry and experience for IBD or IPD
13. Other
14. **Next Meeting:** Las Vegas, NV, January 29 – February 2, 2022

I am on a working group within SSPC 189.1, the committee maintaining Standard 189.1, that is looking at revisions to an Informative Appendix on Integrated Design in the Standard.
Costas Balaras (from Athens Greece) gave me your contact information and those copied here as he said he had attended the virtual TC 7.1 meeting last January.
I have been involved with the 189.1 Standard since the beginning and although we wanted to find a way to somehow 'require' Integrated Design (for a high-performance building), but could not find a good method for that and thus we settled for this Informative Appendix F.

We are reconsidering this issue now again. Issues we are dealing with include:

- How to incentivize the use of Integrated Design (actually a Code either requires or forbids something, so it will need to be more along those lines)?
- Where in the Standard would we put a reference to such a requirement?
- How to adapt to the various building project delivery mechanisms (design-bid-build, etc.)?

Among others.

We were wondering if TC 7.1 has considered issues like this, in particular how it would fit into a Standard and then a Code, and would be interested in hearing your thoughts.
If there are good points/suggestions to pass on, perhaps someone from the TC could present them to the next working group meeting we will have (sometime in July, date and time TBD).
Thank you,

Tom Lawrence, Ph.D., P.E.

(This appendix is not part of this standard. It is merely informative and does not contain requirements necessary for conformance to the standard. It has not been processed according to the ANSI requirements for a standard and may contain material that has not been subject to public review or a consensus process. Unresolved objectors on informative material are not offered the right to appeal at ASHRAE or ANSI.)

INFORMATIVE APPENDIX F

INTEGRATED DESIGN

F1. INTEGRATED DESIGN PROCESS/INTEGRATED PROJECT DELIVERY

Integrated design, and related concepts such as integrated project delivery and integrative design, leverages early stakeholder collaboration through the sharing of knowledge and expertise among project team members to develop stronger, more balanced design solutions. This integrated design process stands in contrast to traditional design methods, where there is limited use of the skills and knowledge of all stakeholders. An integrated design process provides increased predictability of project outcomes earlier and enables the construction of high-performance green buildings that consume fewer resources and provide better comfort and functionality.

Integrated design introduces major issues and key participants into the project early, where more opportunities occur for creative problem solving. The complex interactions of sophisticated building systems require early coordination to maximize their effectiveness and output.

Early team building and goal setting may also reduce total project costs. The collaborative process can inform building envelope, mechanical, electrical, plumbing, and other building system design. The later in the design process that systems are introduced, the more expensive their implementation will be. Information technology can also be a valuable asset in increasing predictability of outcomes earlier in the project and is recommended for all integrated teams.

In contrast with a linear design process, which addresses problems sequentially, an integrated process approaches each problem with input from the various viewpoints of the participants and the domains they represent, circling back after each design decision to collectively evaluate the impact on all stakeholders. This process acknowledges the complex interdependency of building systems and their relationship to resource consumption and occupant well being.

Several existing, and currently evolving, models for collaboration should be considered, including ASHRAE Handbook—HVAC Applications, Chapter 57; the MTS 1.0 WSIP Guide, Whole Systems Integrated Process Guide for Sustainable Buildings and Communities; and Integrated Project Delivery: A Guide by the AIA and AIA California Council.

Project-specific integrated design and/or integrated project delivery processes should be determined with full participation of the stakeholder team. What works for one project may not be the best approach for the next. Additionally, the team should collectively identify the performance standards and the associated metrics by which project success will be evaluated. Design charrettes of varying duration may be an effective tool to consider, though ultimately it is the responsibility of the stakeholder team to determine the process that will best fit a specific problem or project.

F1.1 Design Charrette. The following outlines one type of design charrette process that resulted in a successful integrated design. A charrette process can be initiated at the initial stages of building design, and the members of the process should include all stakeholders.

F1.1.1 Charrette Process. Experienced personnel representing each specialty should participate in the charrette process. A discussion of all systems and all items that affect the integrated design should be discussed. Stakeholders should be able to decide and vote on the best integrated system.

The integrative team process should entail the following steps of design optimization:

a. The original goals and budget of the project should be revisited to see whether the overall intentions of the project are intact.
b. The project should be compared with this standard or at least one existing green rating system.
c. Each of the building and site components should be scrutinized to help ensure that natural systems for energy conservation, lighting, ventilation, and passive heating and cooling are maximized before mechanical systems are engaged.
d. The appropriateness and integration logic of the building's primary systems should be confirmed.
e. The impact of the design on the site and its larger context should be evaluated, including the environmental impact on a life-cycle cost basis.
f. Building information modeling (BIM) software, design tools, and the experience of the design team should be used, where practical, to help optimize the design.
g. All members of the design team should be included when making design decisions.
h. Commissioning and consideration of future operation and maintenance (O&M) requirements should be included within the design optimization process.

F1.1.2 Design Charrette Matrix. At the end of the charrette process, a matrix for each proposed building scheme can be developed and evaluated to summarize the impact on the site, water, energy, materials, and indoor environmental quality and to help in deciding on the best integrated system. The matrix contains cells indicating the high-performance value, grading a particular building system to its appropriate high-performance criteria. Each high-performance value is qualitatively rated from 1 to 10, with 1 being the lowest (minimal energy savings, low air quality, low water efficiency, high cost) and 10 being the highest (high energy savings, high air quality, high water efficiency, low cost). The average of the high-performance values for each building system is the aggregate index. Selection of the best system should be based on a comparison of the aggregate indices for each matrix.

Scheme #1—with Atrium, maximum exposure on the south, three-story office building.

	High-Performance Criteria						
Building System	**Site**	**IAQ**	**IEQ**	**Energy**	**Comm. M&V**	**Initial Cost**	**O & M**
Arch	8	7	6	1	6	1	6
HVAC	—	5	6	2	6	2	7
Plumbing	NA	—	—	—	—	2	7
Structural	—	—	—	—	—	2	
Aggregate index	8	6	6	1.5	6	2	6.8

Result:
Least numbers under energy and cost column defines consumption of substantial energy with high initial cost.

Scheme #2—without Atrium, three-story, minimum exposure on the south and west side.

	High-Performance Criteria						
Building System	**Site**	**IAQ**	**IEQ**	**Energy**	**Comm. M&V**	**Initial Cost**	**O & M**
Arch	6	7	7	7	7	7	6
HVAC	NA	5	7	7	7	7	7
Plumbing	NA	—	—	—	7	7	7
Structural	—	—	—	—	—		
Aggregate index	6	6	7	7	7	7	6.8

Result:
High numbers on all columns indicate the building is conceived optimally.

Figure F-1 Sample charrette design matrices.