Design for Great Technology

October 2008

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The International Association of Conference Centers (IACC) is a not-for-profit organization founded in 1981 to advance understanding and awareness of conference centers as distinct and unique within the training, education, hospitality and travel fields. IACC's mission is to assist members in providing the most productive meeting facilities available and to promote a market awareness of the differences between conference center facilities and other types of hospitality venues.

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DESIGN FOR GREAT TECHNOLOGY

The Board of Directors of the International Association of Conference Centers (IACC) formed the Technology Advisory Task Force in early 2008. Chaired by Kevin Rupp, general manager for Benchmark Hospitality International at The Council House and Wingspread, the Task Force also includes other IACC members: Bob Cohen, vice president of sales for PSAV; Chris Donaldson, then director of Multi Media Services; Jeff Loether, president of Electro-Media Design; and Mike Dickersbach, vice president of information systems for Thayer Lodging Group. Because of the likely impact of this group's work on the Quality Committee and IACC's Universal Criteria, Chris Hayes serves as liaison between the Quality Committee, which he chairs, and the Task Force.

The major objective of the Task Force is to review and analyze those portions of IACC's Universal Criteria that deal with technology. Because the variety, convenience and accessibility of technology have grown exponentially over the past ten years—as well as customer's expectations for its availability in first-class meeting environments—IACC needs to periodically address the issue of how much and what levels of technology we require members to provide to their customers.

The Board asked the Task Force to propose specific changes to IACC's Universal Criteria based on their expertise, research and discussions. With the *Design for Great Technology*, they have done so. In addition, the group has brought IACC forward by leaps and bounds. This document, which represents the culmination of the Task Force's work to date, outlines various levels of conference technology for different sizes and types of meeting rooms.

The purpose of the *Design for Great Technology* is five-fold: (1) to serve the conference center industry as a reference that highlights three levels of technology for meeting rooms and conference centers generally; (2) to serve as a benchmarking tool and blueprint for assessing the current state of technology at a facility and for incorporating the minimum or a higher level of the recommendations here; (3) to provide designers and developers with a handy and specific tool for new conference center projects; (4) to provide recommendations for the direction IACC should take in steering the industry on the technology front; and (5) to serve as a starting point for all facilities to see what technologies are available in the marketplace—even though some may not be applicable to every IACC-member conference center. The Task Force plans to regularly review the technology marketplace and technological trends as part of future updates to the *Design for Great Technology*.

As a beginning, the Task Force classified meeting rooms according to size and function. This is a departure from IACC's past way of describing meeting rooms in only two varieties—dedicated and multi-function. The Quality Committee has embraced this new perspective and the industry should expect future updates to the Universal Criteria and Recommended Guidelines to adhere more closely to this framework than they have in the past.

MEETING ROOM SIZES/TYPES

I. *Dedicated Meeting Rooms*

A. Small Breakout Rooms
(up to approximately 55 square metres or 600 square feet)

B. Large Breakout Rooms, Small Conference/Meeting Rooms, and Boardrooms with flexible furnishings
(approximately 45-120 m^2 or 500-1,250 sq. ft.)

C. Medium-Sized Conference/Meeting Rooms with fixed walls (approximately 95-165 m^2 or 1,000-1,750 sq. ft.)

II. *Multi-Use Rooms**

D. Large Conference/Meeting Rooms and Junior Ballrooms with or without moveable walls
(approximately 135 m^2 or 1,500 sq. ft. and more)

E. Grand Ballrooms and Large Multi-Purpose, Flexible Function Rooms (approximately 275 m^2 or 3,000 sq. ft. and more)

III. *Specialized Meeting Rooms*

F. High-Tech, High-Finish Board and Video-Teleconferencing Rooms with fixed furnishings
(approximately 35-120 m^2 or 400-1,250 sq. ft.)

G. Sloped-Floor or Tiered Auditoriums with or without fixed furnishings (approximately 135 m^2 or 1,500 sq. ft. and more)

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* IACC has traditionally made allowance for "multi-use" rooms to be considered as dedicated conference rooms. We do this only under the following circumstances. (1) These rooms **must** meet all of IACC's Criteria for conference room design; and (2) they **must** be used primarily (or better than half the time they are in use) for conference-style meetings.

As conference center operators and designers consider these guidelines, they should not focus too much on room size but think more about the typical functionality of the room. There is, in fact, a deliberate overlap between sizes of various room types. A conference center should be flexible even down to this level. While many conference groups might never need a room of more than 500 square feet ($45m^2$) for breakouts, some larger groups might require breakouts of 1,000 square feet ($95m^2$) or more.

It is also possible that rooms of the same size may be used for different purposes in separate geographic locales. The more populous an area, the likelier a facility will need larger rooms at each functional level. That's why the sizes indicated here are merely approximations. Each conference center must do what is appropriate for its particular clientele. That notion is woven into the fabric of this document—as well as the fundamentals of IACC's "conference center concept." If customers arrive with an expectation that the same sorts of technology they're accustomed to in the workplace and at home will be available at an IACC conference center, they should have those expectations met—at least at the basic level.

High-tech installations at IACC-member facilities. Upper left and lower right: Boardroom and flat panel displays with HD wide-angle camera and point-source speakers for video-teleconferencing at a private facility in Racine, Wisconsin. Upper right and lower left: View across auditorium with delegate communications panel in foreground and view from simultaneous interpretation booth at SFU Morris J Wosk Centre for Dialogue in Vancouver, British Columbia.

MATRIX: APPLIED TECHNOLOGIES

In the following Matrix, the Technology Task Force and IACC's Quality Committee have specified certain equipment as basic (B), medium (M), or high-level (H) technology, depending on the general functionality of a specific meeting room (as described in the outline of room types above). Each of the Recommended Technologies on the left of the matrix is expanded in the final section of this document so that conference center operators and others can understand the basic function and use of any particular recommendation.

Matrix for Applying Technology by Meeting Room Size/Type

RECOMMENDED TECHNOLOGY			I. *Dedicated Conference Rooms*			II. *Multi-Use Rooms*		III. *Specialized Meeting Rooms*	
			A. Small Breakout Rooms	B. Large Breakout Rooms, Small Conference/Meeting Rooms and Boardrooms with flexible furnishings	C. Medium-Sized Conference/Meeting Rooms with fixed walls	D. Large Conference/ Meeting Rooms and Junior Ballrooms with or without moveable walls	E. Grand Ballrooms and Large Multi-Purpose, Flexible Function Rooms	F. High-Tech, High-Finish Board and Video-Teleconferencing Rooms with fixed furnishings	G. Sloped-Floor or Tiered Auditoriums with or without fixed furnishings
B = Basic level	*M = Medium level*	*H = High level*	(up to approximately 55 m^2 or 600 sq. ft.)	(approximately 45-120 m^2 or 500-1,250 sq. ft.)	(approximately 93-165 m^2 or 1,000-1,750 sq. ft.)	(approximately 135 m^2 or 1,500 sq. ft. and more)	(approximately 275 m^2 or 3,000 sq. ft. and more)	(approximately 35-120 m^2 or 400-1,250 sq. ft.)	(approximately 135 m^2 or 1,500 sq. ft. and more)
I. INFRASTRUCTURE									
1. Power, phone and simultaneous Internet access	1a. Multiple power outlets	1A-1. Available throughout room	B	B	B	B	B	B	B
		1A-2. At least one outlet per wall	H	M	M	M	M	M	M
	1b. Phone connection(s) and high-speed Internet service	1B-1. At least one access point	B					B	
		1B-2. Minimum two access points		B	B	B	B		B
	2. Tie lines to central control		M	M	M	M	M	M	M
3. Floor access to power and data tie lines	3a. Through at least one floor box		M	M	–	–	–	M	–
	3b. Through at least one floor box for every 500 sq. ft. (45m2) of area		–	–	M	M	M	–	M
	4. Cable trunking access and/or cable management (ceiling and/or floor)		–	–	–	–	H	–	M
5. AV input-output connections	5a. Through at least one access plate at apparent front of room		–	–	B	B	B	B	B
	5b. Through at least one access plate built into table(s)		–	–	–	–	–	B	–
	5c. Through an increased quantity of access plates		–	–	H	H	M	–	M
6. Digital, programmable control system	6a. With in-room control panel		–	–	M	M	–	–	–
	6b. And/or with optional portable control panel(s) (wired and/or wireless)		–	–	H	H	H	M	M
7. Rigging points	7a. Fixed 500-lb. (225kg) live-load in rooms with ceiling heights above 12 ft. (4m)		–	–	–	H	B	–	–
	7b. Banner track or lightweight hang track	7B-1. Around periphery (4 walls including operable partitions)	–	–	–	H	M	–	–
		7B-2. Along side walls (2 walls)	–	–	–	–	–	–	M
	8. Show power access at front wall(s) and platform locations		–	–	–	H	B	–	–
	9. Control booth at rear of room		–	–	–	H	M	–	M

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II. COMMUNICATIONS									
10. High-Speed Internet Access (HSIA)	10a. Wired OR wireless connections		B	B	B	B	B	B	B
	10b. Wired AND wireless connections		M	M	M	M	M	M	M
	10c. Wired jacks and power at every seat		–	–	–	–	–	–	B
	11. Built-in telephone hybrid with sound system		–	–	H	H	H	B	B
12. Video tele-conferencing (VTC)	12a. Through portable or built-in system		–	H	H	H	H	–	M
	12b. With robotic video cameras		–	–	–	–	–	M	M
	13. Webcast, simulcast, digital events		–	–	–	–	–	M	M
14. Listening systems	14a. For assisted listening		H	M	B	B	B	B	B
	14b. For simultaneous interpretation of multiple languages		–	–	–	–	–	–	H
	15. Audience response system with polling/voting feature		–	–	–	–	–	H	H
III. AUDIO/ACOUSTICS									
16. Background Noise Criteria (NC) falls between 25 and 35	16a. Maximum of 25 NC		–	–	–	–	–	B	M
	16b. Range of 25 - 30 NC		B	B	B	M	M	–	B
	16c. Range of 30 - 35 NC		–	–	–	B	B	–	–
17. Acoustic treatments	17a. To reduce reverberation time (RT) and eliminate echo on fixed walls and operable partition(s) when present	17A-1. Range of 0.8 - 1.0 RT	B	B	B	M	H	B	M
		17A-2. Range of 1.0 - 1.2 RT	–	–	–	B	B	–	B
	17b. To ensure that Noise Isolation Class (NIC) of walls is 50 or higher	17B-1. All fixed walls achieve range of 50 - 60 NIC	B	B	B	B	B	B	B
		17B-2. All operable walls achieve range of 50 - 55 NIC	–	–	–	B	B	–	–
18. Speaker/sound systems	18a. Voice reinforcement system with microphone input and in-room controls	18A-1. Built-in sound system(s)	–	M	B	B	B	M	B
		18A-2. Ceiling speaker sound systems		H	M	M	M	H	M
	18b. Point-source speakers built in at main display/screen		H	H	M	M	M	B	B

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	18c. Surround sound speakers for program audio	–	–	–	–	–	H	M
	18d. Cluster voice sound system	–	–	–	–	–	–	M
	19.Digital sound processing (DSP) with digital control system	–	–	–	–	B	B	B
20. Audio input systems	20a. Built-in ceiling microphone(s) for monitoring and audio recording	–	–	H	H	–	M	M
	20b. Hot room or mix-minus sound system	–	–	H	H	–	H	H
	20c. Audience or delegate microphone management system	–	–	–	–	–	–	M
	20d. Microphones for video-teleconferencing	–	–	–	–	–	M	M
IV. LIGHTING/VISUAL/VIDEO								
21. Built-in blackout curtains where windows are present	21a. Manually or electrically operated	B	B	B	B	–	–	–
	21b. Electrically operated only	–	–	–	–	B	B	B
	22. Zone-controlled, fully dimmable lighting	M	M	B	B	B	–	B
23. Feature lighting with independent controls	23a. Targetable fixtures	–	H	B	B	B	B	B
	23b. Retractable fixtures with tech power and tie lines	–	–	H	M	M	M	M
24. Programmable lighting with in-room control panel	24a. And at least one panel per separable portion of room	H	H	M	B	–	B	B
	24b. And each panel manages one separable portion of room PLUS all adjacent portions	–	–	–	–	B	–	–
25. Retractable image-display screen	25a. At least one manually or electrically operated screen	M	M	–	–	–	–	–
	25b. At least one electrically operated screen	–	–	B	M	H	B	B

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26. Built-in remote-input computer/video-image display system	26a. With at least one front projector that has minimum output of 2,000 lumens	26A-1. And at least one remote input at front of room	H	B	–	–	–		–
		26A-2. And at least two remote inputs at front and rear of room	–	–	–	–	–	B	–
	26b. With at least one front projector that has minimum output of 3,000 lumens and at least one remote input at front of room	26B-1. Plus ceiling-mounted pole or other fixed support	–	–	B	M	–	–	–
		26B-2. Plus retractable projector lift	–	–	–	H	M	–	–
	26c. With at least one front projector that has minimum output of 4,000 lumens, at least two remote inputs at front and rear of room, and retractable projection platform		–	–	–	–	M	–	B
	26d. Rear projection	26D-1. With projector having minimum output of 2,000 lumens	–	–	–	–	–	M	–
		26D-2. With projector having minimum output of 4,000 lumens	–	–	–	H	H	–	M
		26D-3. And with capability to conceal screen	–	–	–	H	H	–	
	26e. High definition equipment	26E-1. With at least one view screen	–	–	H	H	H	–	–
		26E-2. With multiple view screens	–	–	–	–	–	H	H
	26f. Flat-panel LCD display with remote input		H	M	M	–	–	–	–
	27. Multiple inputs for image-display system(s)		–	H	M	M	M	B	B
	28. Web cameras with built-in monitoring from central control room		–	–	H	H	H	–	–
	29. Interactive computer display/ interactive lectern		–	–	H	H	–	M	M
V. SECURITY									
	30. Electronically auditable door lock(s)		H	H	M	M	M	M	M
VI. ON-SITE PRODUCTION SERVICES									
	31. Recording, production and post-production capabilities		H	H	M	M	M	M	M

TECHNOLOGIES

The total meeting environment today must naturally provide a minimum level of technology to support a successful meeting. Because the best possible environment for meetings and adult learning experiences is exactly what every IACC-member conference center strives to deliver, all dedicated conference space should have interior architecture, sufficient power accessibility, signal infrastructure, design elements and physical arrangement to support the convenient and unobstructed use of all up-to-date portable equipment for audio-visual presentation technologies.

Almost since its inception, the International Association of Conference Centers has stipulated that certain technologies will be available at member conference facilities. For instance, though most of us wouldn't think of it as technology *per se*, the requirement that conference centers provide flip charts and wall surfaces where the sheets can be hung accommodates two interrelated technologies—writing and publishing (albeit not in a permanent or very public way). With the *Design for Great Technology*, IACC focuses its attention on a wide variety of technologies much more intensively than ever before.

Through the Matrix above and the following descriptions of recommended technologies, we have provided a blueprint for members to create a first-class learning environment for guests. Further, we we've tried to clarify some of the vagueness that suffuses the generic term "technology." We believe this document gives the industry a great basis for building on the fundamentals in IACC's Universal Criteria and Recommended Guidelines. And we propose that it prepares IACC to approach the future with both the utilitarianism and flexibility that the day-to-day influx of new technologies demands.

The terms that follow are subdivided and numbered to correspond with the Matrix. All starred terms (most of them acronyms) are further explained in the glossary at the end of this section.

I. Infrastructure

1. **Power, phone and simultaneous Internet access:** Conference centers provide power outlets and at least one communications access point in all meeting/event spaces. Power, voice and data connections may be available on walls or in floor boxes and at least some power and communications access should be available through floor boxes in larger rooms (see #3 below). In order to support High-Speed Internet Access (HSIA*) service, cabling for data connections should be Category-6 (CAT6*) copper and may also include multi-mode optical fiber.

   A) **Multiple power outlets** . . .

      i) **Available throughout room:** In order to minimize lengthy power cord runs, power outlets should be located around the periphery of smaller rooms and throughout larger rooms

      ii) At least **one outlet per wall:** Within all but the smallest breakout rooms, conference centers locate at least one power outlet on or near each wall with no more than 20 feet (6m) between outlets on sections of wall longer than 30 feet (9m).

B) **Phone connection(s) and High-Speed Internet (HSIA*) service** . . .

i) At least **one access point.**

ii) **Minimum two access points:** In all meeting rooms larger than 55m^2 (600 sq. ft.), phone and Internet connections should be located on opposite walls at the ends of the longest dimension of rooms, as well as along side walls of rooms longer than 50 feet (15m).

2. **Tie lines to central control:** Within all but the smallest breakout rooms, conference centers provide patch panels that can connect multiple devices to a central control room or—at a minimum—to the nearest data and technology network closet. All patch panels should include at least two cable runs each of low-skew Category-5E (CAT5E*) copper cabling for transmitting audio-video signals, fiber-optic* (multi-mode) digital cabling, plus analog audio and video circuits. Conference centers may employ these cables (i) to interconnect any combination of meeting/event spaces with each other; (ii) to route telephone and data services to any meeting/event space; (iii) to control or monitor recordings of meetings/events; and/or (iv) to avoid taping cables across floors (which can potentially lead to liability concerns).

3. **Floor access to power and data tie lines:** Particularly in rooms that include operable partition walls, conference centers provide AV/tech tie lines and network connections with adjacent power outlets . . .

A) Through **at least one floor box** or pocket per meeting/event space.

B) Through at least one floor box or pocket **for every 500 sq. ft. (45m^2) of area** per meeting/event space in rooms larger than 1000 sq. ft. (95m^2).

4. **Cable trunking access and/or cable management (ceiling and/or floor):** Conference centers provide an easily accessible means of running and properly supporting cables from point to point. Cable trunking can serve temporary or permanent cables, or both. Typical trunking methods run cables (i) through center-hung cable trays or "J" hooks above the ceilings of meeting/event spaces and service corridors, (ii) through troughs or trenches with embedded empty conduit in floors, and (iii) up or down walls through conduit.

5. **AV input-output connections:** Conference centers accommodate a wide variety of room arrangements by making analog and digital AV inputs and analog AV outputs available . . .

A) Through at least **one access plate** at the apparent front of the meeting/event space.

B) Through at least one access plate **built into boardroom, conference or auditorium tables**, if applicable.

C) Through an **increased quantity of access plates:** Particularly in rooms larger than 1,000 square feet (95m^2), conference centers install AV input-output access plates at the base of all podiums and lecterns, on the floor of stage areas, and/or in the top of boardroom tables and presenter consoles (e.g., the "head table" in an auditorium with fixed furnishings). Circuits and power should be accessible without the need to run cables past any service or public entrance. Alongside or no more than 20 inches (50cm) from any AV input-output connection plate, the conference center should also install an associated power outlet.

6. **Digital, programmable control system:** Conference centers provide electronic controls that (i) interconnect all built-in analog and digital audio and visual systems within a meeting/event space and (ii) give users synchronized, intuitive access and control for all anticipated functions of these systems. Such controls may also interface with environmental elements of the room such as window drapes or shades, programmable lighting and dimming systems, etc. . . .

   A) With **in-room control panel.**

   B) And/or with optional **portable control panel(s)** (wired and/or wireless).

7. **Rigging points consisting of . . .**

   A) **Fixed support for 500-pound (225kg) live-load in rooms with ceiling heights above 12 feet (4m):** Conference centers attach load-rated support hardware to the building structure in order to support theatrical and production stagecraft equipment such as loaded trusses in meeting/event spaces where such equipment may be required. (See also item #23B below.)

   B) **Banner track or lightweight hang track:** Conference centers provide structural steel channels on ceilings of meeting/event spaces where they may be required. These tracks permit the easy installation of specially designed hooks or "eyes" anywhere along the length of the channel. The conference center can suspend banners, curtains, posters, scenery elements, or other hanging features from these tracks without damage to millwork or other interior surfaces . . .

      i) **Around periphery of room** (4 walls), whether or not "walls" are defined as operable partitions, in which case tracks flank both sides of partition track, as well as all fixed walls.

      ii) **Along side walls of room** (2 walls).

8. **Show power access at front wall(s) and platform locations:** Conference centers provide heavy three-phase electrical service that can power theatrical lighting systems for large and/or staged events and productions. Depending on the size of the meeting/event space, show power could range between 50 and 400 amps.

9. **Control booth at rear of room:** Under appropriate circumstances, conference centers build a mezzanine-level AV technology control booth into the rear of at least their largest meeting/event space and/or into the rear of the highest level of their tiered or slope-floored auditorium(s). The control booth allows the facility to accommodate meetings and events that require sophisticated, highly-produced programs. From the control booth, a minimum of two audio, lighting and video technicians/engineers manage and control house systems and/or rented equipment that is used in the production of programs and events. Through an unglazed but concealable (or shutter-able) opening on the wall opposite the staging/production area, all seats in the control booth have full view—unobstructed by soffits, chandeliers and/or other lighting units—of potential stage or other program area(s) plus unobstructed access to the set(s) of equipment which a given technician operates. In addition to technicians and/or engineers, very highly produced programs may require control booth seats for a producer and/or a technical director as well as one or more follow-spot operators. To handle this many people, the control booth should be at least 9-feet (3m) deep by 20-feet (7m) wide and the opening into the meeting/event space should be a minimum of 12-feet (4m) wide by at least 4-feet (1.35m) high starting from a position 3-feet (1m) above the control

booth floor and extending almost to the ceiling of the room. Unless the conference center has all the necessary production equipment on site, ease of access between the control booth and a load-in/out door and dock, plus nearby storage space for equipment cases/crating are important considerations.

II. Communications

10. **High-Speed Internet Access (HSIA*) . . .**

    A) **Wired OR wireless connections:** Conference centers provide High-Speed Internet service in all meeting/event spaces.

    B) **Wired AND wireless connections:** Security concerns often make wired connections indispensible in conference center meeting facilities because many current government and corporate policies prohibit employees from using wireless technologies for purposes of work. Conference centers provide wireless Internet access, too, because many guests now expect wireless service in both guest rooms and meeting/event spaces.

    C) **Wired jacks and power at every seat:** When conference centers include meeting/event spaces such as amphitheaters, dedicated video/teleconferencing facilities and/or boardrooms that have fixed furnishings, they install wired HSIA* jacks and electrical power at every seat.

11. **Built-in telephone hybrid with sound system:** To serve teleconferencing needs from meeting/event spaces with built-in sound systems, conference centers provide at least one device that connects ceiling speakers and microphone pick-ups directly to the telephone system. In any room where the hybrid device is used, it essentially turns the built-in sound system into a very large speaker phone. Under appropriate circumstances, facilities that have multiple rooms with built-in sound systems may require more than one telephone hybrid device.

12. **Video-teleconferencing (VTC*) . . .**

    A) **Through portable or built-in system:** Conference centers provide at least one video-teleconferencing codec with dedicated or integrated camera, lighting elements, connectivity devices and other equipment (regarding microphones, see also #20C & D below) to accommodate interconnection with distant locations for teleconferences that incorporate live video images. On-site infrastructure should accommodate both IP*-based and switched-network (3xISDN*, T1*) telephone services. Under appropriate circumstances, conference centers outfit one or more meeting/event spaces with built-in video-teleconference equipment and support (such as lighting elements and telephone hybrid systems).

    B) **With robotic video cameras:** Under appropriate circumstances, conference centers provide at least one meeting/event space with built-in video cameras that a technician who is not in the room can operate to pan, tilt, zoom, focus, etc. In this way, the use of video cameras is less intrusive and distracting than when in-room operator(s) are required. Moreover, such cameras can serve multiple purposes for image magnification, archival recording, webcasting, video teleconferencing and/or distance learning.

13. **Webcast, simulcast, digital events:** Conference centers provide production equipment and personnel that can serve distance-learning, video- and audio-teleconferencing, webcasting, broadcasting, and/or online on-demand services—among other possible functions.

14. **Listening system(s) . . .**

    A) **For assisted listening**: At a minimum, conference centers have immediately available portable assisted listening devices or systems that can convey live spoken language directly to headphones worn by individual audience members who may be hearing impaired. Available wireless transmission technologies for such devices are either radio frequency (RF*) or infrared (IR*), each of which has its advantages and disadvantages. In the U.S., assisted listening equipment is required by the Americans with Disabilities Act (ADA).

    B) **For simultaneous interpretation of multiple languages:** Under appropriate circumstances, conference centers provide equipment that accommodates translation/interpretation of live spoken language during ongoing events. Each language to be accommodated requires a separate soundproof booth for two interpreters. These systems incorporate headphones and receivers in order for audience members/participants to hear the interpreters and, like assisted listening systems, may employ RF* or IR* broadcast technology.

15. **Audience response system with polling/voting features:** Under appropriate circumstances, conference centers provide the means to elicit feedback and other direct input from audience members. An audience response system serves groups that need to poll participants individually and/or anonymously during the course of an event. Independent systems are usually portable and wireless, but polling/voting features may be built into other technologies as well.

III. Audio/Acoustics

16. **Background Noise Criteria (NC) falls between 25 and 35:** In adult learning environments, it is important to maintain low ambient noise levels without making rooms too quiet. In all meeting/event spaces, conference centers control the loudness of background noise generated (i) by heating, ventilating, and air conditioning systems (HVAC); (ii) by pedestrian traffic and other activities in adjacent public hallways or service corridors; and (iii) by intrusion of outside noises through walls, floors, ceilings, windows and doorways. The latter two of these can best be accomplished during construction by installing adequate soundproofing. But, because HVAC systems are the most frequent culprit in creating excess ambient noise, these systems and all ventilation ductwork should be regularly monitored and maintained to dampen unwanted sound from those sources.

    A) And specialized meeting rooms achieve **maximum of 25 NC**.

    B) And dedicated conference rooms achieve a **range of 25 – 30 NC**.

    C) And multi-use rooms achieve a **range of 30 – 35 NC**.

17. **Acoustic treatments . . .**

    A). **To reduce Reverberation Time (RT) and eliminate echo on fixed walls and operable partition(s) if present:** "Reverberation" describes the tendency of sound energy to linger in a room for a period of time before it is absorbed while "echo" describes discrete reflection(s) of a given sound so that the listener

hears that same sound more than once. Reverberation Time (RT) should fall between 0.8 and 1.2 seconds at mid-frequencies. Conference centers control unwanted reverberation and/or echo by absorbing the excess sound energy within the meeting/event space. Most practically, such absorption is accomplished by installing fabric-wrapped, acoustically absorptive panels on wall surfaces starting at approximately 3 feet (1m) above the floor and running at least 7.75 feet (2.5m) up the wall from that point.

i) And at least dedicated conference rooms achieve a **range of 0.8 – 1.0 RT**.

ii) And larger event/meeting spaces achieve a **range of 1.0 – 1.2 RT**.

B) **To ensure that Noise Isolation Class (NIC) of walls is 50 or higher:** Conference centers must isolate all meeting/event spaces—or portions of a room equipped with operable partition(s)—so that objectionable levels of outside noise cannot bleed through the walls or ceiling and disturb proceedings inside the room.

i) **And all fixed walls achieve range of 50 – 60 NIC:** As with ambient noise (see also #16 above), outside noise may be caused (i) by pedestrian traffic and other activities in adjacent public hallways or service corridors and/or (ii) by intrusion of sound from the exterior of the building through walls, floors, ceilings, windows and doorways. Conference centers are consequently built with sufficient soundproofing in order to achieve the desired NIC.

ii) **And all operable walls achieve range of 50 – 55 NIC:** Whenever a meeting/event space can be apportioned by moving a partition wall, conference centers isolate resulting portions of the room from sound bleed through operable partitions as well as from external noise through fixed walls. To accomplish the desired NIC range for operable walls, conference centers must invest in the highest quality partition walls. Further, they must properly construct and maintain the installation (i) by sealing the partition track to the structure above and below, (ii) by providing adequate baffling at end walls in order to prevent sound from flanking the partition, and (iii) by regular and proper adjustment and ongoing maintenance of all seals and baffles.

18. **Speaker/sound systems . . .**

A) **Voice reinforcement system with microphone input and in-room controls**:

i) To reinforce the voices of presenters, conference centers provide **built-in sound systems** in all meeting/event spaces larger than 95m^2 (1,000 sq. ft.). (See also "audio input systems" at #20 below.)

ii) Because **ceiling speaker sound systems** provide greatest aural intelligibility for voices in typical adult learning environments, conference centers evenly distribute speakers across the area of a room's ceiling

B) **Point-source speakers built in at main image-display screen:** Though ceiling speakers provide best intelligibility for words generated within a room, sound associated with displayed images seems more natural when broadcast from speakers located near the display. Under appropriate circumstances, conference centers install wall- or surface-mounted speakers (usually left and right integrated stereo) to flank either side of the main video projection screen and/or display. These speakers broadcast audio portions of visual programs from DVDs,

television or other sources. In addition, video-teleconference channels can be fed through these speakers to reinforce the broadcast of voices from outside the room to listeners inside.

C) **Surround sound speakers for program audio:** Under appropriate circumstances, conference centers install more sophisticated audio playback systems similar to those used in home or commercial theaters. Such installations, however, require detailed attention to the acoustical environment of the meeting/event space.

D) **Cluster voice sound system:** Under appropriate circumstances, conference centers install sound systems that place engineered speakers over the presenter's head and aim audio signals into the audience space from above. Such sound systems provide the most natural sounding voice reinforcement, but the cluster speaker system operates best in meeting/event spaces with relatively high ceilings and exceptionally good acoustics.

19. **Digital sound processing (DSP*) with digital control system:** DSP sound systems perform multiple functions with a minimum of processing equipment. In contrast, analog systems require several separate devices to perform the same set of functions (e.g., mixer, equalizer, compressor, etc). Conference centers install sound systems that have integrated digital processing capabilities. An additional advantage of DSP systems is that users can easily control them with digital remote controls.

20. **Audio input systems . . .**

A) **Built-in ceiling microphone(s) for monitoring and audio recording:** Conference centers install microphones in the ceilings of meeting/event spaces in order to make it possible for control room technicians to audit and record proceedings in the room. When properly designed and installed, such audio pick-up systems can provide detailed recordings of audience interaction as well as presenter input. Such systems are particularly appropriate if video cameras are also built into the room for monitoring and video recording. In addition, wireless options for this solution are available when the system is appropriately designed. Rooms with such systems also make ideal spaces for tele-training and/or distance-learning sessions.

B) **Hot room or mix-minus sound system:** Under appropriate circumstances, conference centers install a sophisticated array of microphones and speakers in the ceilings of meeting/event spaces. With a "mix-minus" system, each microphone's signal is sent to all speakers except those adjacent to the microphone. Thus, the presenter's voice is reinforced at a distance but not up close. Such systems require extreme care in engineering both sound system and room acoustics.

C) **Audience or delegate microphone management system:** Under appropriate circumstances, conference centers position microphones among the seating in meeting/event spaces where significant audience interaction is anticipated. Depending on the room, microphones may be portable or built-in—the latter especially when there is fixed seating (see item #20D). Such systems allow all participants to hear questions from audience members at their seats, make excellent quality audio recordings of the complete event, and serve well for distance learning and/or video teleconferencing with a large group.

D) **Microphones for video-teleconferencing (VTC*):** In addition to items already specified above (under #12 above), conference centers provide at least standard table microphones on work surfaces or tables in front of the participants in video-teleconferences. If the conference center includes a room specifically designed for teleconferencing, or if they have a boardroom or auditorium of the proper size and with fixed furnishings, then microphones or microphone jacks may already be installed at the seat of each potential participant (see also #20C above).

IV. Lighting/Visual/Video

21. **Built-in light-reducing curtains where windows are present:** In order to accommodate typical visual projection displays as well as to minimize light fluctuation during video teleconferences, conference centers provide a means to substantially eliminate light from any windows into meeting/event spaces.

    A) **Manually or electrically operated** blackout devices**.**

    B) **Electrically operated** blackout devices only**.**

22. **Zone-controlled, fully dimmable lighting:** Conference centers provide controls that adjust light levels in all meeting/event spaces. These controls allow users to dim or brighten lights across the full spectrum from off to full power. Separately, they also often allow users to extinguish lights in the portion of the room most commonly used as a location for projection screen(s). When projection screens are built into the room, the same controls that raise and lower the screen may also control the light fixtures most closely associated with the location of the screen, sometimes automatically changing light levels depending on the position of the screen.

23. **Feature lighting with independent controls:** Under appropriate circumstances, conference centers install recessed "eyeball" fixtures, light pipes, retractable lighting elements and/or other devices to independently highlight or spotlight certain feature(s) of the meeting/event space. Controls for these fixtures operate independently from those for the main room lighting system.

    A) **Targetable fixtures:** In all rooms larger than 160m^2 (1,750 sq. ft.), conference centers provide lighting fixtures—perhaps commercial track lighting—that can illuminate one or more targeted areas such as presentation platforms, display screens, lecterns and/or other room features.

    B) **Retractable fixtures with tech power and tie lines:** Under appropriate circumstances, conference centers provide 500-pound (225-kg) live-load/800-pound (365kg) dead-hang-load rated support mechanisms that can be used to rig trusses and/or other devices such as lighting fixtures needed for production. (See also #7A above.) These support mechanisms can be manually retracted into the ceiling when not in use and lowered from it when supplemental lighting or other devices are required. Connectors for dimmed lighting circuits, technical power, and the full range of tie lines should be readily accessible through ports situated in the same opening that houses the support mechanism. In addition, this system can support projectors, monitors and powered speaker systems—as well as other devices.

24. **Programmable lighting with in-room control panel:** Under appropriate circumstances, conference centers provide digitally-controlled dimmer systems that include multiple control circuits and a range of pre-set lighting scenarios. For

instance, one circuit might control down-lights while another controls wall-wash fixtures. There could be one or more controls for chandeliers, another set for sconces and a third for track lights. Typical panels allow programming for up to six pre-set lighting scenarios that can accommodate different light levels within each of the zones and sets of fixtures. Changing from one pre-set scenario to another requires only the push of a single button. (See also #22 above.)

A) **And at least one panel per separable portion of room**, if applicable.

B) **And each panel manages one separable portion of room PLUS all adjacent portions** that might be combined with it.

25. **Retractable image-display screen:** Conference centers install drop-down screens that retract into ceiling- or wall-mounted housings. Screen dimensions should have a suitable aspect ratio to accommodate high-definition (HD*) format displays, and the minimum vertical dimension of the projected image should be approximately one-sixth of the distance from the screen to the furthest viewer.

    A) At least one **manually or electrically operated** drop-down screen.

    B) At least one **electrically operated** drop-down screen.

26. **Built-in remote-input computer/video-image display system:** Conference centers install ceiling-mounted projectors, electrically retractable front projection screen (as indicated by #25B above), and at least one set of remote controls at front and/or rear of meeting/event spaces. In addition, some rooms may include at least one other of the display technologies that follow in this item (#26). Conference centers frequently situate front-projecting video graphics projectors either on or near the ceiling or suspended from the ceiling on a pole or other structure. When in use, the projector should be positioned no higher than the top of the image on screen. In some cases, projection platforms require built-in and remotely-controlled robotic lifts or enclosures, which can be particularly useful when a room is used for both business and social functions.

    A) With at least one front projector that has **minimum output of 2,000 lumens*** . . .

        i) And **at least one remote input** at front of room.

        ii) And **at least two remote inputs** at front and rear of room.

    B) With at least one front projector that has **minimum output of 3,000 lumens* and at least one remote input** at front of room . . .

        i) **Plus ceiling-mounted pole or other fixed support** that puts the projector no higher than the top of the image onscreen. (Projector and platform or mounting may retract into ceiling.)

        ii) **Plus retractable projector lift:** Describes a mechanism to raise the projector into the ceiling and conceal it so that social functions may be held without the distraction of seeing the projector overhead. When needed, the same mechanism lowers the projector to the proper position for use.

    C) With at least one front projector that has **minimum output of 4,000 lumens*, at least two remote inputs** at front and rear of room, **and retractable projection platform**.

D) **Rear projection:** Under appropriate circumstances, conference centers install display technologies that locate the projector behind a translucent projection screen material. This is used in high-end venues because (i) it minimizes the distraction of a projector hung above the audience, (ii) it does not shine light into the presenter's eyes and (iii) it allows for more natural interaction between presenter and program material. One possible disadvantage is that rear projection requires adequate space behind the display screen for the projector and its necessary distance from the display. While self-contained rear-projection display cubes may be as shallow as 20-inches (50cm) deep, single projector rear projection units may require 5 to 15 feet (1.5-5m) of space behind the display screen.

i) With projector having **minimum output of 2,000 lumens***.

ii) With projector having **minimum output of 4,000 lumens***.

iii) And with **capability to conceal screen**.

E) **High-definition (HD*) equipment:** Under appropriate circumstances, conference centers provide and/or install high-definition (HD) equipment for visual display systems, whether projector-based or flat-panel. All future built-in display technologies should accommodate HD format.

i) With at least **one view screen**.

ii) With **multiple view screens**.

F) **Flat-panel LCD display with remote input:** Under appropriate circumstances, conference centers install up-to-date flat-panel technology displays on the front wall of meeting/event spaces. Such displays can be openly visible at all times in more utilitarian rooms but should be concealable in high-finish rooms. Flat-panel units are currently practical, however, only for small- to medium-sized rooms because size limitations of today's display units limit audience capacity.

27. **Multiple inputs for image-display system(s):** Many digital projectors and flat-panel displays accommodate a variety of source inputs and protocols. Under appropriate circumstances, conference centers provide projector input plates in a number of places throughout meeting/event rooms. Often, they will extend the display inputs to (i) front walls below display screens, (ii) floors underneath any fixed tables, and/or (iii) floor boxes in rooms without fixed furnishings.

28. **Web cameras with built-in monitoring from central control room:** Under appropriate circumstances, conference centers install small, medium-resolution cameras used by conference center staff and their computers to monitor activities in meeting/event spaces. These cameras may also be used for basic webcasting or archival recording of events, but cannot deliver high-resolution, production-quality video recordings.

29. **Interactive computer display/interactive lectern:** Describes lecterns or other control panel display systems that incorporate digital touch-screens of various sizes and that allow the presenter to interact with computer interface, the Internet, and/or other video display functions during an ongoing presentation. Such systems typically also include an electronic "chalkboard" function.

V. Security

30. **Electronically auditable door locks:** On all interior doors to meeting/event spaces, conference centers provide locks that can be programmed to each group's access requirements. Such systems record and track time and number of every key used in the lock, and they can be completely re-programmed between events and/or groups.

VI. On-Site Production Services

31. **Recording, production, and post-production capabilities:** Under appropriate circumstances, conference centers provide expanded creative and production services to conferees and other guests. In advance of a meeting or other event, such services may include designing themed PowerPoint slide backgrounds or providing other program-specific graphics. During a program, conference center staff may audio- and/or video-record proceedings. Then, they may duplicate these recordings for distribution via CD, DVD, Webstreaming, or a variety of other media.

* Glossary of Acronyms

Cabling Standards: Low-skew Category-5E (CAT5E) describes twisted copper cable to transmit video signals while minimizing delay and ensuring optimal picture quality.
Category-6 (CAT6) describes the current standard of twisted copper cable to transmit data signals for Gigabit Ethernet and other network protocols.

Data Signal 1 (DS1 or T1) is the digitally multiplexed telecommunications standard widely used in North America and Japan to transmit voice and data signals between devices. We often refer to cables that feed a telecom network which employs this protocol as T1-Lines, but the T1 standard has come to mean almost any data circuit that runs at the line rate of 1.544 megabits per second. T1, by the way, is incompatible with E1—the digital telecommunications standard used in Europe and most of the rest of the world.

Digital Signal Processing (DSP) is the generic term for the amplification, compression, augmentation or other manipulation of signals (such as sound waves) within a system by means of digital circuitry.

Fiber-optic cabling (no acronym) employs light moving along glass or plastic fibers to transmit digital communications signals across longer distances and at higher data rates (aka "bandwidth") than other types of cable can accommodate.

High-Definition (HD) Video Format refers technically to three features of an image display: (1) The number of lines in the vertical resolution (typically 1080 or 720); (2) the scanning system employed (progressive or interlaced); and (3) the number of frames or fields per second. Thus, 720p60-format displays 60 frames per second of 1280 x 720 pixels that are encoded progressively, while 1080i50 displays 50 fields per second of 1920 x 1080 pixels that are interlace-encoded. The most familiar of these terms is resolution, of course, because display units are described commercially by the most commonly available resolutions—either 1280 x 720 or 1920 x 1080.

High-Speed Internet Access (HSIA) employs one of many possible "broadband" connection solutions to transmit digital data signals between a local computer and/or network and the mega-network known as the Internet.

Infrared (IR) wireless technology operates in the spectrum between visible light and radio wavelengths and employs a broadcasting device to transmit electromagnetic signals through the air to a receiver that converts them into sound waves.

Integrated Services Digital Network *or* ***Isolated Subscriber Digital Network*** *(**ISDN**)* employs ordinary copper telephone wires to transmit voice and digital communications signals between some source (telephone or computer modem) and the receiver (another telephone or an Internet Service Provider or ISP). The oldest means of high-speed digital access to the Internet, ISDN has now been superseded by faster broadband technologies, but it continues to serve telephony because the quality of voice transmission by ISDN is superior to many other methods.

Internet Protocol (IP) is the primary protocol to transmit data packets from host to host across the Internet. It defines addressing methodology and permissible structures for data packets.

Lumen (lm) is a measure of the perceived power of light or "luminous flux" as described by the International System of Units (SI). By way of example, a standard North American 100-watt incandescent light bulb emits 1500-1700 lumens while a standard European 230-volt unit emits 1200-1400 lumens. The light output of projectors is typically measured in lumens. The American National Standards Institute (ANSI) has established a standardized procedure for testing the lumens emitted by projectors. Devices tested according to this procedure may be rated in "ANSI lumens" which are generally more accurate measures than those derived by other methods.

Radio frequency (RF) wireless technology operates within the range of about 3Hz – 300GHz and employs a broadcasting device to transmit electromagnetic waves through the air to a receiver that converts the signal into sound waves.

Video-teleconference (VTC) employs a system of interactive telecommunication technologies to transmit simultaneous audio and video signals between two or more distant locations.

To the reader: *If you encounter any term in the Recommended Technology that you believe should be included in this Glossary, please contact Steve Smith at IACC – ssmith@iacconline.org.*