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Digital Addressable Lighting Interface (DALI) Focus Group Research Project Report

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1516 Ninth Street, 1st Floor
Sacramento, California 95814

Submitted By:
Architectural Energy Corporation
2540 Frontier Avenue, Suite 201
Boulder, Colorado 80301

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Contact Information:

Subcontract Project Manager
 David Peterson
 The Watt Stopper
 20 Commerce Dr
 Warwick, RI 02886
 401-562-4103 voice
 401-562-4150 fax
David_Peterson@WattStopper.com

AEC Program Director
 Judie Porter
 Architectural Energy Corporation
 2540 Frontier Avenue
 Boulder, CO 80301
 303-444-4149 voice
 303-444-4304 fax
jporter@archenergy.com

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Digital Addressable Lighting Interface (DALI) Focus Group Research Project Report

I. Background

Typically, about 40 percent of a commercial building's electrical consumption is lighting. As such, uncontrolled buildings experience considerable energy waste. While companies are concerned with controlling energy use and costs, they also recognize that lighting costs are dramatically less than the costs associated with personnel. As such, lighting control efforts have been very sensitive to possible negative impacts on building occupants and their work performance. Large offices and schools have started to move from standard on/off switches to using automated scheduling systems (i.e., lights go on and off at schedule times) or occupancy sensors (i.e., lights go on and off based on infrared or ultrasound control systems). While these systems are designed so as not to infringe on employees, technology has yet to be used to provide a direct benefit to employees.

A recent advance in dimming controls is the development of the Digital Addressable Lighting Interface (DALI). The DALI lighting control system is designed to make it possible to control the light output of each fixture within the system by using low cost communications. Moreover, DALI is a non-proprietary digital communication between the DALI ballast and lighting system. Those working on DALI believe it has the potential to reduce energy consumption, increase occupant satisfaction, and improve building management. Given the potential impact that DALI could have on energy consumption, the California Energy Commission is funding research in an effort to increase the use of dimming controls. The Watt Stopper is leading the research and development work on the DALI project. Spectrum Associates was retained by The Watt Stopper to conduct a series of focus groups to explore:

- Target market reactions to DALI (e.g., perceived benefits, barriers to purchasing, suggestions for ways to overcoming potential barriers, and price sensitivity); and
- Manufacturers' reactions to target market impressions and their initial thoughts on ways to market and position DALI in light of target market reactions.

This management summary highlights the key findings from the focus groups, and provides Spectrum Associates' thoughts on the implications of these findings for marketing DALI. Spectrum Associates conducted two focus groups with designers/end-customers responsible for lighting control system decisions. One focus group was conducted in San Francisco (September 10, 2003) and one in New York City (September 12, 2003). Each group with designers/end-customers included 9 – 10 participants, and a mix of architects, consulting engineers, lighting designers, building developers, property managers, and building occupants.

Manufacturers observed the San Francisco and New York designer/end-customer groups involved in DALI. Individuals from Advance, New Building Institute, Starfield, and The Watt

Stopper observed the San Francisco group. Representatives from Genlyte, Leviton, Lutron, Universal Ltd., W J. Warren Associates, and The Watt Stopper observed the New York City focus group. Dr. Eliot Hartstone, president of Spectrum Associates, moderated all four focus groups.

Spectrum Associates cautions the reader to keep in mind that this study was conducted using qualitative research methods and, as such, the findings can not be statistically extrapolated from the sample to the target populations. Rather, the reader should use the findings in the spirit in which they are intended -- to provide *indications* of the behaviors, attitudes and opinions of key target markets.

II. Designer/End-Customer Focus Group Findings

A. Current Lighting Control Systems

1. San Francisco participants said that as a result of California's 2001 Title 24, all new buildings in the state are now being designed with some type of lighting control system, and that the type of lighting control varies within the office space (e.g., small rooms often have an on/off switch and a motion detector override; large open areas usually have an on/off switch with a motion detector override and possibly daylighting sensor; and conference rooms/auditoriums/special classrooms often have dimmers and presets). New York participants also said that new buildings have some type of lighting control system due to code, but added that only a small percentage of each building (e.g., small offices, bathrooms and conference rooms) is equipped with lighting controls (usually lighting sensors and automated scheduling, with presets used in conference rooms), as large open space areas are not covered by the code and usually does not have a lighting control system.
2. San Francisco participants said the type of lighting control system used in new buildings depends on many factors, including: who is developing the property, the type of occupant, and the size of occupant.
3. San Francisco participants expressed mixed experiences with retrofits, as some participants said lighting controls are used for some retrofits while other participants said never. New York participants said that with existing buildings, lighting control decisions are often made on a tenant-by-tenant basis. As new tenants come in, some lighting controls are often built in with the new build-out to keep to code and help save money. How much gets done depends on the influence of the architects, designers and engineers to convince the owner to do more (e.g., save money, it is the right thing to do).

B. Familiarity with And Information Sources for Lighting Control Systems

4. About one-half of the participants in each focus group said they were "reasonably" up-to-date about lighting control systems, and the other one-half said they were not.

5. Architects and lighting engineers said they were more knowledgeable than the building occupants, managers and developers said they were. The end-users often rely on the recommendations of the designers.
6. Participants who felt they were “reasonably” knowledgeable said “they could always learn more,” and noted there was information on new developments that they were not very knowledgeable about and needed more education (e.g., DALI).
7. Participants said their information sources on lighting control systems included: trade/professional associations and their publications; trade shows and technical fairs; manufacturer Web pages and representatives; other members on the team (e.g., lighting designers, engineers, architects, property managers); clients (sometimes see and hear about things); general contractors; and seminars.

C. The Ideal Lighting Control System

8. Participants’ responses across the two focus groups suggest that an ideal lighting control system should:
 - be user-friendly;
 - accommodate different needs in different parts of the office;
 - offer flexibility to the building owner (e.g., be able to change lighting to address a new tenant’s needs);
 - incorporate daylighting; and
 - provide remote monitoring.
9. Participants suggested an ideal light control system would differentiate within the office as follows:
 - Open work spaces should use occupancy sensors and/or timing schedules to turn the lights on and off as needed, make widespread use of natural light (e.g., windows and skylights), and have a daylighting sensor and dimming to compensate for daylighting availability.
 - Small offices should use occupancy sensors to turn the lights on and off.
 - Conference rooms should use dimmers and presets to reflect different AV needs.
10. Individuals in New York added the following suggestions for an ideal system:
 - Provide employees with individualized cards that would turn on the appropriate lights when the employee swipes his/her card upon entering the building after hours.
 - Have a computerized display when lights are out (e.g., error message) which is integrated into re-lamping.
 - Be able to turn lights off from remote locations.
 - Use wireless switches so the architect does not need to worry about creating walls to hide the wiring.

D. Overall Reactions To DALI Type System

11. Reactions to DALI were similar in San Francisco and New York.
12. Overall, eight of the 19 participants were “very positive” about the DALI type system and another eight were “positive.” Only three participants said they were neither positive nor negative, and none of the participants said they were negative overall.
13. Reasons given most often for being favorable about the DALI type system were:
 - Energy savings (e.g., reduces energy waste, saves money).
 - High occupant/tenant satisfaction (e.g., individual control over lighting, and flexibility).
 - Can be tied to natural sunlight coming into the office.
 - Added visual interest created by presets/scenes in conference rooms.
 - The information communicated by the system and computerized monitoring (e.g., failed lamps and ballasts).
 - Flexibility to do many different things based on personal preferences (e.g., vary by office, create scenes, and dim lights based on daylighting, etc.).
14. Concerns about the DALI system mentioned by participants were:
 - Individualized controls will create problems in open space (e.g., employees fighting over amount of light there should be, and/or create lack of uniformity in lighting).
 - It may be very hard for occupants to use (e.g., individual control from PC).
 - They are skeptical that the system will really work as planned, and concerned that the company won’t be credible or financially stable.
 - They don’t believe there can be totally flexible lighting without flickering or blinking.
 - They need to see more details and know what the costs will be.

E. Reactions to DALI Benefit Statements

15. None of the six statements distributed had a significant credibility problem, as each statement was described as believable by at least 16 of the 19 participants.
16. The benefit statement clearly selected as most motivating participants to consider DALI was Statement #4 (*able to reduce energy consumption and the owner/occupant power bill*) (ranked 1st, N=12; and ranked 2nd, N = 3), while the 2nd most important benefit to the focus group participants was Statement #6 (*provides management data/reduces maintenance cost*) (ranked 1st, N=1; and ranked 2nd, N = 11).
17. While Statement #4 was the first choice in both locations, the San Francisco participants ranked Statement #1 (*individual tuning/improved occupant satisfaction*) 2nd, while the New York participants ranked Statement #6 (*provides management data/reduces maintenance cost*) 2nd and had a tie for 3rd between Statement #1 (*individual tuning/improved occupant satisfaction*) and Statement #3 (*better security through system integration*). Thus, not

surprisingly, San Francisco participants expressed more concern than New York participants with people in the building having individual control over their lighting, while New York participants expressed greater concern with security than San Francisco residents.

18. Participants who ranked Statement #4 (*able to reduce energy consumption and owner/occupant power bill*) 1st usually attributed it to saving money, while some emphasized the societal good (reduced energy consumption) and saving money equally.
19. Participants who ranked Statement #6 (*provides management data/reduces maintenance cost*) 1st or 2nd said they ranked it so high because this feature of the system will: provide them with useful information (e.g., which fixtures/lamps are out, where money is being spent on energy consumption, benchmark information); save them money; help them prepare sound maintenance schedules; and enable them to make better use of maintenance staff (not just checking for burned bulbs).
20. Participants expressed mixed reactions to Statement #1 (*individual tuning/improved occupants satisfaction*). While some participants said having this type of personal control appealed to them (e.g., enhances the desirability of the space to potential tenants) and makes tenants happier (property managers' second greatest concern behind making money for the owner), various concerns were also expressed (e.g., not practical for open areas as people will argue and keep changing the lighting all day; too expensive; and there is no real benefit achieved by dimming other than providing more light for older employees).
21. Participants were typically favorable about Statement #3 (*better security through system integration*), saying security is a "hot issue" today and it is a nice "added feature" to offer tenants and employees. However, some property managers said it is not so important to them because they cannot sell space based on enhanced security due to concerns about liability issues.
22. While participants expressed a desire for an open protocol, several participants displayed considerable skepticism about Statement #5 (*open protocol benefits*), as their prior experience suggests that more is usually promised regarding open protocols than is actually delivered (e.g., manufacturers want to keep it proprietary so they can benefit from the after-sale market).
23. While some participants were positive about Statement #2 (*LEED certification for green building is major differentiator*), some participants were uninformed about LEED certification or questioned its value (e.g., did not believe LEED certification generated large tax credits, found LEED certification to be more expensive than it was worth, or thought LEED certification was only of value to very large, high performance buildings).

F. Barriers To DALI Type Lighting Control System

24. All nine San Francisco participants ranked cost as the greatest barrier to using a DALI type of lighting control system. Concern about reliability of the system was the 2nd greatest barrier (e.g., will the system work, and how long will it last). Two other barriers ranked highly by several participants were concern about ease of use (e.g., will the end-user

understand and be able to manage the system), and the manufacturer (e.g., support, credibility and warranty).

25. With participants asked to exclude cost (an obvious major barrier), New York participants said the two other major barriers were reliability (e.g., does the system work, and will it stay on the market) and ease of use (e.g., needs to be understandable to facility managers). Four other barriers ranked by several New York participants were: proprietary software/compatibility (e.g., do not want to need to rely on a single vendor for upgrades and service); difficulty using the system in a retrofit; ease of installation (do not want to be tied to one guy for installation); and concern about the manufacturer (e.g., will not disappear overnight).

G. Ways to Overcome Perceived Barriers

26. Participants offered the following suggestions for overcoming the stated barriers:
- ~ Document the system's reliability through: showcase installations; statistics that backup its reliability; references who can discuss the system's reliability; brand name; a good warranty; and sound quality assurance, and market testing techniques.
 - Provide excellent support by having: replacement parts available in every major city, and having guarantees for fast replacements; a 24-hour customer service support line; and troubleshooters in every major city to ensure a technician can be there quickly.
 - Provide a user-friendly manual that is clearly written, short and available online; and includes a “quick start,” less inclusive, directions component.
 - Make it easy to use for the building's maintenance staff.
 - Provide a fail-safe feature to ensure lights can be turned off and on manually if systems goes down.
 - Allow differentiating the amount of lighting control given to individuals.

H. DALI Price Sensitivity

27. While San Francisco participants liked the system a lot, they did not feel tenants would pay a lot of money for this lighting control system, as the commercial real estate market is very soft in San Francisco (25% - 35% vacancy rate). Some San Francisco participants said tenants would not pay any additional rent, and others said about \$.05 more per square foot per month (added to current rent \$.85 cents to \$1.50 per square foot). Participants indicated they would be willing to add \$.25 to \$1.00 to the \$65 build-out (currently includes about \$4.00 - \$5.00 for lighting).
28. Some of the San Francisco participants said that some large corporations would pay for DALI as they would receive benefits over a long period of time, but they felt it would not be a good bet for speculative office buildings.
29. San Francisco participants thought most corporations would have a five-year expected ROI, but that universities and public institutions would be longer (e.g., 10 – 20 years) as they are “good corporate citizens.”

30. When asked how they would divide expenditures across four categories, New York participants said they would devote the largest percentage to the lobby (33%), spend somewhat less on lobby fixtures (26%) and the lighting control system (25%), and spend the least on carpeting (16%). Engineers and lighting designers allocated more money into lighting control than the other participants. Building owners and managers emphasized the lobby, saying prospective tenants see these improvements right away and that would increase the building's marketability. Carpeting was de-emphasized because they felt color and pattern was more important than upgrading cost.

III. MANUFACTURER FOCUS GROUPS FINDINGS

A. Summary of Designer/End-Customer Findings

Target Market Knowledge About New Advances in Lighting Control Systems

1. The manufacturers felt that with a couple of exceptions (e.g., lighting designer and engineers), the San Francisco focus group participants were not very knowledgeable about new advances in lighting control systems. In contrast, manufacturers said that most of the New York participants seemed knowledgeable about lighting control systems, as various participants mentioned: motion sensors, scheduling systems, protocols, user control, and the system's impact on ceiling uniformity.

Perceived Ideal Lighting Control System

2. The manufacturers said that San Francisco participants want a lighting control system that is: cheap, simple, reliable, flexible, a good value, and provides a fast ROI.
3. Manufacturers said the New York participants were most concerned with energy savings (for environmental and cost savings reasons), data management, and flexibility.

Reactions to DALI Type of System

4. Manufacturers observing the designer/end-customer focus groups said the participants liked the system conceptually, but were very skeptical about such a system.
5. Manufacturers observing the San Francisco group added this skepticism occurred despite local showcase facilities and many presentations in the area. Manufacturers viewing the New York focus group said these participants were also skeptical about an open protocol and worried about their having to deal with problems fixing the system.

Benefits/Features Resonating with Designers/End-Customers

6. Manufacturers acknowledged the two benefits that most resonated in the San Francisco and New York groups were: (a) using less energy/reducing their power bill, and (b) lowering maintenance costs due to management data.

Major Barriers to Purchasing a DALI System

7. Manufacturers said the major barriers cited by participants were concerns about: cost, reliability, ease of use, ease of installation, and the proprietary nature of the system.

B. Brainstorming Implications and Strategies for Marketing DALI

Manufacturers Observing the San Francisco Focus Group

Addressing Need for Documenting Reliability

8. Manufacturers observing the San Francisco focus group expressed great concern about the target audience's desire for a three-year track record to be convinced of the system's reliability as they felt they could not wait three years to sell the system. It was suggested that showcase demonstrations and early adopters are needed to document reliability since there is no history.

Addressing Concerns About Cost

9. Manufacturers said that lowering the cost to address target market concern is very difficult because the economies of scale in manufacturing dimmable ballasts make it difficult for manufacturers to bring the costs down. Their suggestions for addressing target market price sensitivity included:
 - Developing less expensive versions of DALI (e.g., multiple light level system without dimmable ballasts).
 - Marketing DALI by suggesting target companies shift some of their tenant upgrade expenditures to lighting controls from carpeting, the lobby, and lighting fixtures (reallocating monies rather than spending more money).
 - Marketing DALI as a way to decrease peak demand, thereby keeping the company's costs down while energy commissions move to real-time billing.
 - Developing a model that would show how an increase in DALI demand would decrease the cost of purchasing DALI, and take this information to energy commissions requesting support for DALI (e.g., a rebate program).

Addressing Concerns About Ease of Use

10. Manufacturers said that addressing target market desires for a simple, user-friendly system could be even more challenging than documenting reliability, and some manufacturers suggested that failing to make the system user-friendly will cause DALI to “fail in the marketplace.”
11. Manufacturers said that issues around user-friendliness were more product-design issues than marketing issues.

Other Marketing Issues

12. Manufacturers suggested that DALI marketing efforts need to focus on one or two memorable and important messages that address target market needs and wants, and everyone involved in marketing DALI should agree on and market DALI using these same messages.
13. One participant strongly suggested the message should not be energy savings, but rather the message should focus on addressing occupant satisfaction achieved through increased flexibility/control and possibly better security. Some participants questioned whether these were the two best benefits to focus on as: (a) efforts to sell lighting control on product

- quality and employee satisfaction have not proved effective to date (e.g., owners not willing to spend the money just to make employees happier); and (b) DALI does not really do much to create more security (e.g., they could just leave the lights on). Rather, these participants suggested the need to focus on DALI's ability to reduce energy usage.
14. It was also suggested by a manufacturer in San Francisco that limiting marketing to one or two messages may help make them more memorable, but marketing efforts need to take into consideration that there are multiple decision-makers with different needs and wants.
 15. Manufacturers said the San Francisco designer/end-customer group revealed that efforts to educate the target audiences have not been effective to date.

Manufacturers Observing the New York Focus Group

Flexibility and Control as a Positioning Strategy

16. It was suggested by some that the most effective strategy for marketing DALI would be to focus on its flexibility, particularly its ability to “discriminately” cut and dim lighting to achieve reduced energy consumption to: (a) cut the load to compensate for higher utility rates resulting from installing new transmission lines, and (b) respond to utility company requests to cut power usage when the grid is unstable. However, other manufacturers observing the New York focus group questioned whether companies will pay the added costs for this flexibility in controlling how the energy demand is reduced or prefer to pay less money and simply turn some lights off or use a dimmer.

Different Messages for Different Market Segments

17. Some manufacturers observing the New York focus group suggested that DALI marketing needs to be segmented as different audiences react favorably to different messages. For example, the “hot button” for architects is occupant satisfaction, while for building owners it is energy management.

Strategy to Address Ease of Use Concern

18. It was suggested that DALI could be sold in different versions, including an easy-to-use version that would offer many, but not all, of the things that DALI is capable of providing. It was suggested that doing so might enable DALI to be sold to companies who have more limited needs and who are particularly concerned about the system being user-friendly.

Reaction to Participant's Skepticism About Open Protocol

19. Manufacturers observing the New York group acknowledged that the participants' concerns about implementing an open protocol were well grounded based on prior efforts to develop a standard protocol.

Number and Size of Demonstration Showcases

20. After the New York group manufacturers discussed whether it is better to have a few large installation showcases or hundred of smaller ones, it appeared the consensus was to try to have both, recognizing that it would mean fewer large installations.

IV. IMPLICATIONS OF DALI FOCUS GROUP RESEARCH

1. The focus groups suggest that more work is needed to effectively educate target markets on the latest advances in lighting control systems, and the important benefits that can be derived through these advances. Efforts should be undertaken to: (a) publish information in trade and professional journals; (b) present information at trade shows, technical fairs and seminars; (c) make information available online; and (d) provide showcase sites, and effectively get the word out about these locations.
2. While education is needed for all target market segments, it appears that building developers, building owners, and occupants are less knowledgeable than those more directly involved in designing these systems (architects, engineers, and lighting designers). As these individuals often play the critical role in the decision, efforts to educate the end-customer should be included in the marketing plan.
3. It appears that once informed about DALI, designers/end-customers will view the lighting control system favorably due to its various benefits, but will also be sensitive to system pricing and skeptical about DALI delivering on its many promises. Thus, while it is necessary for marketing communications to effectively convince target markets that DALI is worth the cost, it is equally critical to address target market skepticism.
4. It appears that the two benefits that most motivate designers/end-customers to consider DALI are: (a) reduced energy consumption, which saves them money and is also good for the environment; and (b) management data, which decreases maintenance costs and helps in managing the building/office. Other important benefits associated with DALI are: increased occupant satisfaction levels (e.g., individual tuning, and use of natural light); increased flexibility for building owners and tenants (can do different things in different parts of the office/building, and modify lighting for new tenants); and greater security for occupants.
5. While the manufacturers observing the focus groups wanted to find a “home run” benefit that everyone could agree to emphasize in their marketing efforts, several factors may preclude doing so. First, the two benefits that most resonated with focus group participants involved saving money (reduced energy consumption and maintenance). As the system will be expensive (at least initially), it is unclear whether focusing on these two benefits will be effective. Second, aside from “cost savings,” DALI’s strength appears to be in offering a variety of benefits rather than any one benefit. Thus, DALI may, in baseball jargon, score runs through singles and doubles rather than by a home run. Third, DALI needs to be effectively marketed to a variety of target markets with different needs and wants. The “hot button” benefit to one segment (e.g., building owners) may not be the key benefit to another (e.g., architects). Thus, marketing efforts may need to be tailored or customized for different audiences.
6. As noted, designers/end-customers expressed considerable skepticism about DALI. Skepticism was directed at: (a) reliability (will this new technology work and last); (b) ease of use (will facility managers understand the system); (c) the promise of an open protocol (e.g., history suggest they will be dependent on one vendor for service and upgrades); and (d) using dimming in open areas (e.g., could create fights about lighting among employees, and create poor aesthetics).
7. Efforts to overcome target market skepticism should include:

- Diverse efforts to document the reliability of DALI (e.g., showcase installations, testimonials, references, strong warranties, and statistics when available), and ensuring customers there is excellent support after the sale (e.g., guarantees on delivery of replacement parts, 24-hour customer service support line).
 - Designing a system that is easy to use even it means not offering all of the “bells & whistles” that could be provided.
 - Providing a fail-safe system where lights can always be turned on and off manually so there is no risk of being without lights if the system goes down.
 - Assurance from participating manufacturers on the open protocol.
 - Explanations and visual displays on how dimming can be used effectively in open areas.
8. While DALI appears to be a technically advanced product that will provide many benefits to end-users, developing an effective marketing communications program will not be easy. It rarely is. In this case, it is particularly difficult because it involves: a new product; skepticism about the product delivering on its promise; high initial costs; diverse target market audiences that are drawn by different messages; and a collaborative effort of a variety of companies involved with DALI. We believe efforts to develop an effective marketing approach and campaign for DALI will require working with a firm that specializes in marketing communications and is independent of the various manufacturers involved. While input from the manufacturers is critical to this process, we believe a professional marketing communications firm should undertake this task.

V. METHODOLOGY

Spectrum Associates conducted two focus groups with designers/end-customers responsible for lighting control system decisions. One focus group was conducted in San Francisco (September 10, 2003) and one in New York City (September 12, 2003). Each group with designers/end-customers included 9 – 10 participants, and a mix of architects, consulting engineers, lighting designers, building developers, property managers, and building occupants.

Individuals recruited to participate in the lighting control system decision-maker groups were screened to ensure they met specific eligibility qualifiers. Specifically:

- ◆ Architects frequently worked with building owners to determine the lighting design of new buildings, and worked on more than 25 of these projects in the past five years.

- ◆ Lighting designers frequently worked with architects to determine the lighting design of new buildings, and worked on more than 25 of these projects in the past five years.
- ◆ Electrical engineers frequently worked with architects and/or building owners on designing systems for their buildings; and worked on more than 25 commercial projects in the past five years.
- ◆ Building developers worked with architects and building owners in determining what buildings will look like and include, and participated in such projects for at least 100,000 square feet of building space in the past five years.
- ◆ Building managers had property management decision-making responsibilities for their company including energy management decisions, and had responsibility for at least 100,000 square feet of building space.
- ◆ Building occupants had responsibility for making decisions about the building design investments for their company's office space, and had responsibility for making these decisions for at least 100,000 square feet of building space.

All four focus groups were moderated by Dr. Eliot Hartstone, president of Spectrum Associates. For the designer/end-customer groups, Dr. Hartstone used a moderator's discussion guide that was prepared by Spectrum Associates with assistance and approval from The Watt Stopper. The manufacturers focus groups were more informal with topics and questions emanating from each group's discussion.

VI. DESIGNER/END-CUSTOMER GROUPS

A. Research Objectives

The research objectives for the designer/end-customer focus groups were to explore participants':

- ◆ Current lighting control systems (Section III.B).
- ◆ Familiarity with and information sources on lighting control systems (Section III.C).
- ◆ Perceptions of the ideal lighting control system (Section III.D).
- ◆ Reactions to and perceived applications of a DALI type lighting control system (Section III.E).
- ◆ Reactions to different feature/benefit statements for a DALI type system (Section III.F).
- ◆ Perceived barriers to a DALI type system, and ideas for overcoming these barriers (Section III.G).
- ◆ Thoughts on paying added costs for a DALI type lighting control system (Section III.H).

B. Current Lighting Control Systems

Participants were asked questions to determine whether their buildings typically had just an on/off switch or a lighting control system; and if they had a lighting control system, which one was most prevalent. We found the following:

San Francisco

- ◆ As a result of California's 2001 Title 24, all new buildings (office buildings and colleges/universities) are now being designed with some type of lighting control system.
- ◆ Some participants indicated that building owners and managers understood the high cost of energy associated with using just an on/off switch, and are putting in lighting control systems when retrofitting old buildings (e.g., occupancy sensors). Other participants indicated they have never upgraded their older buildings other than to go from four lamps to two (received PG&E rebate) and they continue to use the traditional on/off switch (e.g., have janitors turn the lights off after cleaning the office space). It was also suggested that colleges/universities meet Title 24 on new buildings, but are less likely than owners of office buildings to spend the money on a lighting control system by retrofitting a building (lack the money to do so).
- ◆ Participants said the type of lighting control system depends on many factors, including: who is developing the property, the type of occupant, and the size of occupant.
- ◆ Participants said the type of lighting control varies within the office space as: small rooms often have an on/off switch and a motion detector override; large open areas usually have an on/off switch with a motion detector override and possibly daylighting sensor; and conference rooms/auditoriums/special classrooms often have dimmers and presets.
- ◆ Building developers noted that they rely on their architects to offer a couple of recommendations that include an explanation of the cost and savings attributed to different options.

New York

- ◆ Participants said that new buildings have some type of lighting control system because of code, but that typically only a small percentage of the building (e.g., conference room, small offices and bathrooms) has lighting control. Large open areas are not covered under the code, and usually do not have a lighting control system.
- ◆ Participants debated the code requirements, with some saying the code requires certain areas of the building (e.g., offices) to have a lighting control system, while others said the 2002 code was modified in 2003 to be less (rather than more) stringent, making the owner more important in this decision.
- ◆ Participants said that with existing buildings, lighting control decisions are often made on a tenant-by-tenant basis. As new tenants come in, some lighting controls are often built in with the new build-out to keep to code and help save money. How much gets done depends on the influence of the architects, designers and engineers to convince the owner to do more (e.g., save money, it is the right thing to do).
- ◆ Participants indicated that lighting sensors and automated scheduling were the most frequent lighting control systems used, but that conference rooms sometimes had presets. Participants also noted problems with using the lighting sensor control systems, as often occupants get annoyed (e.g., lighting goes off frequently when they are in the room) and/or misuse the system (e.g., turning off the system and using the manual switch, or setting the system to keep lights on all of the time).

Representative verbatim responses are listed below.

Do Buildings Have Lighting Control System

San Francisco

- “Any newer buildings fall under Title 24 (so they have a lighting control system).”
- “(They all do), but not all the rooms. A new building, I would say 70 or 80 percent of the spaces are controlled.”
- “During the ‘70s, or even before that, we were all designing to 100 foot candles in high-rise buildings, so you just had on and off switches. But property owners and building managers quickly became aware of the fact that it was costing them a fortune and started implementing, not only in new buildings but in existing buildings they had, computerized systems and occupancy sensors and that kind of material. Not only is it the new buildings, it is all the old buildings that have been retrofitted.”
- “We have old building owners and we never really upgraded. We have smaller suites, so the tenant would either be paying their own electricity in some situations, if it was separately metered, or in office towers, we’d just have the janitors come through and turn off the lights, so we never really sought out a new system, except for replacing the ballasts and renewing the lamps and going from four lamps to two, which was a big thing back then. That was the way that we dealt with it.”
- “Our old buildings, what we did eight years ago was (go from) four lamps to two and you got a rebate from PG&E and this and that.”
- “I think that, as a base, all the new buildings have some sort of lighting control system.”
- “There have been hundreds of millions of dollars spent on new school construction, especially at the university level. There was a second baby boom, so just a lot of work. I think the new construction is similar. Universities are doing what corporations are doing, but meeting Title 24, so they’re meeting current codes and they’re using (a) good standard design. What they’re not doing is retrofitting. I think corporate America is better at retrofitting. They get a payback if they make an investment. Schools are just barely maintaining.”

New York

- “All the buildings have them. Within the buildings, it’s about 20 percent coverage.”
- “Every project does have some sort of a system, but it’s a small percentage of the project. Conference rooms will have some sort of a dimming system, but the majority of the space will just have (a) regular (on/off switch).”
- “Same thing with me. All my conference rooms, my bathrooms, all have some kind of a lighting control system, but open spaces just (have regular) on/off switches with about 20% (of our open spaces) having an occupancy sensor or scheduling system.”
- “Our open spaces you have on and off, but conference rooms, you don’t want it to stay on, once everybody walks out and all the lights are on I’d say about 20 percent of space (has a lighting control system).”

- “We have to take into consideration the fact that we are guided by the code that says, because of the energy conservation, you’re dealing with a building, certain areas you must have In an office, you have to have the sensors, the light sensors if you’re dealing with an office.”
- “I disagree with that now. For the 2003 code, that’s changed. It was in the 2002 code, but not 2003. They have changed the requirement. We thought they’d get more stringent. They got less stringent along the actual light control within offices. I was totally shocked when I read it.”
- “That’s where the owner becomes (important). You’re satisfying the code. But now the owner himself says, wait a minute.”
- “I think it comes back to the age of the building and how long the tenant’s been in the building. You take a building that was late 60’s or early 70’s, there was very little switching put in. You had quadrant switching on the floor or something like that. Now, as those tenants move out, it’s really on a tenant-by-tenant, floor-by-floor basis. As newer tenants come in, one, we’re abiding by code and, two, they want to save energy. It’s a lot less expensive when the engineers and designers recognize and build it in with the build-out rather than try to go back and retrofit. I would say when you look at the buildings, the older tenants have very little remedial type control and the new build-out spaces are really good. My feeling is I really depend on the architect and the engineer representing the tenant to bring it to the forefront. Let’s face it. Most people moving into a space, they don’t want to spend any money. The code is a good crutch, I think, for the designer and the architect to say, listen, lighting is something, you have to do something. Then I think, once they know they have to do something, it’s easy to convince them that if they do it there’s going to be a payback. The best way to save energy on lighting is to turn it off.”
- “That’s the biggest thing, if you convince them they’re going to save this many dollars a day.”
- “I think most of us feel it’s the right thing to do now.”
- “One of the other things to understand about lighting control with open spaces, you find a lot of the older spaces have the lighting control but it’s just set to continuously on or not adjusted correctly and nobody’s even aware that they have lighting control.”
- “I was in a building that was built in 1905 and they had lights that nobody could shut off. Couldn’t find the switch. They were on all the time.”
- “Lights are on all the time. Uses a mechanical time clock and it’s just set so it will never, ever go off.”

Type of Lighting Control Systems Used

San Francisco

- “Depending on how much money the client wants to spend and what kind of spaces you’re doing, like conference rooms may have wall box dimmers and they may have presets It’s kind of a function of who’s moving in there and what they want.”

- “(If there is) a large amount of common area space, (it’s) usually on a timer or automated system.”
- “A lot of it depends on the size of the tenant, size of the building, that kind of thing.”
- “For schools, I think the spaces where you would have dimming are auditoriums or maybe some conference rooms, large conference rooms.”
- “I would say less (likely to have lighting control systems in schools than offices). Just in the large spaces, the common shared, kind of showcase spaces. In the classrooms . . . you wouldn’t want people fooling with them.”
- “In (college) classroom spaces, typically it is just switched or on motion sensors. But, the auditoriums and special classrooms have dimming systems and different control systems, preset systems, so that it’s not all on a bunch of different switches to set your different levels. But generally regular classrooms are basically fluorescents on occupancy sensors.”
- “Like (the one in this room). There’s an on/off switch and then there’s a motion detector override. That’s the most common in offices, individual offices, small rooms.”
- “(Use in a) one or two-person office or a little conference room. In a big, open office area, then it’s different things. I’m seeing low-voltage switches that are put in a remote location, so you don’t have somebody turning off the lights for 100 people by accident. Sometimes (but not a lot) they’re tied into daylight sensors. (Usually in a large open space you have) motion, motion overriding on-off switches.”
- “There are a lot of conference rooms in a lot of the offices that we do that have pretty intricate control systems. It really depends upon what they’re doing in the conference room. Sometimes they’re showing video, so you have one setting. Other times, they’re doing other types of presentations, so it will be brighter on one side and darker on another. Or it will be just in general use and task lighting, so that’s going to be another setting. You’re going to have a control box, typically by the entrance that will have several buttons, or some of them, where you’re going to be able to adjust the levels manually. But with the office room, yes, typically it’s occupancy sensors that we use. And in general open circulation spaces, we’re going to have daylight sensors. I deal with a lot of buildings that the walls are primarily glass. You’re dealing with buildings that are letting in a lot of sunlight, so that’s a huge factor in the controls for the lighting system. A lot of it depends upon the architecture. Varies considerably.”
- “I’m relying on the architects in that situation. If I’m redeveloping a building or developing an office building, getting your team together, my architects are going to tell me what the latest system is and how it works and what they recommend. This one will save you more money, but it’s going to cost you more. This one’s going to cost you a lot less, but it will not save. They would have a system that they would recommend and they’d talk about that or that was just sort of along with the Title 24 guidelines in developing the building. They’d probably give me one or two choices or say, this is the one I recommend. I’d say, ‘Okay, great.’”
- “I think it depends on who’s developing the property. If it’s a building management firm, they obviously want to spend the least amount of dollars in order to provide a product that

people would still want and pay a certain amount of money for, so they want to spend less, but give you something that you feel is a good value. Then the architects or maybe the project team or if you're doing an improvement for an office building that your firm's moving into, you probably want to spend a little bit more, because it's your image that you are kind of selling to your public or the people that are coming to you for business. It kind of depends who's developing it and who's using the space."

- "The economics of (daylight control) makes sense to me, but I haven't found a system that's readily usable that we can use. (Usually we have) area switching with multi-level . . . three-level, essentially, switching the center lamps, what have you. Then some type of . . . some overall control to turn off the floor. That type of thing. Individual offices with motion detectors."

New York

- "Most (systems) are light sensors. The problem that we're getting, also, is the fact that a lot of people, they haven't been educated on how that system works. After a while, you keep playing with it, it's going to go bad and they go back to the manual switch."
- "How many times have you sat in an office and all of a sudden the lights go off? It's happened to me, when I'm sitting in an office and all of a sudden the lights go off because I haven't moved. It's kind of annoying. I find it very annoying when my lights go out all of a sudden and I'm standing there waving my arms, trying to turn the lights back on."
- "We've got general lighting that's on and off. Apart from that, we've got two types. We've got newer spaces where the general lighting is controlled (through a) time clock. There's an education process in that. We didn't get the timing right for I don't know how long. We'd hear it was on all weekend before we'd go and test the settings. Then we also, of course, have the sensors, which do what you say. They go off when people are too still. But ours don't have buttons they can override. They just go and scream at us."
- "We'll do a lot of motion sensors. We'll do the time clock."
- "I have, in my large boardroom and in a couple of my conference rooms, six buttons on the trunk box, is what it is. There's presets in each one and depending on what I'm doing, I have one that's an audiovisual one. If I'm doing audiovisual, I just press that and it's just some low lighting in the background. Open space is an on/off switch, yes. My security guards, in the morning when they come in, they go and turn on all those lights. When they leave, they turn them all off as part of their rounds."
- "I have buildings all over the place and they're all different."

C. Familiarity With And Information Sources For Lighting Control Systems

Participants were asked to what extent they felt they were up-to-date on the latest developments in lighting control systems, and how they found out about new advances. We found:

- ◆ About one-half of the focus group participants in each group said they were "reasonably" up-to-date about lighting control systems, and the other one-half said they were not.

- ◆ Architects and lighting engineers were described as more knowledgeable than the building occupants, managers and developers. The end-customers often rely on the recommendations of the designers.
- ◆ Participants who felt they were “reasonably” knowledgeable said “they could always learn more,” and noted there was information on new developments that they were not very knowledgeable about and needed more education (e.g., DALI).
- ◆ Participants said their information sources on lighting control systems included: trade/professional associations and their publications; trade shows and technical fairs; manufacturer Web pages and representatives; other members on the team (e.g., lighting designers, engineers, architects, property managers); clients (sometimes see and hear about things); general contractors; and seminars.

Representative verbatim responses on how up-to-date the participants felt they were on the latest developments in lighting control systems are listed below.

San Francisco

- “Could always learn more.”
- “There’s a lot out there, but you tend to zero in on a few different systems or one system for a lot of people. But there’s a lot out there. It’s hard to keep up.”
- “The architect is really where it starts, so I don’t know anything unless someone says, you can get this light, this ballast is bad, and this light’s better.”
- “Once again, if I can save a lot in my electric bill and have an economic return, we’re going to do something. I don’t think about lighting that often. I get a couple management magazines that talks about saving energy and the latest and greatest. I’ll read a couple articles on it, but it’s nothing I really keep up with or am interested in.”
- “I think that I’m pretty well versed in the lighting control systems. But I think the newest thing that I’m maybe not 100 percent aware of is the DALI, the communication, and how DALI interfaces. I can’t really go into it more than that.”
- “Never heard the term DALI before.”
- “What is that (DALI)?”
- “I need to go to a seminar for it. It’s how all of, basically, your building . . . Everything kind of goes back to a brain at some point and with this communication system, the lights can interact with the different building systems. I don’t know exactly what can relate to it right now. It’s much more comprehensive communication and hopefully makes the building work easier, but I’m not really sure.”

New York

- “We need some more information. We don’t have enough. We need more updated information.”
- “I’m not sure (how up-to-date I am).”

- “Reasonably up-to-date.”
- “My thought is they’re working always and they’re coming with something new all the time.”
- “I think the thing is if you’re on the developer side, you’re going to be somewhat dependent on your set of engineers and electrical suppliers and contractors that you’re always working with. To some extent, I suppose, if a system came along, you could recommend it, and you could say, ‘Hey, could you look into this.’ But you’re going to trust their opinions. It’s more often the case where (the designers) will say to you, ‘Do you want to consider this system or this.’ Whether it’s from the contractor design side or from the architect, engineering.”

D. The Ideal Lighting Control System

Participants were asked to write down and subsequently discuss their thoughts on the most desirable lighting control systems for office buildings and schools. We found the following.

- ◆ Participants’ responses suggest that an ideal lighting control system should:
 - be user-friendly;
 - accommodate different needs in different parts of the office;
 - offer flexibility to the building owner (e.g., be able to adjust lighting to address new tenant’s needs);
 - incorporate daylighting; and
 - provide remote monitoring.
- ◆ Participants suggested that:
 - Open work spaces should use occupancy sensors and/or timing schedules to turn the lights on and off as needed, make widespread use of natural light (e.g., windows and skylights), and have a daylighting sensor and dimming to compensate for daylighting availability.
 - Small offices should use occupancy sensors to turn the lights on and off.
 - Conference rooms should use dimmers and presets to reflect different AV needs.
- ◆ Individuals in New York added the following suggestions:
 - Provide employees with individualized cards that would turn on the appropriate lights when the employee swipes his/her card upon entering the building after hours.
 - Have a computerized display when lights are out (e.g., error message) which is integrated into re-lamping.
 - Be able to turn lights off from remote locations.
 - Use wireless switches so the architect does not need to worry about creating walls to hide the wiring.

- ◆ Participants thought there would be more interest in applying expanded dimming capabilities if it was less expensive, but participants still questioned whether building owners would risk any added capital costs knowing that tenants change over time.

Representative verbatim responses on the participants' ideal lighting control systems are provided below.

San Francisco

- “I described something generic. I think the ideal one would be a switch that had a few labels on it, so anybody can figure out how to use it. Then it would have other hidden operating features that are totally automatic, a daylight sensor and a motion detector, and possibly remotely monitored, so somebody could even know if the lights were on or off, if they were to check a panel or PC control. That would be the ideal lighting control system. It would be energy efficient, would offer you some safety monitoring features and it would be convenient for users. I don't know if there is such a thing.”
- “For general use in the offices, I would say the occupancy sensors would be the way to go. These are just normal offices, kind of like rooms like this. Whereas for a special use or presentation or conference rooms, they're a little more elaborate system, where the general lighting could be dimmed or shut off and general task lighting would be switched, but these would all be on presets. They could be labeled, so you'd know what you were doing. But they would be preset, so that you would have the different settings already placed and you wouldn't have to fumble with knobs. Then, in the general circulation areas, I would say have them be timed. Actually, probably timed and be a light sensor, just to have that synced up with what the situation is inside.”
- “The other thing I was thinking was natural light. I just worked on a building downtown, where actually one side of the building is glass and the other side of the building was glass and skylights. It was all switched in the center and those were individually set up, pertaining to what area you were going to work in. Have a lot of natural light.”
- “I came up with, if you're building a spec building, means speculative, you don't have tenants in there and you're filling half the building. I would want a lighting system that'd be convenient and adjustable and have the ability to adapt to a different type of tenant. If it was heavy computer use and you wanted your lamps, not a lot of direct light down, or if it was an ad firm and they wanted a bunch of light. I don't want to hear it coming back to me, ‘Hey, this is going to cost you another hundred grand for this floor, because we didn't put in the right system.’”
- “This just happened in this last market. You had this big dot-com tenant that was coming in and they give you You spent all your money for this build-out and the company goes bankrupt in a year, so I'm stuck with this lighting system that they needed for heavy computer this and that. Now the new guy comes in and goes, ‘Oh, that doesn't work.’ So you've got to do something different. It's going back to a law firm or something.”
- “Ideal would be the automated time system, overridden by motion sensors and daylight sensors.”

- “In a typical office Let’s say this is an office here. You’ve used three lamp fluorescents. Definitely would have AB switching, where you would get three-level switching on here. It’s comparatively inexpensive. If you group two fixtures together, you can pair the ballasts, so there’s a small cost on using two-lamp ballasts or using in-between. But, basically, you have three levels of lighting. My basic approach would be to have your motion sensor turn on the lowest level of lighting, which quite often you have enough daylight in the place. Then have an override for the other two lamps, for the higher level of lighting, which would also be tied into a motion sensor, but it would have to be activated by the person coming into the room, to get the higher level of light, which I think would pay for itself and I’m sure, many times, cutting out unnecessary light where you’ve got plenty of light in the room.”
- “The other thing I find is just in thinking about the change of use in an office building. Generally, if people are on computers, it’s much nicer to have a lower level of general lighting and have more reliance on task lighting.”
- “That’s just the point I was going to make.”
- “Whereas if you don’t have that going on, if you have a bunch of offices with attorneys, they’re all going to want lighting.”
- “Especially with computer workstations. It’s a lower level. You’re getting the light closer to where you’re using it and you’re not lighting the whole space up.”
- “I think most lighting designers, if they had the choice, would try to use indirect lighting with computers, because then you don’t get reflections in the screens.”
- “There would be a lot more (dimming if it was less expensive) The ways I would see it changing mostly would be specific instances, like for the conference rooms or what not.”
- “That’s a tough question. I think it’s like who’s bearing the costs, whether it’s the tenant or the owner. It looks like the owner’s going to bear the cost upfront, in order to put these things in. No matter how inexpensive they are, he’s going to want to realize the payback on it. . . . My experience has been most of the time people want to increase the light level, even though they don’t need it. That’s working contrary to that.”
- “Yes, because I think in a space where you’re going to be renting out and the tenant is going to be remodeling or whatever. Like he said, if you’re putting that in, you’re going to have to be fairly confident that whoever you rent it to would find that particular feature desirable. You’d be taking a chance that even if the cost was lower, whoever you rented it to may not realize the benefit of that particular system.”

New York

- “I’d like to see the occupancy sensors, the dual capability ones that use infrared and motion combined. It’s like a dual technology. Because then you don’t have to wave your hands if you’re in a space. They’re more sensitive, they perform better. The perimeter offices . . . that would be the open space. Then I’d like to combine that same sensor with daylighting and dimming capability in the perimeter offices. I’d still want the occupancy sensor for on

- and off, but I'd also want it to be able to dim those lights that it's controlling, to take advantage of the daylight. One device that does both."
- "We just did a school and an office building using a very simple manual switch, where there's two switches on the wall and either all the lights are on or half them are on and the teacher just does that."
 - "My main thing is running low-voltage wiring across the switches and light fixtures. I want to see wireless switches on walls. All the wiring stays above the ceiling. That would get rid of the opened up office scenarios where you have partition walls that don't go all the way to the ceiling. There's always the issue of how does the architect hide the wiring to get down to the walls. That does away with all those issues. Does away with the issues of sensors being blocked, etc., etc."
 - "I know this system is starting to come on the market like this. It's the actual addressable lights, addressable switches, and they're all independently addressable and they can all be programmed so a switch you can have on the wall operates a line of lights there. You can go back into the data programming and now it controls that row of lights there and that row of lights there without any changes of switching. I think that's great. When you're dealing with an office building, the problem that you find also is on weekends you may have a couple guys coming in. You may not have the whole floor being occupied on the weekend. When you have that system, when you turn that switch off and this is it, they're not going to have light."
 - "In one of my buildings in Long Island, the building is cut into six zones. Everybody, when they come in, they know what zone they're in. If they work on a Saturday, they turn on their zone only. Go into the telephone, they dial the number, they turn on their zone. Certain people that have access. They're the people that are there on Saturdays, like the supervisors, the managers. They can go in, if they come in on Saturday and they have people with them in their zone, they can go in and turn on their zone. One sixth of one floor only lights up and it always lights the bathrooms."
 - "We're moving to an era in which every office worker carries their own little card and swipes that as they enter the building. All that's programmed in, as to what they might conceivably use and it's all reprogrammed when they're terminated."
 - "If we're going to be tied into a central computer, I'd like to see it monitor light fixture functions, whether lamps are out or not, and then also tie that into a schedule for relamping."
 - "Send me an error message when I've got a light out."
 - "What I want to see is a combination of all my buildings together. I want a computer-run building with multi-zones and telephone dial-in that I could turn it off at night and I know that somebody can always do it. I want private offices with timing devices with overrides. Infrared and motion, but I want to be able to override it, too."
 - "I'd like to have light sensors, not necessarily motion, but light itself. We have a lot of windows in all the buildings. I would like to see just when it gets dark the light would come on, not on a timer, just the light and brightness itself. One of my schools, they get

great light during the day, but they also have their lighting on, they have desk lamps on. They have everything on when there is so much natural light coming in. Use it.”

E. Reactions To DALI Type System

The moderator handed out a two-page overview of DALI (though the name DALI was not used). A copy of the handout is provided in Appendix B. Participants were asked to record their overall reaction to the concept, and write down the main reason why they felt the way they did. Participants were then asked to discuss their responses.

Figure 1 displays participants’ overall reaction to the DALI type system in aggregate and by location.

Figure 1
**Overall Reaction to Next Generation Lighting Control System
for Non-residential New Construction**

	Total	San Francisco	New York City
Very Positive	8	4	4
Positive	8	3	5
Neither Positive nor Negative	3	2	1
Negative	0	0	0
Very Negative	0	0	0

As shown in Figure 1:

- ◆ Eight of the 19 participants were “very positive” about the DALI type system and another eight were “positive.” Only three participants said they were neither positive nor negative, and none of the participants said they were negative overall.
- ◆ Responses were similar in San Francisco and New York.

Participants’ explanations for their responses revealed the following.

- ◆ Reasons given most often for being favorable about the DALI type system were:
 - Energy savings (e.g., reduces energy waste, saves money).
 - High occupant/tenant satisfaction (e.g., individual control over lighting, and flexibility).
 - Can be tied to natural sunlight coming into the office.
 - Presets/scenes in conference rooms (e.g., adds visual interest).
 - The information communicated by the system and computerized monitoring (e.g., failed lamps and ballasts).
 - Flexibility to do many different things based on personal preferences (e.g., vary by office, create scenes, dim lights based on daylighting, etc.).

- ◆ Other reasons given for being favorable about the system were:
 - It allows building developers/owners to have the system incorporated in the “backbone” at build-out and change lighting to meet the needs of a new tenant and/or charge a fee to those tenants who choose to take advantage of the system.
 - It enables manufacturer interface.
 - It adds value to the building due to benefits it offers tenants.
 - It allows tenants to adjust lighting for specific purposes.
 - It provides a lot of options for the designer to be creative.
 - It enables occupants going to work after hours to use the swipe card to turn on specific lights.

- ◆ Concerns about the DALI system mentioned by participants were:
 - Individualized controls will create problems in open space (e.g., employees fighting over amount of light there should be, and/or create lack of uniformity in lighting).
 - It may be very hard for occupants to use (e.g., individual control from PC).
 - They are skeptical that the system will really work as planned, and concerned that the company won’t be credible or financially stable.
 - They don’t believe there can be totally flexible lighting without flickering or blinking.
 - They need to see more details and know what the costs will be.

Representative verbatim responses are listed below.

Reasons for Overall Reactions Given During the Focus Group

Reasons Favorable

- “I love the energy savings, and occupant satisfaction. I’m in the business of tenant retention. I’m in the business of keeping tenants, acquiring tenants, so whatever I can do to have my tenants be satisfied. One lady I work with has got migraines. She has the lights off during the day, with natural sunlight coming in. I know other people like the lights on. That individual control (over the amount of light) is important. I like the digital recording analogy there from the CD, digital to analog. I like that it’s increasing the life of the lamp, which is going to save me money, once again the economic thing. You’re adding value to my building. You’re building in flexibility they talked about before. It’s paying dividends. I like all the levels of that.” (San Francisco)
- “This seems great. It almost, for me, meets right on what I was describing as the ideal lighting. It optimizes the lighting. It’s high-tech. It’s modern. It’s better. It saves energy. I think by doing the presets you can add a lot of visual interest so it’s attractive. I think things that don’t have to be controlled by users, if the building works for you and you have these presets, it could be tied into solar. If it reads that it’s dark, then it goes to that mode and the sun comes back, it goes to another mode. Allowing an individual to control the

light . . . maybe they've got one right over their desk. If they want that one to be a little brighter It seems like a winner all the way around.” (San Francisco)

- “I just like the idea of not wasting the energy. I believe we waste a lot of energy, especially in this country.” (San Francisco)
- “I think it's really interesting because, while it's very complex in the beginning and to document and to design, it's going to be really easy for the end-user to use. I don't like that anyone can control their light levels, but if you organize it in a manner where it makes sense how the light levels are being controlled, then you can think that out in advance and then kind of choreograph it. I think that's really slick. (As a designer) you can do a lot of fun things with it like it can be choreographed to movement or how you're occupying a space, different times of the day. The light levels could start lower and peak. It could kind of relate to the user and the time and the environment a little bit better. Like bluer lamps mixed in with the yellower lamps. You could do a lot of different things with it that could be really fun. We could sell these ideas to an architect or something and make the project kind of exciting.” (San Francisco)
- “I was a little hesitant to give it a ‘very positive,’ but it seems like a good system. It's a lot like the ETC sensor system, which is something that I was using before.” (San Francisco)
- “In his case, because he's got a new tenant coming in One person had a jungle gym. The other tenant is a bunch of computer guys. They're going to have to call us or someone else to come in and reprogram this if it's difficult. If it's really simple, he can just plug in his PC and go, ‘Oh, yes, well this one I want to do like this.’” (San Francisco)
- “It was economically good for the person paying the bills, as well as for the user. Also the energy conservation factor is a good thing. I think that should factor in a lot more than it does.” (San Francisco)
- “I had gone on a vacation and I called the paper to stop my paper for a week or something. Maybe you could do the same thing with the PC and say, ‘Hey, I'm going on vacation for a week, these lights don't need to be on, so save more power.’” (San Francisco)
- “Now everybody's worried about energy, so we have to start thinking about saving energy. Cost and environmental issues. If you're saving energy, then you're going to save money.” (NYC)
- “The ability of it to communicate, the back and forth. You don't get that. I thought it's kind of vital to a new system, just the advances that are being made, but to have a system that can do that and respond and let you know. Just like she said, she can dial up on the phone, it's great, you can access this stuff pretty readily. Unlike a lot of you guys, engineers, architects, I'm neither. I'm the manager, trying to keep track of all this stuff. Once you guys finish, I'm left with it and I need to be able to understand it in the simplest form. Once my engineer leaves, unless there's a big problem, he's gone, he's done. This project is finished for him, but I'm still the owner. I represent the owner and I'm still dealing with it.” (NYC)
- “Flexibility. You can do almost anything anywhere. There's different abilities to be able to do different things, the scenes, the settings. Lighting scenes, that you can control lighting

scenes. That you can control daylight sensors, dimmers, everything with one system. Do different things in different offices, depending upon what it's for." (NYC)

- "It seems to be a combination of the best of all features. You're going to get the energy savings. You can customize your lighting. And it seems to provide all the amenities to allow you to control the lighting in ways that most people who hate controls . . . for the reasons that most people who hate controls hate them. Always going off, not knowing what the hell this thing on the wall is. It seems to get past all that. It seems to accomplish everything at once." (NYC)
- "Failure monitoring is especially important. You don't really want to get up on the ladder and find out whether it was the bulb or the ballast." (NYC)
- "I agree with the flexibility of just being able to adapt. A lot of people, as businesses grow, they change and you revisit things. Being able to make those changes are great. You don't want to be locked into something. Whether you use the features or not, you want to have a choice." (NYC)
- "A lot of money saving, like he said. If there's something that's going to tell me that it's a ballast and not a light, not a lamp, I don't have to have my porter go check the lamp now. All I do now is call the electrician who comes and changes my ballast. It's not two people running to see the same thing." (NYC)
- "Print out a report that tells me, go change all these ballasts. That's beautiful. Electrician comes in, I hand it to him, thank you, go do it." (NYC)
- "But I think the beauty is the flexibility. You can do whatever fits your needs." (NYC)
- "I read this as it talks about it gives the individual occupants that flexibility, which makes them happier." (NYC)
- "Basically, if you're taking a new building and you're going to lease floors to tenants, you put this in as a backbone like BMS Riser and then, at each floor, you'd have a tie in point where, when you write your lease, it's like, 'Okay, give me \$20,000 or whatever.'" (NYC)
- "That's an excellent idea for a developer, to put this backbone in." (NYC)
- "It shouldn't be left to the owner to install all that, but I think the owner can provide flexibility. He can have it there. Okay, you come in as a tenant. You want it, you can get it." (NYC)
- "Then tie it into your swipe card system and you could swipe it and the lights go on." (NYC)

Concerns

- "My main concern, the reason I was hesitant to give it a 'very positive,' was because I have no idea what the control interface is going to be. You could need to know German and Japanese at the same time, upside down, in order to program this thing or it could be really straightforward. That's a big, big factor." (San Francisco)
- "Why I wasn't impressed? Well, it's all very good. You have systems that will almost do this, but you've got to show me the details in the money and what the cost is going to be on

- this thing and what are some of the other hidden costs. It's wonderful in concept. I'm just not impressed until I see the bottom line and what we're talking about." (San Francisco)
- "I'm wondering how It says the lamps can be turned on at any level without flickering or blinking. I just don't see how that's possible." (San Francisco)
 - "I was a little concerned about it being user-friendly. It said that you can do it from your PC, but can anyone do it from their PC? Some people are more challenged in that area than others. What exactly can happen?" (San Francisco)
 - "Also, too, if you learned anything from this last business cycle, you get a piece of paper like this, wow, this technology's great. Let's put it in all our buildings and do all this stuff, and there's no backbone to it. The system falls apart and they go bankrupt from there. I need something that's going to be proven from a big company that's going to back it up or it's been around for awhile before I just start jumping into all this. Those are the type of questions you're asking now that maybe you didn't really ask before." (San Francisco)
 - "I had problems with just the individual again, as well. One of the things you notice is heating. Some people are really cold. Other people are really hot with the same temperature. You'll likely find if you have a big open space with a lot of cubicles, one guy's controlling his lights, the next guy's controlling his lights. There's a lot of light being cast, not just from the fixtures overhead, but ambient lighting. You could easily have a big revolution on your hands, with people changing to fit their individual desires. (Someone says), 'I want it darker.' (And someone else says), 'Oh, no, I want it lighter.' I'm dialing it up. This guy's dialing it up." (San Francisco)
 - "If you're in a big open space, you wouldn't want everybody to have their individual controls." (San Francisco)
 - "This could be like a task light. You could have a minimum and a maximum. You've got to have this much and you can't have any more than that and there's override." (San Francisco)
 - "What goes into it? This is a concept. I'm sorry. I like to get into the details of these things. I am an engineer. I haven't put these things together and I'd like to see what's really involved. That's why I'm not impressed or unimpressed. Show me the product with the diagrams and how it's put together and the rest of it. This is very conceptual." (San Francisco)
 - "Giving everyone the individual control of their lights, whether they want to dim the lights or not dim the lights, I think is a problem. First of all, the overall architectural appearance of the space, as you walk down the hallway, this guy's You put your sunglasses on walking by one office. You go to the next office and it's, I'm exaggerating, it's dark. I think it loses a little uniformity. If you have an open office area and I'm the one . . . I come in and I like it brighter. You come in and, gee . . . and someone's got to put their referee shirt on to say, 'Let's just put it in the middle.'" (NYC)
 - "What I'd rather do is this. Lutron had a system years ago that I thought was great. It's a phasing system. You dim the fluorescent lighting, which you can do with this. You put the space in At that point you dim them 80 percent. Then as the time goes by, you're

dimming it then additionally 20 percent. A year later you're dimming it 15 percent. The next year you're dimming it 10 percent. After the last year of its life you dim it not at all. That way you get a uniform light throughout the spaces and you extend the life of the lamp. I like that." (NYC)

- "I didn't see this as controlling open space. A person being able to shut the light over their head would be ridiculous." (NYC)
- "I think the general manager should have that computer. The general manager should have that and he has the flexibility of doing it." (NYC)

F. Reactions to DALI Benefit Statements

1. Statement Believability and Motivation for Purchase

The moderator handed out six statements that described different features and benefits of a DALI type lighting control system. The six benefits statements are listed below.

Statement #1

Feature: This system has the ability to manually dim individual fixtures to "tune" the lighting to the occupant's preferences and needs.

Benefit: Allowing an occupant to control/dim his or her lighting based on individualized and changing needs increases the occupant's comfort, satisfaction level and performance.

Statement #2

Feature: This system provides additional points toward LEED certification.

Benefit: LEED certification can lead to major tax credits, and positions the building as a "green building" that is environmentally responsible and occupant sensitive; and this classification is becoming a major differentiator among high performance buildings.

Statement #3

Feature: This system has the ability to integrate the lighting with other building controls.

Benefit: Among other benefits, integrating lighting with other building controls increases occupant security by: creating a path of light for occupants who enter the building after hours; showing security which areas of the building are occupied; and flashing all lights to apprise security of a panic situation or security breach.

Statement #4

Feature: This system has the ability to reduce energy consumption and decrease peak power demand.

Benefit: Reducing energy consumption and peak power demand benefits society overall and reduces the owner/occupant energy bill.

Statement #5

Feature: This system is based on an open protocol.

Benefit: An open protocol allows devices from different manufacturers to co-exist without losing basic functions. It also encourages competition among suppliers, simplifies design, and ensures continued availability.

Statement #6

Feature: The system identifies energy consumption by area, and also identifies failed lamps and ballasts.

Benefit: This system improves building management and reduces maintenance cost.

Participants were asked the following questions about each statement:

- ◆ Is the statement believable?
- ◆ To what extent does the benefit associated with the feature motivate you to consider this type of lighting control system?

Figure 2 (see page 22) displays responses to these questions for each of the six statements. Included in Figure 2 is the overage motivation rating for each statement.

As revealed in Figure 2:

- ◆ None of the statements had a significant credibility problem, as each statement was described as believable by at least 16 of the 19 participants.
- ◆ The benefit statements receiving the highest motivation ratings were Statement # 6 (*provides management data/reduces maintenance cost*), and Statement # 4 (*is able to reduce energy consumption and owner/occupant power bill*). Specifically:
 - Statement # 6 had the highest mean (4.8) and the most “5” ratings on motivation. Also of note, Statement #6 had the most differentiation between San Francisco and New York participants, as all 10 New York participants scored it a “5” compared to about one-half of the San Francisco participants.
 - Statement #4 had a mean score (4.6) and many “5” ratings (N=12). Ratings on this benefit statement were similar for San Francisco and New York.
- ◆ The other four benefits statements had mean scores ranging from 3.7 to 4.2.

**Figure 2
Reactions to Feature/Benefit Statements**

Statement #		Believable		Motivation Ratings				
		Yes	No	5 A Lot	4	3	2	1 Not At All
6	Provides management data/reduces maintenance cost (average motivation rating=4.8) *							
	San Francisco	9	0	5	4	0	0	0
	New York City	10	0	10	0	0	0	0
	Total	19	0	15	4	0	0	0
4	Ability to reduce energy consumption and owner/occupant power bill (average motivation rating=4.6) *							
	San Francisco	9	0	6	3	0	0	0
	New York City	10	0	6	4	0	0	0
	Total	19	0	12	7	0	0	0
5	Open protocol benefits (average motivation rating=4.2) *							
	San Francisco	8	0	4	3	1	0	0
	New York City	8	2	3	4	3	0	0
	Total	16	2	7	7	4	0	0
2	LEED certification/green building/major differentiator (average motivation rating=4.1) *							
	San Francisco	8	1	3	4	1	0	1
	New York City	9	1	4	5	1	0	0
	Total	17	2	7	9	2	0	1
3	Better security through system integration (average motivation rating=3.9) *							
	San Francisco	9	0	2	4	2	1	0
	New York City	9	1	2	6	2	0	0
	Total	18	1	4	10	4	1	0
1	Individual tuning/improved occupant satisfaction (average motivation rating=3.7) *							
	San Francisco	8	0	2	5	0	2	0
	New York City	10	0	1	6	2	1	0
	Total	18	0	3	11	2	3	0

* The average motivation rating is calculated by summing the ratings across sites and dividing by the number of participants rating the statement.

Participants were asked to discuss their reactions to each statement. Their responses revealed the following.

- ◆ Participants said they reacted favorably to Statement #6 (*provides management data/reduces maintenance cost*) because the information obtained from the system will help them: plan budgets, compare products, identify power usage in different areas in the building, etc., and reduce maintenance costs.
- ◆ Participants said they reacted favorably to Statement #4 (*is able to reduce energy consumption and owner/occupant power bill*) because it is a “no-brainer” or “slam dunk,” as it conveys everyone’s concern with saving energy from both a cost savings and energy conservation perspective.
- ◆ Participants expressed mixed reactions to Statement #1 (*individual tuning/improved occupants satisfaction*). While some participants said having this type of personal control appealed to them, various concerns were expressed (e.g., not practical for open areas as people will argue and keep changing the lighting all day; too expensive; no real benefits achieved by dimming other than providing more light for older employees).
- ◆ Participants were typically favorable about Statement #3 (*better security through system integration*), saying security is a “hot issue” today and it is a nice added feature to offer tenants and employees. However, some property managers said it is not so important to them because they cannot sell space based on enhanced security due to concerns about liability issues.
- ◆ While participants expressed a desire for an open protocol, several participants displayed considerable skepticism about Statement #5 (*open protocol benefits*), as their prior experience suggests that more is usually promised regarding open protocols than is actually delivered (e.g., manufacturers want to keep it proprietary so they can benefit from the after-sale market).
- ◆ While some participants were positive about Statement #2 (*LEED certification for green building is major differentiator*), some participants were uninformed about LEED certification or questions its value (e.g., did not believe LEED certification generated large tax credits, found LEED certification to be more expensive than it was worth, or thought LEED certification was only of value to very large, high performance buildings).

Provided below are verbatim statements displaying participants’ reactions to each of the six benefit statements.

Statement #1

Feature: This system has the ability to manually dim individual fixtures to “tune” the lighting to the occupant’s preferences and needs.

Benefit: Allowing an occupant to control/dim his or her lighting based on individualized and changing needs increases the occupant’s comfort, satisfaction level and performance.

- “I gave it a 1.5. It’s possible, but it’s going to be really expensive to wire up each individual light to a separate control circuit. Cost prohibitive for any building of a decent size.” (San Francisco)
- “I don’t know. I’m just going to come back to a very, very famous quote. I forget which company, but there was a president, CEO of a huge computer company in the ‘70s. He said, nobody will ever want to have a computer at home. We just don’t know. When I was

done with this, I'm wondering, why don't we have this now? This is the future. This is where we're going." (San Francisco)

- “Again, at this point, yes, it's totally possible. This is something we can do. Are you going to have a 350 circuit dimming system or are you going to have a 48 circuit dimming system? A 350 circuit dimming system is going to cost you an amazing amount of money. The electrical contractor will bless you and your children, because he will be able to buy his place in Malibu after that. It's just going to cost a lot.” (San Francisco)
- “We've made a commitment to an office-less environment. The president of Cigna Healthcare Tri-State is in a cubicle. It's a big cubicle, but it's a cubicle. It just doesn't seem that this kind of feature would really help me much because I'm in an open environment. I have lights that everybody shares, so dimming one and not the other (wouldn't work) I think it's a good thing, but I don't think I would spend the money on it.” (NYC)
- “Just the ability to dim, I think is wonderful. The more control you have of your light, the better off you are. Obviously, there is control, your space versus someone else's. You can't infringe on someone else's and that's the problem I'd see with open areas.” (NYC)
- “I don't think the dimability control is one that can be justified as I don't think the cost can be justified by the benefit. The only benefit I really see is the age benefit. Older people and younger people like different levels of light. After that, I can't really see anything other than like the thermostat thing where the more control you give people, the more they're cranking things up and down.” (NYC)
- “Does anybody know of anybody who used that Johnson Control HVAC at the desk system? They came out with a system a couple of years ago where everybody could control their HVAC. Nobody bought it because the few people that did buy it in the beginning, everything was going up and down. Everybody basically, like the whole floor, went crazy because everybody was moving these controls all day.” (NYC)
- “I don't think from the owner's perspective it's anything that's going to lease or not lease the space. From the tenant's perspective, they don't want to bother. It is too much control.” (NYC)
- “For a tenant, I think it's a good idea. Of course, its cost has to justify. But as an owner, the idea, I guess, is in the back of my mind is (I can get more rent).” (NYC)
- “I only know from my own experience. I've never had any desire to adjust the lighting like that.” (NYC)

Statement #2

Feature: This system provides additional points toward LEED certification.

Benefit: LEED certification can lead to major tax credits, and positions the building as a “green building” that is environmentally responsible and occupant sensitive; and this classification is becoming a major differentiator among high performance buildings.

- “What tax credits? I don’t really know what they’re talking about here. I don’t see where you’ve got any great tax credits. You’ve got to show me.” (San Francisco)
- “LEED requires commissioning which is very costly. This can be prohibitive.” (San Francisco)
- “But it may look good on paper, so if your company is like this bigwig green corporate people, maybe they want to pay a lot of money to be LEED certified and get a platinum medal or whatever. But my company, we just moved offices, and while we may have designed to LEED certification, we didn’t actually get certified for it because it was cost-prohibitive in our situation. It wasn’t worth the cost associated with it for us.” (San Francisco)
- “It has to be a pretty large project for LEED certification to actually make a difference, as far as the tax credit.” (San Francisco)
- “It’s more for the attaboy-gold star to get your LEED certification for most projects, but it’d have to be a pretty big project to make that much of a difference in the tax credits.” (San Francisco)
- “Major differentiator among high performance buildings only. Again, we’re talking about one-tenth of one percent of the buildings.” (San Francisco)
- “There’s a project out on the pier, I think it is pier one-and-a-half. They put in a bunch of pumps and they put pipes down into the bay and they’re bringing up bay water that’s at a cool temperature. That’s an exotic thing and for them it was smart. It pays back, but they had to pay a whole lot of extra engineering. For anybody to be doing a normal, plain mill building, this LEED stuff is like trying to win a gold medal in the Olympics. People do it, but we’re not doing it.” (San Francisco)
- “Well, I do big projects. Smaller projects, you don’t . . . it’s not necessary. But on the larger projects, yes, it is necessary.” (San Francisco)
- “I’ve never heard of LEED until now.” (San Francisco)
- “Me either.” (San Francisco)
- “I’ve gone to a lot of LEED seminars and I consider myself fairly well educated, but when we say major differentiator, I don’t agree, as far as how we qualify major. I guess I question, also—but I’m learning right now, the fact that nine people said yes—what the general public thinks of LEED, who knows about it, who doesn’t know about it. When I go to these seminars, it’s all architects, engineers. But if I grab somebody on the street or a potential client, if you say yes, you’re going to get money back, they’re going to cue into it. But if you say what’s LEED, so it’s a city in England, right?” (NYC)
- “What is the tax credit? What does it cost?” (NYC)
- “And how many additional points are you going to get?” (NYC)
- “It’s all in an analysis.” (NYC)
- “In some markets, they’ll use that. They’ll sign you up with that. Some tenants will value that and certain ones won’t. To some tenants, they may be looking for that.” (NYC)

- “I don’t quite understand LEED as well as other people may, but I do a lot of green buildings. I try to get the energy source verification for my buildings. Didn’t come very close because of the lighting in the building. The reason I tried to get the energy star was because I think it will be a marketing advantage and might set that building apart from others. Right now, when the real estate market swings up and down, people start becoming very selective between what space they’re going to go into. Naturally, I think they’re going to gravitate towards a certified green building.” (NYC)

Statement #3

Feature: This system has the ability to integrate the lighting with other building controls.

Benefit: Among other benefits, integrating lighting with other building controls increases occupant security by: creating a path of light for occupants who enter the building after hours; showing security which areas of the building are occupied; and flashing all lights to apprise security of a panic situation or security breach.

- “Security is a big issue in renting out space. That’s a key issue. If you’re able to ensure that you’re able to have state-of-the-art type of security system, would you go to ‘A’ Building at the same price or ‘B’ Building?” (San Francisco)
- “I see this as free. If you’ve got all these other things, this digital computer control stuff works, as a free feature, it’s fantastic. Security is a big deal. We’re spending a lot of money on security. There are all these trends. ADA was a trend. Energy conservation is a trend. Now security is a hot trend. Last two years, hot trend.” (San Francisco)
- “I said two, because as a property manager, you never sell security. You don’t tell people we have this system that’s going to ensure your security. We don’t ensure their security I just don’t know that this would be something that we would sell I don’t know that it would motivate us to consider this type of lighting, based on the fact that we don’t sell the security feature, I guess.” (San Francisco)
- “We don’t guarantee, but in fact I’ve got major developer clients and they’ve got guards on duty and they’ve got signs in the elevator saying that (a) guard will walk you to your car. They promote features that they have.” (San Francisco)
- “What she’s saying from a legality standpoint, it’s like we don’t promote saying, ‘Oh, we’re a secure building.’ Somebody gets raped and they come back to say, ‘You said you were secure.’” (San Francisco)
- “I see a feature where somebody’s ready to leave. They worked late, it’s 2:00 a.m. If they pushed one of the buttons that was in their path, that entire parking garage that was really dim and dark is super bright until they get to their car. That’s a nice feature.” (San Francisco)
- “That’s a good preset. I’ve got to remember that one.” (San Francisco)
- “It’s a tenant amenity, so I like it also, too, along with, ‘Hey, the person can dim the light in their office and they can also have a security feature, too.’” (San Francisco)
- “Again, once you have all the digital stuff, this is free.” (San Francisco)

- “I had experience with a system like this. We had put in a stairway, the fire stairs in a building, we put occupancy sensors. Each one had a relay on it and as each occupancy sensor tripped, it would send us a relay that somebody was in the stairs that shouldn’t be there, because common people get out of the building, they go downstairs. We were able to sit there at the console and actually track someone entering the stair, alarm goes off. You can see the lights.” (NYC)
- “This day and age, security’s more important.” (NYC)
- “If somebody’s alone by themselves in an office late at night and they’re uncomfortable with something, if they can type into their computer and have the lights flash so that security knows that they’re there and there’s some trouble, I think that’s a great added thing for them.” (NYC)
- “I always like the idea of any kind of added security.” (NYC)

Statement #4

Feature: This system has the ability to reduce energy consumption (lighting and HVAC) and decrease peak power demand.

Benefit: Reducing energy consumption and peak power demand benefits society overall and reduces the owner/occupant energy bill.

- “No-brainer.” (San Francisco)
- “Save money.” (San Francisco)
- “Slam dunk.” (San Francisco)
- “Reducing energy consumption is a big (thing).” (San Francisco)
- “It will pay for itself.” (San Francisco)
- “Reducing energy consumption is a big concern for everyone. It’s just very high priority.” (San Francisco)
- “The other things are features. This is going to make you money.” (San Francisco)
- “ROI.” (San Francisco)
- “It’s going to save money.” (NYC)
- “Five with a caveat. It’s just that statement about the HVAC reduction. It needs to be quantified.” (NYC)
- “Saving on the energy bill. As I said, tenants pay part of the energy bill, so they would love it. It would be wonderful.” (NYC)
- “Again, saving money.” (NYC)
- “And we have a responsibility to save energy.” (NYC)

Statement #5

Feature: This system is based on an open protocol.

Benefit: An open protocol allows devices from different manufacturers to co-exist without losing basic functions. It also encourages competition among suppliers, simplifies design, and ensures continued availability.

- “This is great, but I questioned whether I should believe it or not. Whoever’s selling it is going to be making some money and they like to lock things in. I really question whether it’s believable.” (San Francisco)
- “This is the one I come the closest to not believing. Because I have no idea.” (San Francisco)
- “It exists. The open protocol exists. It’s the one I was talking about, DMX. There are other protocols that convert to DMX very easily and vice-versa. It’s there. How useful? General office building won’t have to really sync up with systems, typically. Not everyone’s going to need it to talk to another system, but if you do, and it has a standard protocol, great.” (San Francisco)
- “Everybody who’s got an addressable system says open protocol. Everybody who’s got one. As soon as you try to tie one of them open protocol systems to another person’s open protocol system (there are problems).” (NYC)
- “Honeywell, Johnson Controls, Carrier They say open protocol and you try to get them together. Forget it.” (NYC)
- “They’re sold much more aggressively than they produce.” (NYC)
- “The word open protocol should have about another three page statement attached to it. There are systems that integrate and there’s ways around it. But it’s like we’re saying, getting that control to work with that control, because he wants to plug his system into his, can be easy depending on who the vendors are, or it can be an absolute nightmare and cost you tens of thousands of dollars.” (NYC)
- “The experience has been in today’s manufacturing environment, whether it’s elevators, fire controls, whatever, when you’re dealing with technology, everybody wants to work on the razor blade model. They give away the razor and they’ll sell you blades. I just can’t see any manufacturer passing up that incentive. Otherwise, someone in China would produce the parts and why buy them here.” (NYC)
- “I think in theory you want it. In practicality, somehow, it doesn’t work.” (NYC)
- “When they sell the system, they tell you it’s open protocol. You try to buy someone else’s device and plug it in, it’s a little different.” (NYC)
- “But if they said it does not have open protocol, that would be a strike against it.” (NYC)

Statement #6

Feature: The system identifies energy consumption by area, and also identifies failed lamps and ballasts.

Benefit: This system improves building management and reduces maintenance cost.

- “Anything that reduces maintenance costs and improves building management, from a property manager’s standpoint, is a good thing.” (San Francisco)
- “The reservation I have is I can see where the feedback is upon this Every lamp or every ballast, at least, you’re going to have to have some kind of device that senses this and it’s money. I don’t know whether it’s going to pay for itself or not.” (San Francisco)
- “It’s a terrific, wonderful concept, but when you get down to it, if it costs you a million dollars” (San Francisco)
- “Like we’ve been talking all night - conservation.” (NYC)
- “Has information on how much energy each area is using. It would give me the lamp life cycles, ballast life cycles.” (NYC)
- “Gives me history.” (NYC)
- “You can budget lighting with this information. This information would help me a lot in that category.” (NYC)
- “It now tells me what my life cycle is. I can make decisions based on experience, because I have experience on how long things are working.” (NYC)
- “You can compare products, Sylvania versus Phillips or whatever.” (NYC)

2. Rank Order of Statements For Motivating Purchase

After discussing their responses to each statement individually, participants were asked to compare the six statements and individually rank order the two benefit statements that most motivated them to use this type of lighting control system.

Figure 3 displays the rank ordering of benefit motivation.

Figure 3
Rank Order of Benefits that
Most Motivate Consideration of "DALI"

Statement #		Total		San Francisco		New York City	
		1st	2nd	1st	2nd	1st	2nd
4	Ability to reduce energy consumption	12	3	7	0	5	3
6	Provides management data/reduces maintenance cost	1	11	0	5	1	6
1	Individual tuning/improved occupant satisfaction	4	3	2	3	2	0
3	Better security through system integration	2	0	0	0	2	0
5	Open protocol benefits	0	2	0	1	0	1
2	LEED certification/green building/major differentiator	0	0	0	0	0	0

As revealed in Figure 3, when forced to rank order the system's benefits:

- ◆ The benefit clearly selected as most motivating participants to consider DALI was Statement #4 (*is able to reduce energy consumption and owner/occupant power bill*) (ranked 1st, N=12; and ranked 2nd, N = 3), and the 2nd most motivating benefit to the focus group participants, overall, was Statement #6 (*provides management data/reduces maintenance cost*) (ranked 1st, N=1; and ranked 2nd, N = 11).
- ◆ While Statement #4 was the first choice in both locations, the San Francisco participants ranked Statement # 1 (*individual tuning/improved occupant satisfaction*) 2nd, while the New York participants ranked Statement #6 (*provides management data/reduces maintenance cost*) 2nd and had a tie for 3rd between Statement #1 (*individual tuning /improved occupant satisfaction*) and Statement #3 (*better security through system integration*). Thus, not surprisingly, San Francisco participants expressed more concern than New York participants with people in the building having individual control over their lighting, while New York participants expressed greater concern with security than San Francisco residents.

Focus group participants were asked to discuss the reasons for their rank order preferences. We found the following.

- ◆ Participants who ranked Statement #4 (*is able to reduce energy consumption and owner/occupant power bill*) 1st usually attributed it to saving money, while some emphasized the societal good (reduced energy consumption) equally.
- ◆ Participants who ranked Statement #6 (*provides management data/reduces maintenance cost*) 1st or 2nd said they ranked it so high because this feature of the system will: provide them with useful information (e.g., which fixtures/lamps are out, where money is being spent on energy consumption, benchmark information); save them money; help them prepare sound maintenance schedules; and enable them to make better use of maintenance staff (not just checking for burned bulbs).
- ◆ San Francisco participants who ranked Statement #1 (*individual tuning/improved occupant satisfaction*) 1st said it enhances the desirability of the space to potential tenants (provides owners/property managers a selling tool) and makes tenants happier (property managers' second greatest concern behind making money for the owner).

Representative verbatim responses are listed below.

Statement #4 (able to reduce energy consumption and owner/occupant power bill)

- “It saves the money.” (San Francisco)
- “Saving money, conserving energy.” (San Francisco)
- “It's both (the money and the energy savings), equally, I would say.” (San Francisco)
- “It's both.” (San Francisco)
- “Reducing costs improves the bottom line for the owner, but I think conserving energy is everybody's social responsibility.” (San Francisco)

- “For me it’s the money, period.” (San Francisco)
- “Absolutely it’s the money first.” (San Francisco)
- “You can save all the energy in the world, but if it costs you more money, you would not do it.” (San Francisco)
- “Saving money for the company is always great for you, the individual, for the company. And number two, the environmental issues are very real. I think we’re all aware of that.” (NYC)
- “And if you’re selling this system, trying to install it, that’s a thing you can quantify. You can put it there and there’s the numbers for you. This is what it’s costing. This is how much electricity you’re going to save. This is how long your payback’s going to be. Tuning a light to somebody’s comfort, how do you quantify that?” (NYC)
- “I agree 100 percent. Show me the payback. And it’s the right thing to do morally.” (NYC)
- “Well, obviously, the savings. I work with scientists. They would love this. They hate waste. It just would be a great overall improvement.” (NYC)
- “The same, cost.” (NYC)

Statement #6 (provides management data/reduces maintenance cost)

- “And I think Statement #6, while it can save money, it also seems like it could be a tool for us. It can tell you if this fixture’s out or those lamps are out, you can also kind of program your fixture schedule in there, your maintenance schedule. You can know that this fixture uses this type of lamp. There are a lot of things that we write into our spec that the end user probably never gets to see and we’re worried about them keeping it up-to-date.” (San Francisco)
- “The system identifies energy consumption by area. That’s what I really liked. Just again back to the cost thing and the run around thing is what we find. The run around. First, I’ve got to send someone to investigate. Second . . . if I know and it saves me a couple steps, it’s advantageous to me, from the management end. Again, I’m on the management end. It’s saving me some phone calls and some steps and I know it’s important to me.” (NYC)
- “I know one of the things that we’re trying to do is to track money back to areas, to departments, divisions, floors, whatever they should be, to hold them accountable for their money that they’re spending, whether they’re making more or spending. This would be a good tool for me to be able to say, ‘Well, your energy costs are this high and this group’s energy costs are this low.’” (NYC)
- “Informational. This type of information is very useful for me. In anything and everything I do, the more I can benchmark the facilities I manage, the more accurately I’m performing my job.” (NYC)
- “I like to see maintenance doing something else, other than changing light bulbs. You could use that body somewhere else and be more productive.” (NYC)

- “Searching for burned out bulbs, yes, is a waste of time.” (NYC)

Statement #1 (individual tuning/improved occupant satisfaction)

- “It’s a feature, #1 is a feature, and it’s a selling technique, a selling tool. The way the buildings are now, it’s hard to get people to rent them, so whatever you can do to enhance the desirability of the building, it’s going to be a plus in my book.” (San Francisco)
- “Because, obviously, as a property manager, while your first responsibility is saving money, increasing the owner’s bottom line, your second responsibility is to make sure your tenants are happy.” (San Francisco)

G. Barriers To DALI Type Lighting Control System

1. Perceived Major Barriers

Participants were asked what they thought were the major barriers to using the lighting control system described. After developing a list of barriers, participants were asked to rank order the greatest barriers to using this type of system and to discuss the reasons for their concerns. Figure 4 displays participants’ rank order of the perceived barriers to using a DALI type lighting control system. Please note that in San Francisco, participants included cost in their rankings, but in New York participants were instructed to assume cost as a given and exclude cost from the rankings.

Figure 4 (see page 34) and participants’ explanations of their ratings revealed the following:

San Francisco

- ◆ All nine participants ranked cost as the greatest barrier to using a DALI type of lighting control system.
- ◆ Concern about reliability of the system was the second greatest barrier (e.g., will the system work, and how long will it last).
- ◆ Two other barriers ranked highly by several participants were concern about ease of use (e.g., will end-user understand and be able to manage the system), and the manufacturer (e.g., support, credibility and warranty).

New York

- ◆ With participants asked to put cost aside, the two major barriers cited were reliability (e.g., does the system work, and will it stay on the market) and ease of use (e.g., needs to be understandable to facility managers).
- ◆ Four other barriers ranked by several New York participants were: proprietary software/compatibility (e.g., do not want to need to rely on a single vendor for upgrades and service); difficulty using the system in a retrofit; ease of installation (do not want to be tied to one guy for installation); and concern about the manufacturer (e.g., will not disappear overnight).

Figure 4
Barriers to DALI Type System

	San Francisco (Base=9)				New York City (Base=10)			
	Points*	1st	2nd	3rd	Points*	1st	2nd	3rd
Cost **	27	9	0	0	N.A.	N.A.	N.A.	N.A.
Reliability	9	0	4	1	14	1	3	5
Ease of Use	5	0	2	1	14	3	1	3
Manufacturer	5	0	2	1	6	2	0	0
ADA	2	0	1	0	0	0	0	0
Proprietary Software/System Compatibility	1	0	0	1	9	0	4	1
Ease of Installation	1	0	0	1	8	2	1	0
Lamp/Ballast Interaction	1	0	0	1	0	0	0	0
Aesthetics	1	0	0	1	0	0	0	0
Hard to Retrofit	1	0	0	1	9	2	1	1

* Points are calculated based on 3 points for each 1st place ranking, 2 points for each 2nd place ranking, and 1 point for each 3rd place ranking.

** For New York City, cost was described by the moderator as a given, and as such, excluded from the rankings.

Representative verbatim responses are listed below.

Reliability

- “Reliability. There have been all these great ideas and all these great inventions and people are going to change the world and this and that. Not a lot of it panned out. I want to know that this system has been in place, has been worked and has the kinks out. I want to make sure that that works.” (San Francisco)
- “Control systems are very complicated to document, so you want to make sure that once you have something specified, that it’s going to work and you’re not going to be getting a bunch of calls about it.” (San Francisco)
- “There are too many products being sold on the initial cost and not the long-term cost. It looks to me like you could more easily sell the thing on initial costs, perhaps, but the reliability comes in. Is it going to last the life of the building?” (San Francisco)
- “That’s what bites you in the butt, is reliability. You could put in the coolest Ferrari control system, but in a year or two, if it dies, you’re going to get calls and they’re not going to be happy. You’re not going to want to specify it again.” (San Francisco)
- “And then they only have one person who does the tech on it.” (San Francisco)
- “We’re not talking about dessert. We’re talking about meat and potatoes. You’ve got to have lights. If the lights are not on, there’s nothing happening in that building. It’s basic. It’s like water flowing.” (San Francisco)

- “I’d say the reliability of the system. You don’t want to put it in and then find out it’s not working. The stuff’s going on and going off.” (NYC)
- “Sometimes new products just don’t work.” (NYC)
- “And they take them out after a few years.” (NYC)
- “I wouldn’t want to be the first one to put it in, first on the block.” (NYC)
- “A lot of new lighting products have had problems in their first generation. Electronic ballasts came with a slew of problems from the residence issues to burnouts, followed by the dimmer light ballast which were very expensive and not reliable. There have been issues.” (NYC)
- “Show me the product. Show me the figures.” (NYC)
- “We’ve all bought products that didn’t work.” (NYC)

Ease of Use

- “The user interface is key.” (San Francisco)
- “Once it’s in place, can the people there manage it?” (San Francisco)
- “User-friendly. You (need to be) easily able to understand it. Even the facility managers.” (NYC)
- “If you have features that you don’t understand how to use, then why bother giving them to me?” (NYC)
- “The engineer’s gone, the architect’s gone, and I’m left there with a manual this thick.” (NYC)
- “If the final client’s not happy, no one’s happy.” (NYC)

Manufacturer

- “I’m not going to know how to do this. I want someone from the company to be there to do it.” (San Francisco)
- “Warranty. That’s a big thing.” (San Francisco)
- “The integrity of the manufacturer. If it’s a manufacturer that’s been there a long time, I know I can take more of a chance on reliability, because I know they’re going to back it up. If it’s a company that just started up, I’ve never heard of them, I certainly would not want to be the first one to put it in.” (NYC)
- “Not disappear overnight.” (NYC)

Proprietary Software

- “Proprietary nature, if you’re going to be reliant on software upgrades and available features to a single vendor.” (NYC)
- “How much is it going to cost me down the road to upgrade my program?”

- “This is like the BMS systems. He’s probably going to break even (on the sale). Where he’s going to make his money is selling you continued service, all the add-ons and attachments to the system.” (NYC)
- “That’s what I meant by proprietary. It’s kind of an ease of maintenance or continued lifespan. It’s breaking out the cost of the initial installation versus the cost down the road, because you have to go to one guy.” (NYC)

Ease of Installation

- “It has to be easily installed by the same union and non-union electricians as all the other ones.” (San Francisco)
- “I suspect you’ll get a lot of questions from the building department and the fire marshal, too. Because you’ve got all kinds of security features in there, fire features on it, emergency lighting, and all that other stuff that’s in there.” (San Francisco)
- “Contractor skill level required to do the installation. In other words, are you going to be tied to having to use one guy?” (NYC)

2. Ways to Overcome Perceived Barriers

Participants were asked for their thoughts on ways to overcome the barriers they listed. Participants offered the following suggestions:

- ◆ Document the system’s reliability through:
 - showcase installations;
 - statistics that backup its reliability;
 - references who can discuss the system’s reliability;
 - brand name;
 - a good warranty; and
 - sound quality assurance, and market testing techniques.
- ◆ Have excellent support by having:
 - replacement parts available in every major city, and having guarantees for fast replacements;
 - a 24-hour customer service support line; and
 - troubleshooters in every major city to ensure a technician can be there quickly.
- ◆ Provide a user-friendly manual that:
 - is clearly-written;
 - is short;
 - is available online; and

- includes a “quick start,” less inclusive, directions component.
- ◆ Make it easy to use for the building’s maintenance staff.
- ◆ Provide a fail-safe feature to ensure lights can be turned off and on manually if system goes down.
- ◆ Allow differentiating the amount of lighting control on an individual basis.

Representative verbatim responses are listed below.

Document Reliability

- “You have to have some statistics that back up the reliability of the system. You’re not going to go out and buy a car that is disposable in two years. You’re going to go out and look at a car that’s been proven to be reliable.” (San Francisco)
- “References (that show) the product has been up and running for two or three years.” (San Francisco)
- “(Develop) showcase installations and people can go and see it there.” (San Francisco)
- “Need a good name.” (San Francisco)
- “Brand name, somebody you’ve heard of that’s been in business for a long time.” (San Francisco)
- “Make sure it’s not lights.com.” (San Francisco)
- “Have a good warranty.” (San Francisco)
- “Show us an installation. Show us something that works. Give us a model. Do something.” (NYC)
- “Quality assurance in manufacturing and then market testing.” (NYC)
- “Visiting other installations and talking to the people, talking to the manager.” (NYC)

Provide Support

- “There needs to be replacement parts in every major city in the country. They need to have a 24-hour or 12-hour or 6-hour guarantee. You’re going to get that part replaced in six hours. It’s there and it’s their own licensed techs or whoever and there’s a program in place. It’s not like, ‘Oh, we didn’t know that was going to break.’ We’ll get that from Japan in a couple of weeks.” (San Francisco)
- “I think six minutes is more appropriate, not six hours.” (San Francisco)
- “24-hour customer support.” (San Francisco)
- “That’s a big thing.” (San Francisco)
- “And people that you’ll have in, hopefully every city, but the major cities that can go out and troubleshoot if there are problems. The client doesn’t want to have to call a contractor and get on this schedule and how many weeks to get something fixed. If there’s a problem

at a job site, you guys need to be able to send someone out there to address it.” (San Francisco)

- “Like the elevator guys that come out to the buildings every other day.” (San Francisco)

Provide Easy to Read and Use Manual

- “Have the owners’ manual only one page. A one-page owners’ manual.” (San Francisco)
- “Clearly written.” (San Francisco)
- “Don’t make the manual 2,500 pages.” (NYC)
- “Write it in plain English.” (NYC)
- “Give (a manual) online so we can search for something.” (NYC)
- “Always give the quick start directions now. I want the quick start for everything.” (NYC)
- “Provide a real simple idiot’s guide. You don’t want to know the ins and outs. You want it, but you want a quick start. Maybe down the road, I might want to know about those details.” (NYC)
- “You might want to understand the exact electronics, but you don’t need it on day one.” (NYC)

Make it So Maintenance People Can Maintain the System

- “I think it’s more about being able to give the maintenance people who you already have on your staff the tools and knowledge to maintain it, as opposed to having to call in a consultant every time something goes wrong.” (NYC)
- “So you can program yourself.” (NYC)

Have Fail-safe Feature

- “One design feature might be some built-in redundancy. Something can break, but you don’t lose everything. Maybe you don’t have all the control, but you always have lights. A fail-safe operation that buys you a little bit of time. You don’t need the bells and whistles, as long as you’ve got the lights for the day.” (San Francisco)
- “You can turn it on in the morning, turn it off at night.” (San Francisco)
- “You can go manually.” (San Francisco)

System Should Enable Giving Different Occupants Different Levels of Control

- “There could be different levels of users. The simple user can control one light. Somebody else would program in all these other things.” (San Francisco)
- “Or like the original programming can be very intensive and figure out what groups are going together and everything, but then once that’s blocked out, then they can reprogram

how high their lights come on every morning in their private office. If they like it really bright, they can come on at full bright. If they like it only halfway bright, then they can come on. Or if they want it to turn off at lunch or something. They can program some things, but I don't think it's good for them to have the full range of programming. There should be some sort of lock-outs." (San Francisco)

- "It's kind of like ordering a telephone system." (San Francisco)

H. DALI Price Sensitivity

Participants in San Francisco were asked how much more they thought a tenant would pay per square foot for a building that has the type of lighting control system described during the focus group. The moderator also asked participants in San Francisco how much they would pay for the system on top of the customary build-out rate (described as \$65 by the participants). Participants were also asked how fast the expected ROI would be.

San Francisco participants' responses to these questions revealed that:

- ◆ While participants liked the system a lot, they did not feel tenants would pay a lot for this light control system as the real estate market is very soft in San Francisco (25% - 35% vacancy rate), and they "want you to do everything for them."
- ◆ Some participants said tenants would not pay any additional rent and others said about \$.05 more per square foot per month (added to current rent \$.85 cents to \$1.50 per square foot). Participants indicated they would be willing to add \$.25 to \$1.00 to the \$65 build-out (currently includes about \$4.00 - \$5.00 for lighting).
- ◆ Some participants said that some large corporations would pay for it recognizing its benefits over a long period of time but that it would not be a good bet on speculative office buildings.
- ◆ Participants thought most corporations would have a five-year expected ROI, but that universities and public institutions would be longer (e.g., 10 – 20 years) as they are "good corporate citizens."

San Francisco

How Much Pay Per Square Foot

- "Five cents."
- "Five cents, also. We agreed on that."
- "I said not much. Well, five cents. I said it's an unproven system. It reminds me of smart buildings. Ten years ago, all buildings were going to be smart and realtors were running around, 'Hey, you've got to move into a smart building.' Whoever heard of a smart building lately?"
- "No additional rent, especially not in this market."
- "Exactly."
- "None, also."

- “I’m only paying 85 cents a foot.”
- “Maybe two years ago, you could get them to pay for anything and everything. But nowadays, tenants are coming in and they want you to do everything for them.”
- “I hear that story about the vacancy and everything, but”
- “Vacancy rate now is 35 percent.”
- “25 percent to about 30 or 35 percent. It depends how you look at it. It’s a lot. They say there’s a ten-year supply of office and industrial space.”
- “It’s always driven by the economy.”
- “It’s also based on the fact that I don’t think your speculative office building is your real market. I think your real market is going to be with the corporate user who’s going to recognize the benefits over a longer period of time.”
- “People are going to have to look at the actual energy savings and you can certainly charge that much. Then the features are worth a little bit more.”
- “If it’s that good, it will pay for itself.”
- “It’s always based on economics. Show us that it will pay for itself in a reasonably short period of time, and that may vary with the economic conditions, the time period, but basically that’s it.”
- “Most of us are in the zero cents to five cents range, except for one. In fact, you look at people are paying a buck to two bucks a foot right now, depending on how good quality it is. That’s carpet and that’s bathrooms. That’s space. That’s everything. This is just one little feature. I might use it to pick that building over that building, everything else being equal. But why would this one little feature Because I still have lights. It’s just more control and all these other little goodies. Unless that energy payback is there, these features are tiny little things that are worth a couple of cents. Am I going to pay 85 cents a foot or 90? That’s about it.”
- “A class ‘A’ space – is running at a buck-fifty.”
- “I just signed a new lease, after four-and-a-half years, and I’m at a good time right now. I went to my landlord and I said, ‘I want to renew my lease. I want to pay half of what I paid before. I’ll pay a buck-fifteen.’ They said, ‘Oh, that’s ridiculous.’ You know what they signed? Eighty-five, because they made me walk around. Some people would let me move for 85. They were meeting 85 and they could have signed me to a buck-fifteen. They said, ‘Yes.’”
- “I think it’s a bad gamble to put the system in, because you’re definitely going to pay thousands and thousands and thousands of dollars for something like this. There’s no way it’s in the hundreds of dollars range. So what you’re going to be doing is gambling on, will my tenant need this? If they do need it, if it’s something that they really, really need, they’re going to be more in his range. But I think on the average, most people aren’t going to need it. That’s why we’re cutting back to the five-cent range. Most people will think,

‘Hey, that’s kind of nifty.’”

How Much for Build-out Beyond \$65 Average

- “How much electrical is in that \$65 now?”
- “Not very much, because it’s coming out of my lighting budget and I don’t want to pay for dimming ballasts everywhere.”
- “Again, pay zero. It’s got to pay for itself on a return. It’s still an economics thing.”
- “Out of that 65 bucks, the lighting alone is what? - four or five bucks? So how much would you pay for this kind of lighting versus that kind of lighting? No way would you pay 50 percent more. Maybe you’d pay 20 percent more. You’re in the 25 cents to a buck a square foot premium. That’s what people would pay for this. Then you look at the payback. If there’s a lot of energy savings, maybe more. You’re in that 25 cents to a buck. Your \$65 project may be a \$66 project.”

What Would the ROI Need to Be

- “Five years.”
- “Three to five years.”
- “I think five is more realistic than three.”
- “Five is the high end.”
- “Institutions, a university or a public building, they might go ten years. Corporate America, it’s four or five years.”
- “Everything’s shorter for corporations. They might not even be in the building after five years.”
- “I’ve been (at a company) where they had a corporate policy. It was three years. If it didn’t pay out in three years, they wouldn’t do it. They owned the building. They have money. They can make money with their money. If it doesn’t pay off in three years, they’re going to make more money doing something else.”
- “On the other hand, you work for municipalities, you do studies, and it can be 20 years. They would consider 20 years sometimes.”
- “They’re doing it because they’re good public citizens.”
- “It would be good to promote cost savings. On a university campus or a corporate campus, where there are all these buildings tied in together, and suddenly you have this software where you can see where fixtures are out or where this is out or that’s out, then maybe the maintenance costs are reduced, because you don’t have to have some guy in every building or something. I personally wouldn’t want to spend a lot of money on the dimming system in the overall lighting scheme. That just means the money is coming out of the fixture costs, which are already We already get beaten up on lighting a lot whenever the project’s over budget. They always come to us.”

Participants in the New York focus group were asked to think of the money spent on lighting fixtures, carpeting, the lobby and lighting control, and to write down how much they would allocate out of every \$100 beyond standard expenditures across these four items. We found:

- ◆ Overall, participants said they would devote the largest percentage to the lobby (33%), spend somewhat less on lobby fixtures (26%) and the lighting control system (25%), and spend the least on carpeting (16%).
- ◆ Engineers and lighting designers put more money into the lighting control than did the other participants. Building owners and managers emphasized the lobby saying prospective tenants see these improvements right away and that would increase the building's marketability. Carpeting was de-emphasized because they felt color and pattern was more important than upgrading cost.

Representative verbatim responses are listed below.

New York

- “I have \$40 for lobby, \$30 for carpet, \$20 for lighting fixtures, and \$10 for lighting controls. To me, the lobby is a hell of a lot more important, the nice carpet, the visual stuff right off the bat, a light fixture. I'm an architect, I'm a designer. That's what's important to me.”
- “\$30 for lighting fixtures, \$30 for lighting control, \$25 for the lobby, and \$15 for the carpet. I'm an engineer. A carpet is a carpet. The lobby, a lot of that lighting control is going to go towards the lobby. We're going to have some nice finishes in there. With the lighting control, I can make the space look a lot better finished than it really is.”
- “I have \$40 for carpet, \$30 for the lobby, and \$15 for lighting fixtures and for lighting controls. I get a lot more bang for my buck on carpet. You're going to see it right away. Lighting is supposed to be something that you don't notice. It's supposed to make you comfortable. You're not supposed to look up and say, 'Oh, nice lights.' People come in and they see a carpet and they're much more drawn to that.”
- “I had lighting controls first, \$40. I think lighting is very important. It sets the whole ambiance.”
- “50 percent lobby, just because that's a very marketable benefit; 5 percent carpet, because half of that is picking the pattern and shade. I wouldn't enhance it very much. I'd rather spend the remainder, 25 on nicer fixtures, maybe 20 percent is a reasonable percentage for enhancing those cost savings or using better controls.”
- “I left carpet off. We have a variety of colors and patterns and textures. They've all cost the same per square foot for my company. We've got some executive areas where they're upscale, but we could live without them. After that, I'm kind of splitting them all three ways. I gave light fixtures and controls \$35 and the lobby itself \$30. I do think lighting fixtures can change the ambiance tremendously.”
- “I gave \$30 to light fixtures, \$10 to carpeting because you can always change your carpeting out later. If you go to change your light fixtures out later, you're looking at a

bigger deal. \$30 in the lobby and \$30 on controls. We always wind up valuing engineering lighting controls in the end. The number of times we've gotten rid of dimming altogether and said, 'Okay, we'll have every other circuit so you can do half the space on and half the space off.'"

- "I did \$50 for the lobby. At the other end I did \$10 for carpet for pretty much the same reasons. Carpet, you change it every couple of years. Energy is probably 30 percent of my cost in occupying the space. I've got 20 percent on lighting fixtures and 20 percent on controls. I may get the money back and I can architecturally enhance the space with the fixtures."
- "My lighting fixtures 30 percent, carpeting 20, my lobbies are 40, and my lighting control is 10. We have to get the person inside. We have to get the person interested. I'm working on a deal for a condo at \$1.4 million. My lobby, my Venetian plaster is important. My lighting control, they can bring someone in. I have to sell the space. I have to get them in."
- "I have lighting control at \$40, because again we're talking about energy. You could have a great lobby, if you don't have your light, they're not going to see anything. Carpet is \$20. You can have the best carpet in the world, you don't have lights, they're not going to see it."
- "It is very interesting to know what everybody does and then hear these things, because if you'll notice the engineers have one idea, the architects have different ideas. The lighting guy walks in a space and looks up."

VII. MANUFACTURERS FOCUS GROUPS

A. Goal

The goal of the San Francisco and New York manufacturer focus groups was to provide manufacturers involved with DALI the opportunity to: (1) discuss and debate what they heard during the designers/end-customers focus group immediately after the focus group session; and (2) begin the process of brainstorming the implications of the designer/end-customer focus groups for marketing DALI.

Manufacturers were first asked to summarize some of the key findings from the focus group they observed in order to get everybody on the same page. The moderator then asked some questions to initiate and facilitate the discussion process. However, unlike the designer/end-customer focus groups, where a formal, moderator's discussion guide was used to ensure participants addressed specific topics and issues of interest to the manufacturers, the manufacturer focus groups were less formal with most of the discussion self-directed by the manufacturers participating.

B. Summary of Designer/End-customer Focus Groups

Manufacturers were asked a few questions to create a brief summary of the information gleaned from the designer/end-customer focus group so that manufacturers could be on the "same page" when discussing their reactions to the participants' comments. Manufacturer summaries are provided below for the San Francisco and New York focus groups.

How knowledgeable were the designers and end-customers regarding lighting control systems?

San Francisco Focus Group

- ◆ The manufacturers felt that with a couple of exceptions (e.g., lighting designer and engineers), the San Francisco focus group participants were not very knowledgeable about new advances in lighting control systems.
- ◆ The manufacturers felt the discussion showed that efforts to educate the target audience on the importance of lighting control systems and DALI have been unsuccessful.
- ◆ The manufacturers said participants did understand that the energy code was the big driver behind installing lighting control systems.

New York Focus Group

- ◆ The manufacturers said that most of the participants seemed fairly knowledgeable about lighting control systems, as various participants mentioned: motion sensors, scheduling systems, protocols, user control, and the system's impact on ceiling uniformity.
- ◆ A few participants were viewed as less knowledgeable due to their roles.

What do designers/end-customers want in an ideal lighting control system?

San Francisco Focus Group

- ◆ The manufacturers said that participants want a lighting control system that is: cheap, simple, reliable, flexible, and a good value.
- ◆ The manufacturers felt the participants want a system that reduces energy consumption, but they would only purchase a system to reduce energy consumption if there is a fast ROI.

New York Focus Group

- ◆ Manufacturers said the participants were most concerned with energy savings (for environmental and cost savings reasons), data management, and flexibility.

How do designers/end-customers feel about a DALI type of system?

San Francisco Focus Group

- ◆ Manufacturers said that participants liked the system conceptually, but that participants were very skeptical as they viewed the system to be unbelievable. Manufacturers said skepticism existed even though there are showcase facilities and many presentations available in the area.

New York Focus Group

- ◆ Manufacturers said the New York participants were favorable about several aspects of the concept described, but: (a) were skeptical that they could deliver on this system; (b) did not want to have to deal with problems fixing the system, and (c) did not believe that an open protocol would work.

- ◆ Manufacturers did not view the participants as “early adopters.”

Which benefits/features most resonated with designers/end-customers?

San Francisco Focus Group

- ◆ Manufacturers said the two benefits that most impacted participants both involved saving money: using less energy and reducing the power bill, and lowering maintenance costs through data management.
- ◆ One manufacturer said another major factor that surfaced which related to money was security; with owners and property managers concerned about their liability if a tenant gets hurt.

New York Focus Group

- ◆ Due to time constraints, the moderator used flip charts to briefly sum up focus group participants’ comments, and the manufacturers concurred that participants described the major benefits as: lower maintenance costs due to management data, and reducing energy consumption and the power bill.

What were the major barriers to designers/end-customers purchasing a DALI system?

San Francisco Focus Group

- ◆ Manufacturers said the major barriers cited by participants were concerns about: cost (the greatest barrier), reliability, ease of use, and ease of installation.

New York Focus Group

- ◆ Due to time constraints, the moderator used flip charts to briefly sum up focus group participants’ comments and participants concurred that the major barriers raised by the participants were concerns about: reliability, being user-friendly, and the proprietary nature of the system.

What did designers/end-customers say could be done to address major barriers?

San Francisco Focus Group

- ◆ Manufacturers said participants indicated they want a three-year track record to convince them of the system’s reliability.

New York Focus Group

- ◆ Not discussed.

Representative verbatim responses are listed below.

Participants’ Knowledge About Lighting Control Systems

San Francisco

- “Do you want to do it on a zero-to-five basis? (It’s a) 0.5. Some of them were 30 years out-of-date and none of them were up-to-date. Some of them may have been up to about three years to five years ago, up-to-date.”
- “They knew that the energy code was a big driver. Their experience was directly related to that.”
- “Only one was up-to-date. The lighting designer, the woman.”
- “That guy on the end was pretty good. He was close to second. But he wasn’t bad.”
- “I’m not sure you can characterize some of those people as out-of-date. It’s not an area they’re in. They hire consultants for some of that stuff.”
- “But I think you could also say that they were very typical.”
- “But he (property manager) knew what gets tenants into a space, what sells the space.”
- “I think the key thing is that we said that only one person was really up-to-date. All the other people weren’t. That means that the educational process has not worked. It’s not critical; it’s not at the top of their chart of things that they pay attention to.”

New York

- “(They are about) five years behind.”
- “I don’t know about that. I think they made reference to the Lutron Systems. They’re very familiar with (motion sensors). They all got up and waved their arms.”
- “They made distinctions between scheduling systems and time-out systems.”
- “Protocols.”
- “There were some guys with some pretty sophisticated systems. Bill made the distinction that he didn’t want to give over control. He was aware of individual control in open spaces and issues with non-uniform lighting in the ceiling. So these are some pretty advanced folks.”
- “You also had some people (who weren’t). For instance, the one woman sitting over here didn’t even know that you could do daylighting.”
- “But she knows how to make a space attractive and that is her field.”

What Designers/End-customers Want in an Ideal Lighting Control System**San Francisco**

- “Cheap.”
- “Cheap, and simple.”
- “They wanted high value. They wanted low cost and lots of features.”
- “Flexibility.”

- “One thing we have to keep in mind is, they did distinguish audiences really clearly. They said you’ve got the institutional, corporate and then you’ve got the spec builds. They’d make decisions differently.”
- “Reliability.”
- “The one thing I heard several times is keep it simple. It came from the lighting designer. I heard it from multiple lighting designers here in San Francisco. Keep it simple. The lighting designer does not want to be the commissioner of the system.”
- “He doesn’t want to get phone calls. They hate phone calls.”
- “They realize that digital systems require more commission and they don’t want to do it.”
- “One thing that intrigued me is they kept saying that energy was a big motivator and they made a point of that, but they never put that in the context of the decision. They always defaulted to, well, if it doesn’t pay back, forget it.”
- “Right at the beginning, the ideal system is daylight sensor which was first. Motion sensor was second. Pre-set was third. Time sequence was fourth.”

New York

- “Flexibility and cost savings, energy savings were the two.”
- “And I thought the environmental responsibility ran pretty high, too.” (*several*)
- “Yes, save money and environmental responsibilities seemed to come out pretty high and that was on the reducing energy consumption and then the maintenance ranked second.”
- “The data management was the key point.”

Reaction to DALI Type System

San Francisco

- “Very strong. They really liked the feature set that you passed out. There was a very strong response to that.”
- “But it was kind of unbelievable to them.”
- “Yes, they couldn’t believe it.”
- “It’s highly conceptual and it has nothing to do with what you have available.”
- “I think all of them had trouble envisioning it.”
- “But it goes back to that education thing. Even someone, a lighting designer here in San Francisco, is not aware of a facility that was done to create that showcase.”
- “And we’ve done ten presentations on them and written two articles.”
- “The two that were (not favorable), they were more from a cost standpoint.”

New York

- “There were sections that they were very favorable about.” (*several*)
- “But, skeptical that it could deliver.”
- “They don’t want to be embarrassed buying a system and then not knowing how to fix it. They don’t want to call in an electrician today Calling an electrician today is a few hundred bucks.”
- “The open protocol is almost a red flag going up saying, look out, these things don’t work. There was kind of a Catch-22 . . . they were afraid of an open system that manufacturers had to work together, but then they’re also afraid that only one manufacturer would have it.”
- “I thought they gave the impression that they’re not very happy with the contractors who install.”
- “It wasn’t a room filled with early adopters.”

Features/Benefits that Most Resonated

San Francisco

- “Two things that stood out were the things that save money. So the energy savings and the maintenance savings. They were all, like, ‘Hey, if it saves money it’s great.’”
- “Energy savings is a given. The maintenance thing is okay. But, I think the most interesting thing that came out of this for me were the comments about security. In my thinking in my brain, I try to think of, what are the hot buttons that make people do things? Not, what are the benefits, but what are the reasons why they do things? There were a couple of them that came up about the security thing.”
- “The number one driver for people to do things is fear. Fear. Fear of this or the fear of missing something. And security goes right to the fear thing. And those were some of the property managers and the owners who are the ones that actually make the decision to do something. That was the nugget that I got out of it, the security thing was important and it was a benefit. They’re not thinking about how much our system costs, they’re thinking about how much money they lose if somebody gets hurt. The liability, you know?”
- “Yet she was saying they can’t market it.”
- “I think that security was the most controversial.”
- “The point about it was they don’t use it, but I think the level of importance was the key thing. It’s something that we can sell to them because they think it’s important. They don’t use it to sell to the tenants necessarily.”
- “No, I think what I was trying to say is that, yes, they’re not going to push it and tell people they have that system, okay? They don’t want people to think that they have a foolproof system, but if you can say, this is going to improve your security in your building, they’re going to say, ‘You know, what? That’s a good thing.’ They’re not thinking, I’m going to tell people about it, but I’m going to make sure that I don’t have a problem.”

- “They’re not going to charge another nickel for it. They don’t think they get anything for it, which is right.”
- “The designers are basically risk averse. They do not want to get a call that something went wrong.”
- “So they want to decrease their risk in all elements.”

Barriers

San Francisco

- “Cost.”
- “Reliability.”
- “Simplicity.”
- “The ease of installation, too, and I just kind of combined those two into simplicity. The simplicity of installation and operation.”
- “But the underlying barrier is cost. That’s the central problem, it costs too much. I saw it mentioned at least twice. The dimmable ballast costs too much. The designer said, ‘I can’t afford to take a bunch of dimmable ballasts out of my lighting budget. I won’t do it.’”
- “I don’t think anyone is going to argue with you about it. Everybody agrees.”

C. Brainstorming on Implications and Strategies for Marketing DALI

Manufacturers discussed their reactions to the designer/end-customer focus groups, and brainstormed some implications for effective marketing. Some of the key points from the San Francisco and New York manufacturers focus groups are provided below.

Manufacturers Observing the San Francisco Focus Group

Addressing Need for Documenting Reliability

- ◆ Manufacturers observing the San Francisco focus group expressed great concern about the target audience’s desire for a three-year track to be convinced of the system’s reliability as they felt they could not wait three years to sell the system. It was suggested that showcase demonstrations and early adopters are needed to document reliability since there is no history.

Addressing Concerns About Cost

- ◆ Manufacturers said that lowering costs to address target market cost concerns is very difficult because the economies of scale in manufacturing dimmable ballasts make it difficult for manufacturers to bring the costs down.
- ◆ Ideas for addressing cost concerns were: (1) develop less expensive versions of DALI (e.g., multiple light level system without dimmable ballasts); (2) market DALI by suggesting target companies shift some of their tenant upgrade expenditures to lighting controls from carpeting, the lobby, and lighting fixtures (reallocating monies rather than

spending more money); (3) market DALI as a way to decrease peak demand, keeping costs down as energy commissions move to real-time billing (note: Manufacturers debated the extent to which real-time pricing will be implemented across the U.S, and some suggested DALI could be an impetus to encourage energy commissions to adopt real-time pricing); and (4) develop a model that would show the impact of how an increase in demand would decrease pricing for DALI, and take this information to energy commissions requesting support for DALI (e.g., a rebate program).

Addressing Concerns About Ease of Use

- ◆ Manufacturers said that addressing target market desires for a simple, user-friendly system could be even more challenging than documenting reliability, and some manufacturers suggested that failing to make the system user-friendly will cause DALI to “fail in the marketplace.”
- ◆ Manufacturers said that issues around user-friendliness were more product-design issues than marketing issues.

Other Marketing Issues

- ◆ It was suggested by several participants in the manufacturers’ focus group that DALI marketing efforts need to focus on a small number of memorable and important messages that address target market needs and wants, and everyone involved in marketing DALI should agree on and market DALI using these same messages.
- ◆ One participant suggested the message should not be energy savings, but rather the message should focus on addressing occupant satisfaction achieved through increased flexibility/control and possibly on better security.
- ◆ Some participants questioned whether these were the two best benefits to focus on as: (a) efforts to sell lighting control on product quality and employee satisfaction have not proved effective to date (e.g., owners not willing to spend the money just to make employees happier); and (b) DALI does not really create more security (e.g., they could just leave the lights on). Rather, these participants suggested the need to focus on DALI’s ability to reduce energy usage.
- ◆ It was also suggested that limiting the messages may help make them memorable, but that marketing efforts need to take into consideration that there are multiple decision-makers with different needs and wants.
- ◆ Manufacturers said the designer/end-customer group revealed that efforts to educate the target audiences have not been effective to date.

Manufacturers Observing the New York Focus Group

Flexibility and Control as a Positioning Strategy

- ◆ It was suggested by some that the most effective strategy for marketing DALI would be to focus on its flexibility, particularly its ability to “discriminately” cut and dim lighting to achieve reduced energy consumption to: (a) cut the load to compensate for higher utility

rates resulting from installing new transmission lines, and (b) respond to utility company requests to cut power usage when the grid is unstable.

- ◆ Other manufacturers observing the New York focus group questioned whether companies will pay the added costs for this flexibility in controlling how the energy demand is reduced or prefer to pay less money and simply turn some lights off or use a dimmer.

Different Message For Different Market Segments

- ◆ Some participants suggested that marketing DALI needs to be segmented as different audiences react favorably to different messages. For example, the “hot button” for architects is occupant satisfaction, while for building owners it is energy management.

Strategy to Address Ease of Use Concern

- ◆ It was suggested that DALI could come in different versions, including an easy-to-use version that offers many but not all of the things that DALI is capable of providing. It was suggested that doing so may enable this DALI to be sold to companies who have more limited needs and are very concerned about being user-friendly. For example, it can offer the occupant benefits without having addressing and commissioning which adds complexities.

Reaction to Participant’s Skepticism About Open Protocol

- ◆ Manufacturers acknowledged that the participants’ concerns about implementing an open protocol were well grounded based on prior efforts to develop a standard protocol.

Number and Size of Demonstration Showcases

- ◆ Manufacturers discussed whether it is better to have a few large installation showcases or hundreds of smaller ones. It appeared the consensus was to try to have both, recognizing that would mean fewer large installations.

Verbatim responses from the manufacturer focus groups are provided below.

San Francisco

Addressing Reliability Concerns

- “How you can take three years and boil it down to the point where you can get people confident in a year? What I’m saying is, they want three years of experience for a new system. If we have to wait three years for things to get off the ground The system is dated in three years.”
- “We don’t have a history.”
- “First of all, we have to accept certain parameters of the marketplace. We know that there’s a point where it starts to grow faster, right? We have to have early adopters, you have to have projects. That’s all part of the educational process. I don’t think three years is

. . . At three years, does everybody start doing it? I mean, even then I don't think so, but we have to accept what they're saying."

- "You have to have demonstrations."
- "Yes, early adopters."

Addressing Cost Concerns

- "The underlying point is for DALI and some of the controls, like with three-length pictures, you don't need the dim to be able to do an intelligent DALI control at multiple light levels. So you aren't necessarily trapped into that box of added cost for the dimmable ballast except for a limited number of spaces. In the market, I think that will be crucial because everyone is going to assume that's a fully dimmable ballast and jump to the Lutron price, not even the smaller price, but we're not boxed into that necessarily."
- "You can have a DALI on/off ballast that is digitally controlled."
- "That's a great idea."
- "Raise it to \$20 and then lower the cost for the dimming and you still make the same amount of money."
- "Today, just in the economy, the cost isn't going to come down to where they would want it. The economies of scale. The cost is not going to come down. Not today. Five years from now? Ten years from now? Yes, but today it's not going to."
- "We'll run something out of the factory and if we're only running that ballast two, three or four times in a year, it's going to cost us more to do that compared to our standard, run-of-the-mill two- or three-lamp electronic ballasts that we're continually doing. So we're getting better costs on components and all sorts of things like that."
- "So in other words, the people that make those products are going to get as much money as they can from the early adopters because they're not making any. And they're going to try to get whatever they can out of it."
- "They have to recover their investment dollars."
- "If the demand increases, the price is going to drop."
- "I always wonder, when it comes down to cost, it comes down to trade-offs. If a building costs \$65 per square foot for the tenant improvements, how do they decide how much they want to spend for carpet? And for this stuff? And for the cubicles and all of that stuff? How important would lighting control be in comparison to these other things?"
- "(Research) has found that the lighting control did very well against carpeting, against marble in the entryway."
- "How important is (lighting control) compared to the other things? I think if we could (get pricing down) maybe we could find the way to leverage against some other part of the space."

- “We had people on the interior of the building that would move from a really nice office to a hole-in-the-wall just to get the natural light. Lighting control was the same, but it followed more of a bell curve. If you’re very sensitive to light, you’ll do almost anything to - including getting up and screwing off lights and putting in all kinds of . . . but it’s a bell curve. That guy that was here, the older guy that liked lots of light, he thinks everything is fine. But when we actually gave people control of their lights, it was a big deal to the people who were really bothered by the lights.”
- “People will start to say, ‘Well, why are we putting in that expensive carpet when we can be putting in lighting controls?’ Look at all the more benefits it gives us.”
- “We heard that we can’t get any more money from them so we’re going to steal it from somebody else.”
- “From a different perspective, a perspective we really didn’t hear so much in this meeting, but the perspective of a regulatory person, especially in California, looking at compelling owners to be able to reduce peaks.”
- “Real-time pricing.”
- “Yes, real-time pricing. What we did hear with all these folks - it was a given. It was that cost and codes drive the system unequivocally. If the cost is going way up for energy because of these real-time billings and you have a system that can respond to that and also the peak shaving, which is actually the other side of the coin. If that becomes a requirement then the systems are just going to have this capability. DALI might or might not be the best way to get it. That ceases to be the issue. It’s really how to respond to the code requirement. Is that a compelling issue? Is that something that the codes would be looking at? I don’t know if we need to answer that, but that would change everything.”
- “If real-time pricing were to happen tonight, that would become an issue in designing lighting systems.”
- “Absolutely. But it didn’t happen.”
- “It’s happening in New Jersey. Eleven hundred of the key accounts.”
- “Yes, it depends on how they tier. What they were talking about in the State of California, the real-time pricing would have absolutely had an impact on these types of things.”
- “But if the utilities knew that there was a realistic response to real-time pricing, they could start moving in that direction. Knowing that the technology was there to respond to it, then they would have a stronger case to say, ‘Well, we need real-time pricing because in fact buildings could choose to respond to this.’ It’s only because we’re not charging enough to make it worth your while so, of course, you’re not responding. Why would they? So the grid just keeps getting more and more overloaded. We have all the resultant problems. But that’s an issue on the East Coast. I agree.”
- “If we could actually get a model for what the pricing of the DALI ballast might be if volumes increase, this would give us a position to go back to places like the California Energy Commission and talk about rebates, getting costs down to the point where we

believe we will match where it will be in five years if it were to grow at the same rate as, for instance, when standard electronic took over from magnetic.”

Addressing Desire for Simplicity

- “I think making the system simple is a bigger challenge for us than what this focus group came back and said. I think we can overcome the reliability issue easier today than overcoming the simplicity concern.”
- “Desire for user-friendly interface, simplicity. They used those words.”
- “It has to do that or it will fail in the marketplace.”
- “They said that there can be several levels. Initial commissioning step, but by the time it gets down to an individual, it’s got to be intuitive.”
- “You walk in the door, you want to know that all you have to do is reach over there and press a button and the lights are going to come on. You don’t want to have to sit there and start reconfiguring things or you’re not going to use it. You have to recognize the different audiences that are going to be using the product. It has to respond.”

Marketing DALI

- “If people buy DALI, the environment benefits. The Energy Commission benefits. All these people benefit if we make this successful. But marketing says, positioning the product so that people want it. Alright? Need it or want it? Those are the two things. Then you have to get past this cost issue and that’s where I think we really have to start to say that two interesting things that are going on right now. One is does the ability to control light improve the occupant’s satisfaction? If it does, that’s very interesting. And the other one is the flexibility. That came out. And the third one is security. Those are all things that could become wants or needs. Energy savings is just how you recover. And I think that as an industry, if we’re talking about marketing, we have to start to think about, hey, why don’t we go around and say, ‘Hey, these are real things that you can have that can really drive something.’ I know that when you position anything - any product or service - there is usually one or two things that people remember about it and that’s it. If everybody said the same thing, people will start to remember those one or two things. They’ll say, you know what? We have to have that because of that reason. That’s what positioning is all about.”
- “Or people perform better under daylight or people enjoy daylight or it makes you feel happy or . . .”
- “But the decision-makers intuitively know that. That’s the one nice thing. Almost everyone believes that. After ten years of studies, people like daylighting; they don’t like the glare. Even if they like the lighting, they want to be by a window, period. And they like daylight. Big time.”
- “Owners get that and so if we can insert it into the (marketing of DALI).”

- “I think if you say energy savings, you’re not going to get them to say they want it. Something has to be tied to the daylighting. If you’re making that the issue, then link it.”
- “If we’ve only got one or two shots, there are only a couple of messages that people are going to latch on to then as a group we have to be in concert on these things. We’ve only got a few opportunities and we have to work together closely so that we make sure that those couple of important messages get there and it doesn’t get confusing. With the new technology and all the newfangled things that it can do we can certainly confuse that message between all of us.”
- “I think that’s actually the most important thing regarding marketing. That we don’t cause confusion. If we could come up with, as a group or as an industry, the couple of key benefits that are going to really drive it and we all start preaching that. (What are the key benefits) is the question.”
- “Based on my experience the number one perceived benefit was occupant satisfaction. And the flexibility for human control. Why not say occupant satisfaction? It comes from that. One position statement, occupant satisfaction. Okay. Control is why they’re satisfied. Flexibility is why they’re satisfied. Those are all parts of this. That’s the key thing here. If we all start saying occupant satisfaction, but we come up with the right definition for that. Tuning is why you have occupant satisfaction. The benefit is not tuning. The occupant satisfaction is the benefit and tuning helps them become satisfied. Flexibility, control and all that stuff.”
- “The occupant satisfaction? You have to think of a better word. That’s just blah, blah, blah. It’s happy customers, happy workers or something less corny, but”
- “There are several messages that are coming back. Do you want to hone in on a single message so that you create that critical mass in the marketplace where the perceived need or understanding is there? Several of them that pop out from DALI are ‘DALI Delights’ from the occupant’s standpoint. ‘DALI does daylighting.’ You could come up with several key phrases like that that you could begin to hang campaigns around. But I think getting the group to agree on what the common message is would be a real challenge.”
- “Look at Carol Jones’ effort to increase the perception that quality lighting actually has value. She’s been on that now for five years. At least. This group was telling us that they didn’t really buy into it (and questioned whether) putting in a system that simply serves the users better is justification for spending more on the system. They said, ‘Well, hey, if we’ve got lights, people should be happy that they’ve got lights at all. What’s the problem?’ That’s the present perception. Unless you change that perception, the value equation doesn’t change.”
- “If we were to run a campaign focused on the CEOs of institutions, what would your message be? One of the most confusing things about DALI is coming down with a strong benefit message and honing in because it has many potential benefits. If you decide that you’re going to just focus on this (benefit) one week and the next group’s going to focus on another one, you’re going to confuse the message.”

- “Two things. Two things that I heard. User comfort. Responding to your user needs. And (the second was) security. Those are the two highest issues. This group had no perception at all that there actually is this bell curve. That not everybody wants four input candles. We have amazing studies that completely refute what this guy here was saying. That’s the satisfaction. I agree with you that security is number two. The other ones fell out. I mean, there’s obviously energy savings and everybody accepts that and understands it so we don’t need to push that one because it will be there. I don’t know what the security message is though. That’s what my problem is with that one.”
- “The point that I was going to make is that the varying light level allows us to reduce demand. I think it’s a point we’re missing as we look at those top two messages. What you want to say is, now you can help control your demand without your occupants knowing it by reducing it slowly over time to control demand. I think that would be, in my opinion, a much more legitimate position to take than security because in my mind, I don’t know what we’re talking about with the security.”
- “That’s the problem. (Security) would be nice if it was real.”
- “You can have the security with the energy savings. For instance, stairwells. A stairwell, if you put occupancy sensors in there, if that stairwell is not occupied, you bring those lights down to 20% output so you’re not wasting energy, but you still have security level lighting.”
- “But somebody could say, I can just leave the lights on and I’ve got it more secure.”
- “Right, but you’re wasting energy.”
- “There is a connection that you can make.”
- “You can, but if your focus is, you’ve got a more secure building with DALI than without DALI. Is that what we’re saying? I don’t think you can say that.”
- “How do we show it? That’s what he’s saying.”
- “If we could figure that one out, I can tell you right now, we’d make that number one. There would be no question about it.”
- “I was jumping into the whole complex strategic marketing theories where you have multiple decision-makers and multiple technical folks and CEO folks that all undermine your decision and I was jumping between them. The CEO is going to say, ‘I want daylighting because it improves my folks.’ The building manager is going to say, ‘How am I going to deal with this dimming system? If it breaks, it’s a maintenance problem.’ On the true marketing, you have positioning and each one of these are going to be complex sales.”
- “I mean, the best marketing thing you could do is point it to something that is a recognizable Like Energy Star or LEEDS. I was surprised (LEEDS) was so low here. That’s the lowest I’ve seen in any group in awhile.”
- “But again, I think it goes back to the larger companies, the institutions that are saying They’re taking a stand on sustainable design. They’re saying, we will do everything. But again, it gets back to that education thing, whether it be LEEDS or DALI or whatever. We’re not hitting whatever the people who were here are using for their education.”

- “You have to do more articles.”
- “I have a feeling there are manufacturers out there who are intentionally dispensing confusion on DALI.”
- “Exactly. When I went to the Light Fair this last year, you walked around and I was trying to get research and information because of our project Are you going to offer DALI? It was interesting. It was. The ones that didn’t even attempt to address the issue of DALI protocol, they were the ones who were saying, ‘Oh, you don’t want that, it’s the same old thing.’ They’re trying to downplay it because they’re not dealing with it. That was what we heard.”

New York

Marketing Flexibility and Response to Grid Instability

- “What is the great advantage of DALI given the situation that the grid is in right now and the fact that the utilities are going to be charging for improving the transmission lines. DALI has the opportunity of being able to dim everything based on a zone or by pushing a button. I mean, that’s something that almost no other system has. We visited Con Ed and Pete Jacobson said if the lighting level were 15% less, nobody would notice. If the lighting level was 30% less, some might notice, but more than half of their light is coming from a task light. Now, the future will be, you get a higher energy rate so you’re going to try to cut the load a little bit in order to compensate for that increase that the utility wants for putting in new transmission lines. Secondly, you’re going to get calls now from utilities when the grid is slightly unstable and rather than take a chance on a repeat of August 14th, the utility will call their major users and say, cut 30%. With DALI you have that ability.”
- “The ability to not only cut, but to select the area that you’re cutting.”
- “Exactly. You can do it discriminately.”
- “You wouldn’t cut the lawyers and you wouldn’t cut the president and the vice president, which is the story that Peter gave. They’re the only ones at Con Ed in the new system that have constructed offices. Everybody else is going to be in an open plan. They’re taking down all the walls except for a few dozen executives. Now, how do you control those open plans? I don’t think it’s by turning a dedicated light on or a slightly undedicated light on, it’s by taking everything down in a particular area 15% or 20% by a simple means. You get a phone call from the utility, you respond almost instantaneously.”
- “I guess the question is, you can do that with the right lighting system without using DALI The reality is, if I had an open floor space and I get a call from Con Ed, I’m going to cut this off in my floor space by 30%. I don’t need to cut over the secretary’s cubicle by 50% and the administrative assistant’s by (something else).”
- “I guess it gets back to, how much does it cost to (differentiate reductions) as opposed to dimming everyone down by 30%.”
- “Correct me if I’m wrong. If you’ve got a big open space and you’re just looking at energy management and being able to cut back, you could use any dimming system for that. You don’t need DALI for that. You just drop the whole space.”

- “That’s the balancing act. There are benefits to having this freedom, but then you’re going to pay for it. I don’t know what the answer is. How much are people willing to pay for that freedom? And if it’s not mandated . . . I understand that Con Ed is going to say, you need to put sections from zero to 10-volt because when I tell you to cut power, you have a choice. You can either dim the lights or turn them off, but you’re going to cut power. They’re going to do something, but the question is, how much more are they going to pay for this DALI? What’s the compelling reason? What’s the value proposition?”
- “The next point is that Con Ed may tell you to cut down 10%. Okay. Obviously you don’t want to cut out the president or the vice president. You just want to cut in the open areas. So with DALI, you have that flexibility. Suppose tomorrow a president’s room changes from here to there. With DALI, you can change that.”
- “That’s a different value proposition. No question that DALI gives you the value proposition of flexibility. I’m not sure it gives you any more.”
- “You’ve got a very expensive system and there are other systems that I’ve seen that are very sophisticated and coming along that will have the same hurdle to come over as DALI. I saw one in Chicago last week. It’s getting approval now. It will be very interesting. There are many people working very hard on electronic systems that control lighting. Maybe they’re cheaper and maybe they’re not. But I think DALI is, perhaps, a very saleable product, but I think you heard the interests, the varied interests of the different segments and I think you have to address them. Everyone has a hot button that you have to click on in order to reach them. _____ hears that you’ve got a system and you can tell her exactly which lamps and ballasts are out and she’ll say, ‘Terrific. We’ll buy it. How much more does it cost?’ Yes, but look at how much you’re saving on an electrician. You don’t have to call the electrician every day to diagnose.”

Marketing to Different Audiences

- “I personally believe the marketing approach needs to be segmented. If you’re dealing with architects, their reason for this kind of a system is going to be occupant satisfaction and the green building thing. That’s what they’re into these days. If you’re dealing with a building owner, we already heard, they’re interested in the energy management aspects of it and saving energy and all of that good stuff. That’s a totally different sale than you’re going to take to the architect. And if you’re dealing with the engineer, he’s going to want to know that it’s easy to design and it’s not going to give him a headache with the contractor calling him every day. So he’s got different hot buttons as well.”

Marketing Different Types of DALI Systems

- “I’d love to see us separate out the complex from the simple because DALI can do some very elegant things with very simple lighting control functions where you don’t need to commission it. You don’t end up with a PC But then that very thing, when someone says, can you tell me the ballast that failed? Now you’re dealing with another whole level. You’re starting the communications. The addressing becomes critical and all those problems go with it.”

- “So we have this thing that can do anything and you take advantage of all of it and then, suddenly, it becomes complex. You can’t have it all and have it simple. But you can have a lot of your functionality at the occupant level with the occupancy sensing, with the combination of tuning the lighting the way he wants. You can have a lot of those functions with no or very little complexity.”

Reaction to Skepticism About Open Protocol

- “I thought they were right on.” (*several*)
- “I think everybody in the room can point to a dozen jobs or more where it’s been the case. Either it’s difficult to do or something happens and it becomes finger-pointing.”
- “I mean, people were not even aware of it. One of the questions we asked . . . I mean, even the simplest non-system application you have a dimmer, a ballast and a bulb and something in that room doesn’t work. It’s sockets. The first thing you look at is the control manufacturer and they’re saying, ‘Well, it’s the ballast,’ and the ballast guy is saying, ‘Well, it’s the control and the bulbs aren’t working, try someone else.’ That’s a simple installation. You talk about systems working together and the building management system.”

Few Large vs. Many Small Demonstration Showcases

- “I don’t know the answer to this one. What builds confidence faster? Three or four large installations with showcases that have been monitored very carefully or several hundred smaller installations How are you going to get that information out about several hundred?”
- “The big ones come along few and far between. Your ratio is much better with the smaller jobs and people associate with that.”
- “Can you do both?”

The Moderator’s Discussion Guides and the DALI Overview Handout that were utilized for the focus groups are available for review upon request.