OSHPD Office of Statewide Health Planning and Development

Hospital Building Safety Board
400 R Street, Suite 200
Sacramento, California 95811-6213
(916) 440-8453
Fax (916) 324-9118
www.oshpd.ca.gov/Boards/HBSB/index.html

HOSPITAL BUILDING SAFETY BOARD
Technology Committee

"Building Management Systems" Workshop/Meeting

Wednesday, May 20, 2015
10:00 a.m. - 4:00 p.m.

California Lottery Operations Division
Pavilion 1
700 North 10th Street
Sacramento, CA 95811
(916) 822.8033

Board Members
Eric Johnson, Chair
Patrick Sullivan, Vice-Chair
Deepak Dandekar
Michael Foulkes
Mike Hooper
Scott Karpinen
Bruce Macpherson
Poki Namkung
Michael O'Connor
Joe La Brie, Consulting Member

OSHPD Staff
Paul Coleman, FDD Deputy Director
Hussain Bhatia
Glenn Gall
Diana Scaturro

HBSB Staff
Linda Janssen, Executive Director
Evett Torres

1. Welcome and Introductions

Chair Eric Johnson called the meeting to order and summarized the agenda. Board members and OSHPD staff introduced themselves.

2. Presentation #1: Building Automation Systems – Tim Baer, Frank M. Booth Design/Build Company

- ✓ Evolution of controls in hospitals
- ✓ HVAC controllers and how they work

- ✓ Connectivity with other systems
- ✓ Failure scenarios: parts/controllers/network
- ✓ Future developments on the horizon

Mr. Baer used drawings throughout the presentation to illustrate his explanations.

Terminology. Mr. Baer began with spell-outs of common acronyms and definitions of common terms. He stressed that the term "open systems" has been expanded – decades ago it meant open communication protocols, but now it includes the ability to get parts for a system from a variety of places.

Typical HVAC Systems. Mr. Baer focused on the Air Handler System and the Zone Control System. He also showed the Chilled Water System and the Heating Hot Water System, which are much more complicated.

Evolution of Mechanical System Control. Mr. Baer summarized the progression from Pneumatic, Electro-Pneumatic, Electronic, and Direct Digital, to Building Automation Systems. He brought along some DDC controllers as "props."

BAS Architecture. Mr. Baer noted that you can put BAS architecture on the customer's intranet, or you can build a dedicated backbone – there are pros and cons to each. He also explained the function of the server, which is limited; most importantly it adds storage.

Monitoring and Integration. This can be done with physical connections or with open protocol. In a health care facility, integration is typically done to medical gas systems, fire alarm/Life Safety systems, electrical systems, domestic water hot water, medical systems (lab refrigerators, MRI systems, isolation rooms, and typically physical points), and lighting.

Reliability & Functionality. Mr. Baer shared elements that his company has found valuable due to feedback from facility engineers. For system design: complete sequence of operations, complete commissioning plan, control panel power supply, fail-safe positions, overrides, and hardwired overrides (with photographs for digital and analog). For system implementation: complete commissioning (verification of

standalone control, power loss/restoration, failover sequences, and alarms and notification). For ongoing (after implementation): alarms and notifications, and facility personnel (engineers). Mr. Baer stressed the issue that the building automation system is key to the operation of the mechanical system.

The Future of Building Automation. This includes wireless, mobile access, video, further displacement of old technology, and the Internet of Everything.

- Discussion and Public Input

Mr. Coleman asked what happens when software used in these systems becomes obsolete or is no longer supported. Mr. Baer answered that with open systems, if you have four dissimilar systems with four different programming tools, for example, you can make them talk to each other via BACnet.

Mr. Dandekar commented that even if the company survives, with future updates you may not get a good price because now you are a captive audience. Mr. Baer responded that this is the reason that ASHRAE did BACnet and LonMark did LonWorks.

Mr. Coleman asked if redundancy and overrides are typical of all the systems. Mr. Baer responded that many systems have overrides that you can purchase optionally for your device; not all systems have it built in and not all service providers supply it because it is not a code requirement.

Mr. Johnson asked if facilities can ever run alone without the Internet. Mr. Baer answered that as long as the design criteria is set out correctly, a controller that has lost communication with everything else in the system because the Cat6 cable is unplugged should continue to operate.

Mr. Dandekar commented that hospital projects move slowly – with technology moving so fast, how do you decide what to install five or seven years hence? Mr. Karpinen agreed that widgets and devices do change all the time. Mr. Baer responded that the Design/Build Company would always provide the “latest and greatest.”

Mr. Bhatia asked if anyone is working on integration with the early seismic warning systems. Mr. Baer replied that it should be on the list – he felt sure it is taking place.

Ms. Scaturro asked if anyone has compiled a history of system failures so common issues could be examined. Mr. Baer replied that Siemens (Frank M. Booth, Inc.'s supplier) has a very low controller failure rate. Probably any manufacturer would supply that data to someone who represents them properly.

Mr. Sullivan asked how much more energy efficiency can be squeezed out of the newer systems. Mr. Baer replied that for his company's initial design, they are looking for as much energy efficiency as possible with the program.

Mr. Karpinen explained to an Interested Party that designers can do energy models for facilities – installing flow meters, energy meters, and gas meters in the Building Automation System – and watch the energy usage for a year or two to estimate the trends.

3. Presentation #2: Integration of Information Technology and Building Systems – Trevor Hogberg, Kaiser Permanente

- ✓ Convergence of Internet Protocol-based equipment
- ✓ Wireless networks and connectivity of equipment
- ✓ Redundancy of systems and backup of services
- ✓ On-site data storage trends
- ✓ "Internet of Things" trends

Mr. Hogberg stated that he leads an organization that looks at how technology is applied in Kaiser's clinical spaces, both inpatient and outpatient. At present Kaiser is seeing a drive for more of a consumer-based health care model.

Mr. Hogberg showed a video that set the context for where Kaiser sees technology is going. It included mobile health care delivery; home health with remote monitoring, data gathering, and increased preventative care; social networking/mobility; and self-triage over a smartphone.

Mr. Hogberg illustrated the scale of Kaiser Permanente with $53.1 billion in operating revenue, 175,000 employees, 620+ medical office buildings, 10+ million members, etc. When Kaiser looks at technology solutions, they do advanced metrics and analytics to find solutions that are scalable for Kaiser's size, or "enterprise ready."

At present Kaiser must look at how to attract new individual consumers. It is looking at the member experience much more closely: not only physical design but also technologies.

The technology base line going into new clinical facilities includes:

- Phones – IP telephone systems.
- Multimedia – digital signage lets members know the length of their wait time.
- Mobility and Video – communication within the facility via text, voice call, or video consult; interactive patient care; telehealth.
- Clinical Applications and Biomed – networked Biomedical systems are less expensive for Kaiser and more secure.
- Facility – physical security systems, surveillance.
- Network – Kaiser is trying to converge all kinds of network infrastructures (wired, staff WiFi, guest WiFi), Distributed Antennae System.
- Printers.
- Computers – a morphing of the standard computer to a fit-for-the individual device.

Technology trends impacting facilities include:

- Telehealth is the wave of the future; it supports remote locations and brings specialists to less-populated areas.
- Mobile phone usage and texting are being enabled.
- Location services: anyone should be able to find the location of staff or members.
- Cloud: Kaiser has its own data centers. There are reliability and security concerns with hosting data outside of its data centers.

- Internet of Things: Mr. Baer does encourage vendors to provide their core business very well, but not to try to provide every kind of integration.
- Security is on everyone's minds after the data breaches at Target and Home Depot.
- Advanced analytics: Kaiser is looking at correlating its enormous amounts of data for better outcomes.
- We are seeing robotics in surgery as well as supply and delivery.
- For the technology workstream approach, Mr. Hogberg's group would like the business partners, nurses, and physicians to define what they want so the group can suggest a unified system to meet their needs.
- Mr. Hogberg played a second video of various technologies that were only ideas a short while ago and are now realities.
- A challenge is that facilities get products that were made *to sell* to them; they don't necessarily get products made *for* them.
- Mr. Hogberg's team developed the Connected Environment Requirements Catalog (CERC) and compiled the hardware interoperability requirements for the facility to share with the vendor community. The next generation of products that the vendors build will be useable without the wasted time and money.
- A wireless large volume infusion pump was an example of waste: over $1 million was spent because the vendor lacked maturity in the IT space, and Kaiser had to spend the money upgrading its wireless infrastructure to block the pumps from going to unintended places on the network.
- Another example was the need to standardize a physiological alarm system for sending secondary notification to caregivers of patient conditions.

- Discussion and Public Input

Mr. O'Connor asked how augmented reality is being used. Mr. Hogberg answered that there are many consumer applications today: constellations, foreign language translation, etc. Clinically, Kaiser uses the latter. More may come into use in the future such as virtual triage.

Mr. Karpinen asked if Kaiser typically keeps its medical records and computer data in the hospital itself and the cloud as well. Mr. Hogberg replied that Kaiser has national distributed data centers as well as local storage.

An Interested Party brought up the problem of a patient having medical records with multiple providers. Mr. Hogberg said that Kaiser and other health care systems belong to organizations with data-sharing policies and imbedded capabilities – the Connected Care Consortium. As more and more health care systems have electronic medical records, interoperability can increase.

Mr. Bhatia asked about any vulnerability studies of infrastructure regarding physical disaster preparedness. Mr. Hogberg replied that Kaiser does this on an ongoing basis. It has a dedicated emergency response team.

An Interested Party asked about technology for notifying a medical team that a patient is soon to arrive. Mr. Hogberg responded that this kind of messaging technology exists – it's a matter of workflow and operational changes that would be needed to install it.

Mr. Dandekar asked about the inclusion of confidential information in Patient Medical Records. Mr. Hogberg replied that a challenge of every system is whether it has credit card information and private health information. Kaiser must consider regulatory aspects as well as internal controls to ensure that data broadcasted on the internal network is secure and reliable.

Mr. O'Connor asked about the high value of patient health information on the black market. Mr. Hogberg explained how health care fraud works.

An Interested Party asked whether the new technology informs physical design space. Mr. Hogberg said that it does – the design of facilities is actually beginning to change. Mr. Baer gave an illustration of the capability to move light switches on walls.

An Interested Party asked about the integration of outpatients in a security sense. Mr. Hogberg answered that Kaiser does not track people – location technology

allows it to locate people. Kaiser is partnering with its labor unions to help union members do their jobs more effectively using location technology.

4. Presentation #3: Microgrid Technology and Demand Response – David Bliss, M.D., Charge Bliss, and John Griffiths, Mazetti and Associates

- ✓ Microgrids for hospitals trends
- ✓ Automation of energy production and control
- ✓ Energy storage trends
- ✓ Information Technology integration components for energy consumption and control
- ✓ Loss of utilities and back-up systems

Mr. Johnson stated that the presentation included Mr. Scott Barnett speaking from New York.

Dr. Bliss introduced himself as a surgeon and owner of a company that develops microgrids. John Griffiths is a principal electrical engineer at Mazetti and Associates. Scott Barnett is a Global Sales Leader at GE Energy Storage, which focuses on energy storage solutions.

Dr. Bliss spoke about the developer's perspective.

- He explained the components of a microgrid.
- The Governor has set the challenge for everyone, including hospitals, to be at net zero energy consumption by 2030.
- Hospitals are intensive users of power, and the way energy is delivered is rapidly changing. For the last century it has been load-following (building as much capacity as possible to meet all the loads).
- Goals are to augment hospital power options; to maintain power "hierarchy"; to meet state imperatives for green power and sustainability; and to lower costs of healthcare system operations.
- Dr. Bliss noted that Alcatraz runs on a microgrid.
- The Institute of Electrical and Electronics Engineers projects that of all industries, the health care sector is the most likely to deploy microgrids over the next five years.

- As the general population grows, we are becoming more intensive users of energy.
- Currently we have a very limited way of managing buildings. The Charge Bliss Controller can create reliable system automation where you can regulate or monitor as many systems as you wish, and feed or not feed power to those systems.
- The Charge Bliss P3000 can show minute-to-minute fluctuations in power and energy from individual devices.
- Challenges are: defining supplemental power; locating points of interconnection; and discerning whether to rely on current safety code.

Mr. Barnett spoke about the supplier's perspective.

- He described the expansion of the GE product line to energy storage.
- He distinguished between battery power and energy.
- GE is focused on being a full AC system supplier, consisting of three main elements: control systems for grid connected systems, AC hardware, and DC block (battery manufacturing).
- The hardware that GE provides consists of Durathon IQ Controls, Brilliance Inverter, and Prolec Transformer.
- As a full system provider, GE provides hardware, software, upgrades, finance, and customers.

Mr. Griffiths spoke about the builder's and hospital's perspective.

- Challenges to bringing microgrids to hospitals include:
  - Seismic compliance
  - The requirement of an OSHPD Special Seismic Preapproval for active components
  - Utility interconnection per PG&E Rule 21
  - Microgrids require multiple tests – but hospital power cannot be turned on and off
  - There is an obligation to maintain two sources of power at all times.
  - The government has set the 2030 zero energy use challenge.

- Opportunities include:
  - Microgrids add resilience to the existing emergency systems (but do not replace them)
  - Microgrid controller integration improves reliability, brings a much more sophisticated control system, and reduces greenhouse gas production.

Dr. Bliss added that legislative and policy imperatives are growing over time for all buildings in California to be increasingly sustainable, to be zero net energy consumers, and to decrease production of greenhouse gases. Those imperatives will probably grow over time.

He continued that the California Energy Commission (CEC) released a Program Opportunity Notice for microgrids in critical facilities; Charge Bliss was awarded the project and is already in discussions with OSHPD.

Dr. Bliss felt that this is the start of a key dialogue with the HBSB Technology Committee and OSHPD. The discussion needs to be broadened to the whole health care community – some hospitals do not know that this technology exists.

Dr. Bliss felt that the key piece is the integration of control and monitoring systems.

Mr. Griffiths mentioned the iBeacon phone technology for mobile commerce.

Dr. Bliss felt that it's really about the controller and the web of architecture that weaves everything together to make it work most effectively. To date, in most buildings things operate independently. However, we are now in an era where every mechanical and electrical device in the building is going to be coordinated.

He continued that California law policy is going to be a big driver – whether we want it to happen or not is irrelevant. With hospitals a major consumer of energy, we cannot ignore their roles and responsibilities in that regard, clearly with an eye to privacy, health, and safety, while trying to be as efficient and effective as possible.

He stressed the importance of the controller. Part of the intent of the CEC project is to develop the world's leading microgrid controller with data as granular as several thousand data points per second about every connected device.

With OSHPD at the lead, agencies need to coordinate: the CEC, the California Public Utility Commission, and the inter-operator service organizations. Standards and policy issues need to be addressed, as well as design and execution issues.

- Discussion and Public Input

An Interested Party remarked that the health care customers he deals with for PG&E have interest in solar, but not battery storage. Dr. Bliss stated that right now, investors will get very little benefit for doing batteries sequentially because there are no incentives. However, operationally it is going to be far more likely to get a third party investor if you bring solar and battery together. Mr. Griffiths added that from the engineering perspective, building design must include the question of where to put the battery storage.

Mr. Coleman asked about the location of the microgrid system. Dr. Bliss explained that it is located downstream from the utility and upstream from the Automatic Transfer Switches (ATSs). Ideally it is on the customer's side of the meters.

Mr. Karpinen asked about hospital pushback over the 2030 deadline, as they are currently exempt from the energy regulations. Dr. Bliss was sure that some will push back. Ultimately, market economics being what they are, there is a large advantage to hospitals making the switches if they look at the long-term picture. Mr. Griffiths added that the cost of complying with the new energy code is coming down as the supplier community/contractor becomes more familiar with it.

5. Comments from Committee Members and the Public on Issues Not on This Agenda

Mr. Johnson suggested scheduling another committee meeting to discuss today's presentations – are they helping the committee achieve the goal of helping FDD address new technology?

6. Adjourn

The meeting adjourned at approximately 2:50 p.m.