The Evolution in Healthcare Requires Contemporary Design and Out of the Box Thinking

Creating a Modern Data Center that Provides an Estimated 30% Savings in Cooling Efficiency

The healthcare industry is on a mission. With healthcare reform on the horizon and the need for more efficient systems for patient records and billing, information technology has become essential to the industry's success. Dealing with life or death situations, healthcare professionals have only one chance to get it right, so the systems that support this mission must include a solid, robust network infrastructure.

Recently, Orlando Health, a comprehensive, private, non-profit healthcare network based in Orlando, Fla., partnered with Chatsworth Products, Inc. (CPI) to create an innovative, state-of-the-art data center that supports healthcare reform in the realm of digital data, reimbursement, payment and several other variables that are evolving the healthcare industry. As Rick Schooler, Orlando Health's CIO points out, "when it comes to building an information technology platform to support healthcare, we really have to understand that it has become a key enabler. Never in the history of healthcare has information technology been so front and center." Orlando Health's Chief Technology Officer (CTO), Brian Comp added, "healthcare IT is growing significantly—we are on average, growing 30-50% a year in our data processing requirements and those things are significant enough that we have to continually think out three to five years 'how are we going to be able to manage this growth?'"

Orlando Health Team from left to right, Brian Comp, Chuck Hahn, Steve McAllister, Patricia Wood, Martin Reinwein, David Simpson, Ahmed Mohamed, Samual Tift

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To prepare for this evolution of healthcare, Orlando Health had to master a reliable, highly efficient and productive data center that could ensure quality care, increased revenue and efficiency. Schooler notes that "the 2009 American Recovery and Reinvestment Act (ARRA) has provided money to healthcare providers who demonstrate and certify themselves based on federal criteria as meaningful users of healthcare IT." This stimulus money has helped push the adoption and use of electronic medical records, which will ultimately

F-Series TeraFrame® Cabinets deploying CPI's Passive Cooling® Solution

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provide a more efficient healthcare system. Not only does the point of care become more efficient, but also the health information exchange environment.

Increasingly important is quality and clinical outcomes, adherence to best-practice, clinical practice and the cost of care delivery throughout the healthcare continuum. Schooler notes that "it's imperative to establish health information exchange platforms that bring patient data together in a consolidated view, as well as be able to provide advanced analytics through enterprise-wide data warehousing. However, if healthcare providers don't have electronic records, automated registration, scheduling and billing systems, they won't capture the needed information. The future requires that patient and related information be integrated across all healthcare enterprises for use at the point of care as well as for vital data mining purposes."

Healthcare IT is at the forefront of this mission, providing reliable systems that will "get all information in one spot for our healthcare system, as well as the ability to exchange information with other providers and have the resources to do really advanced analytics," said Schooler. Quite simply, the importance of a reliable data center is crucial to the expansion of the Orlando Health system, its staff and patients. "Healthcare professionals expect systems that are reliable and perform well. An organization must have a robust network infrastructure and a stable computing environment," said Schooler.
In order to provide that platform and successfully evolve with healthcare reform, Orlando Health disregarded contrary beliefs on modern data center designs and partnered with CPI to transition from traditional to contemporary by creating an innovative, state-of-the-art data center that would provide the best quality care and ensure exponential growth in an ever-changing industry. Although this design transition can sometimes prove challenging, the end result is well worth the effort towards meeting the needs of today's data centers.

Orlando Health

Orlando Health is comprised of Orlando Regional Medical Center, Arnold Palmer Hospital for Children, Winnie Palmer Hospital for Women & Babies, Dr. P. Phillips Hospital, South Seminole Hospital, South Lake Hospital (50 percent partnership), St. Cloud Regional Medical Center (20 percent partnership) and MD Anderson Cancer Center Orlando – affiliate of the University of Texas MD Anderson Cancer Center in Houston, TX.

Distinguishing Orlando Health as a healthcare leader for nearly two million Central Florida residents and 4,500 international visitors annually is Orlando Health's advanced medical treatments, procedures and highly qualified staff. In addition to Orlando Health's vast patient care, they are also Central Florida's fifth largest employer with nearly 14,000 employees and more than 2,000 affiliated physicians.

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>
> Chuck Hahn (Technical Services Senior Manager)

A strong commitment to serving their community is exceedingly important to Orlando Health and they are continuously researching new ways in which to invest their time, energy, and resources to provide the best possible healthcare for the Central Florida community while maintaining financial stability. One way in which Orlando Health maintains financial stability and provides the best possible healthcare to the community is through the implementation of their new, cutting-edge, energy efficient, green data center.

Energy Efficient, Flexible Design

Orlando Health estimated some time ago that their second data center (of two total) would eventually need more space due to the size and growth of the Orlando Health system. "In the last several years, because technology has changed so much, it has drastically changed the heating and cooling requirements within a facility. What we find on a typical rack today requires four times the power of a rack from five years ago. Surprisingly, we found that these new heating/cooling requirements were new to the engineers. That's why we put our core team together within Orlando Health who really did a lot of research and spent a lot of hours looking at other data centers. We did some site tours, and that's when we were introduced to CPI, and they became a very integral part of building out this entire facility with Orlando Health," said Patricia Wood, Technical Services Manager, Orlando Health.

About three years ago, management teams began looking for data center solutions, and according to Technical Services Senior Manager, Chuck Hahn, "the number one factor Orlando Health values in their data centers is power and cooling." Not only did Orlando Health seek to design an energy efficient data center, but also one flexible enough to be consistent with their green initiatives while maintaining financial stability.

The new data center would also need to be completely redundant with Orlando Health's original data center and support systems that have direct impact on patient care along with financial data, electronic medical records and payroll. Through this technology, Orlando Health planned to incorporate patient financial information and medical information into corresponding portals in order to simplify processes that detract from patient care. It is through these efforts that Orlando Health continually seeks to solve important issues through technology.

Along with aiding in patient care, Orlando Health's new data center needed to adopt a sustainable, flexible design that would grow with the community and adhere to internal green initiatives. While planning the layout for their new data center, Orlando Health originally decided a traditional approach would be sufficient and consistent with their existing data center, but they quickly learned that a traditional approach in their new location would actually offer more challenges and fewer benefits than a contemporary design.

An energy efficient data center would not only be important to the productivity of the facility but also to Orlando Health's carbon footprint. Orlando Health not only lowered their overall power usage effectiveness (PUE) to reduce emissions but they also recycled materials and managed waste to minimize their impact on the environment."We needed to focus on how we could improve not just our compute environment but also reduce the total impact to the environment as a whole. We were able to reduce a considerable amount of new materials giving us large cost avoidances; some of these items were the existing dropped ceiling and cooling units. With the help of CPI, we were able to come up with a space that is not only energy efficient but also has less impact on the environment through reduced building materials and equipment," said David Simpson, Data Center Manager, Orlando Health.

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Planning & Implementation

During planning, Orlando Health projected that the entire data center space would be fully occupied with cabinets. After calculating the power consumption used in their original data center, Orlando Health came to the conclusion that a minimum of 16 AC units would be needed to effectively cool their new data center. Given this new location had limited roof space, it was absolutely impossible to accommodate 16 AC units.

In an effort to find effective and efficient cooling solutions, Orlando Health then met with CPI's Senior Data Center Consultant, Steven Bornfield. In order to eliminate the number of AC units required, Bornfield introduced Orlando Health to the possibilities of a modern data center equipped with CPI's Passive Cooling® Solutions, as well as overhead power and cabling versus under the floor.

To tackle the issue of cooling, Orlando Health implemented a contemporary design using CPI's TeraFrame® F-Series Cabinets equipped with Vertical Exhaust Ducts which allowed hot air to be directed out of the cabinet and into an isolated return air path above the drop ceiling. In isolating the hot return air, Orlando Health was able to make the most out of their cool source air, thus the contemporary design gained efficiency and reduced the number of total CRAC (Computer Room Air Conditioning) units used from 16 to 3.

In addition to this cooling solution, Orlando Health also removed an existing raised floor creating additional height in the space, allowing for overhead power and network cable pathways and a larger return space above the drop ceiling for hot exhaust air. This change to the flooring would have a direct, positive impact on passive cooling, which would thereby reduce the number of CRAC units needed, resulting in a layout that would accommodate more equipment than would typically fit in a traditional layout.

Furthermore, a contemporary design would also cool a higher load capacity with fewer CRAC units given the airflow restrictions seen with raised floors. Here, it's important to note that while raised floors create an air plenum, they also create restrictions in airflow, necessitating excess air to be pushed underneath the floor to overcome under-floor pressures. With a slab floor, there is less backpressure, allowing air to move more efficiently and ultimately cool more with less.

Another benefit of a contemporary slab floor is its cleanliness, which ultimately assists in making the data center more efficient. In a traditional raised floor environment, not only is air pushed from underneath the floor but also dust and other particles are transmitted into the front of systems located in the room. This causes systems to fight harder to take in air which results in poor efficiency. In Orlando Health's new data center, all of the exhaust is pushed through CRAC units, which filter dust and particles and can easily be changed without compromise to any critical systems in the data center.

Additional Implementation

This modern data center configuration now offered flexibility, allowing it to grow with the increased demands of the community. Because technology changes so rapidly, it's often difficult to plan the infrastructure design of data centers more than five years out, so Orlando Health agreed that a flexible infrastructure would allow the ability to control space and bring in different types of equipment without a great deal of rework; even five, ten, fifteen years from now.

Another way in which the contemporary approach provided a flexible solution to Orlando Health was through the ability to house more rows of cabinets and equipment because air conditioner needs were greatly reduced. Furthermore, cabinets could easily be serviced or replaced thanks to convenient overhead power and cabling. The innovative design also freed up floor space and provided a consistent and aesthetically pleasing atmosphere.

Further enhancing the efficiency and flexibility of the new data center is Orlando Health's addition of overhead power and cabling which resulted in full

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visibility and more flexible cable pathways. Cable trays were mounted on cabinets rather than having to anchor them to the ceiling above, allowing for convenient and easy accessibility to network and power connections. Samuel Tift, RCDD at Orlando Health explained,"we could push and pull a cabinet rather easily and if we have a change of cabinet, it's just a matter of dropping a few connections that are going into it, taking it down and pushing it out of the way, then putting another one in its place. If we have a preloaded cabinet coming in, we take one out and put that one in its place, very quickly and simply done."

Although Orlando Health initially incurred cost on the overhead power and cabling, they expect to decrease expenses in the long run because of savings in reducing equipment maintenance and eliminating re-work, excessive cleaning and numerous variables associated with the upkeep of a raised floor environment. Technical Facilities Manager, Patricia Wood points out that "over time, we will definitely save money with the overhead power."

Consistency & Efficiency Realized

Another goal for the new data center was to create a clean, consistent look and solve various floor space issues that result from a mix of cabinet styles and footprints. Typically, cabinets are bought from the same vendors that provide the servers, resulting in an accumulation of multiple cabinet types over the years. This causes a lack of uniformity, unpleasing aesthetic appearance and a number of logistical problems such as how to get cabling and power in the racks at the same angles. Older style cabinets result in lost floor space from all the different shapes and layouts and "a couple inches difference could cause you to lose several feet of floor space because it makes it unusable," said Hahn, Orlando Health's Senior Manager of Technical Services. Because of these issues, Orlando Health built their new data center around one basic cabinet style that could meet all of their needs—CPI's F-Series TeraFrame® Cabinet System.

The choice to line the rows of their ultra modern data center with CPI's glacier white F-Series TeraFrame Cabinets also provided efficiency to Orlando Health. Along with the cabinet's sharp appearance, the white was chosen to provide a green solution to decrease lighting costs, resulting in energy savings. The white cabinets reflect light, allowing a smaller bulb to illuminate racks. Using the white cabinets allowed Orlando Health to use lower wattage lights while still meeting the minimum standards for lighting and made cabling and installation easier. Aside from offering efficient solutions, the white cabinets are visually unique and give the room a clean, fresh, and modern aesthetic.

The overall contemporary design greatly contributed to energy efficiency by enabling Orlando Health to reduce their estimated 16 CRAC units to a much

CPI Cabinets and Racks in Orlando Health Data Center

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less than planned number of CRAC units. “We have four [CRAC units] but we have one shut off, so we are only actively using three,” said Wood. In addition to the greatly reduced number of CRAC units, Orlando Health is using less total tons of cooling in their data center than what was originally planned to cool the floor, which is below capacity, allowing for future growth and sustainability.

To further enhance the contemporary design of this state-of-the-art data center, CPI customized an air box for side breathing switches specifically for Orlando Health. “We did participate in developing an airflow box specifically for the Cisco Catalyst 3750-E Series Switch, which had not previously existed. We were able to provide input into the design considerations for that

Provide efficiency and an aesthetically pleasing appearance.

CPI Custom Air Box designed specifically for switches that require side airflow

component, along with Chatsworth providing guidance into how it's going to help with airflow and making sure we had all of our bases covered to really get the most use out of that component," said Steve McAllister, Senior Network Administrator. The air box would ultimately provide an additional flexible and energy efficient solution for the overall design of the data center. Orlando Health decided it would allow for quicker access, greater flexibility and overall practicality to include switches in the same cabinets as the servers. Although the decision solved several networking issues, it created airflow issues that increased the heat load within the cabinet, making it necessary to custom design an air box which would allow cool air to circulate around switches within the cabinet. "It is beneficial for switches to be in the same racks as the servers because it keeps the large number of physical connections isolated to a single rack reducing the amount of cabling going outside of the rack," explained McAllister. This solution provided simple cable management and an ease of moving equipment and cabling around resulting in open flexibility between racks.

"Another important issue is support. We can respond very fast when we know which cabinets aren't having any issues, making it easy and quick to identify which cabinet is problematic, without risking cabling," added Ahmed Mohamed, Technical Services Manager, Orlando Health. Orlando Health has not worked with any other manufacturers aside from Chatsworth Products, Inc. that would customize a piece for them. "I think what separates Chatsworth from most other manufacturers is they can engineer it, design it, build it," said McAllister.

The flexibility, energy efficiency, and customization of Orlando Health's contemporary data center proved to be well worth the journey in the end. "Since we've been in this facility, we've had the same cooling capacity, twice the amount of floor space to cool and we don't have any type of heat issues at all. In fact, the temperature is staying 10 to 12 degrees cooler than what our other facility was," said Wood. Based on computer simulation modeling, the less traditional approach "should save an estimated 30 percent in cooling efficiency" according to Senior Manager, Technical Services, Chuck Hahn. "If given the opportunity to start with a whole fresh room then we would deploy this same design again."

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Orlando Health was pleased with the products, services offered and their partnership with CPI's Senior Consultant, Steven Bornfield, and expressed interest in working together again on future projects. "Chatsworth was very accommodating in helping us engineer the solution for the data center based on our needs. Everything from designing the air box for the types of switches that we were using, creating the chimney solution to duct hot air out so that we could reduce the number of AC units that were required to cool the data center, to the innovative and efficient white cabinets were all options put on the table by Chatsworth and we were able to develop solutions with them," said McAllister. Comp adds, "I think this design and what CPI and Orlando Health put together, really positions us well for the future."

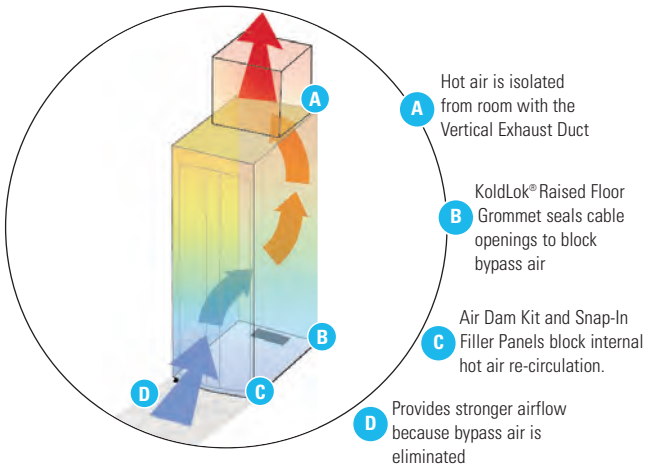
Conclusion

Although some are critical of contemporary designs in data centers, Orlando Health has revolutionized the industry and introduced an innovative and effective approach to improving efficiency and flexibility. "I think every one of us had the concern of doing something outside of the traditional data center when we started and then as we progressed we became more and more comfortable with the idea. Now everyone I've talked to or anybody that had a different belief thinks that this is one of the best state-of-the-art designs for data centers that there is," said McAllister. Dave Simpson adds, "while our focus on the new data center space was to innovate, the greening of the data center is a becoming a major direction for us as well. We are still planning to improve the energy efficiency of our new space as well as our existing space. We will continue to drive more energy efficient solutions in all aspects of our business especially our IT solutions and cooling. In our previous data center design we would not have been able to accomplish these improvements in energy efficiency".

TeraFrame® Family of Cabinets

Uniquely designed, the TeraFrame® Family of Cabinets feature CPI Passive Cooling® Solutions, an innovative thermal management technique that allows you to control the flow of air throughout cabinet spaces, without additional CRAC units, in-row air conditioners or risky liquid cooling solutions. Serving as the Simply Efficient™ choice, CPI Passive Cooling Solutions offer the ability to reduce data center energy costs up to 40%, while maximizing cooling unit efficiency and minimizing environmental impact.

CPI Passive Cooling® Solution



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About Chatsworth Products, Inc.
Chatsworth Products, Inc. (CPI) is a global manufacturer providing voice, data and security products and service solutions that optimize, store and secure technology equipment. CPI Products offer innovation, configurability, quality and value with a breadth of integrated system components, covering virtually all physical layer needs. Unequalled customer service and technical support, as well as a global network of industry-leading distributors, assures customers that CPI is dedicated to delivering products and services designed to meet their needs. Headquartered in the US, CPI operates global offices within the US, Mexico, Canada, China and the United Kingdom. CPI's manufacturing facilities are located in the US, Asia and Europe. (www.chatsworth.com)

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