


# BUILDINGS GET A BRAIN

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## Pulse Check from Our Annual Industry Gathering

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# Introduction: A Routine Exam of the Intelligent Buildings Ecosystem

In January 2015, Cleantech Group held its second annual *Buildings Get a Brain* executive summit, convening over 100 senior executives in the commercial buildings sector in a two-day candid dialogue about the future of intelligent buildings. Conducted under Chatham House rules (i.e., no direct attribution of participants' comments), the event produced great conversation, great connections, and just the right amount of controversy.

Cleantech Group previously published a detailed overview of opportunities and challenges in the intelligent buildings space in 2014, which you can read [here](#).

In that paper last year, we called out major opportunities in the built environment in terms of:

- Improving the interoperability of building systems
- Better aligning stakeholder communications across the value chain
- Reframing the conversation beyond energy efficiency
- Better financing adoption of intelligent building projects

Many of the same themes still ring true today, and this paper serves as a brief addendum to those topics. Below, we reflect on a few of the sentiments from this year's Summit, which helped provide more nuance as to which of these opportunities are stalling (and why), which might need to be reframed, and which are still wide open to enterprising leaders.



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# Psychosomatic Therapy: Exploring More Nuanced Diagnoses of the Sector's Challenges

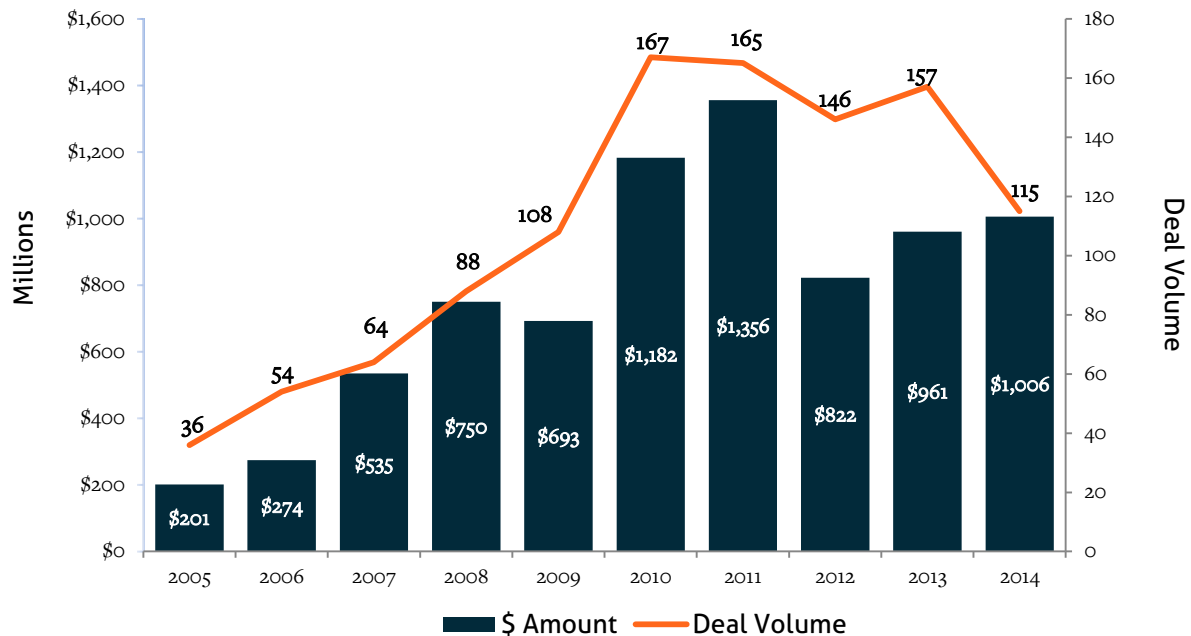
The buildings industry is one of the slowest to evolve and incorporate new technologies and solutions, especially into operations and maintenance. Although one year is a short time frame in any industry's innovation commercialization rate, the sentiment during the 2015 Summit reflected that the overall pace of innovation – with respect to new technology commercialization, adoption, and success – had slightly plateaued over the preceding year.

Summit participants both raised some frustrations and provided more nuanced views of the key opportunities raised last year and the challenges still facing the industry today:

## Integrated and interoperable building systems

Over the past 3-5 years, there has been great progress in creating better platform-as-a-service solutions for intelligent building technologies, as well as designing for their implementation earlier in the building value chain (i.e., by designers and construction firms). Summit participants clearly value this trend, but now increasingly realize that there will likely *never* be a completely plug-and-play ecosystem for intelligent building technologies – and that's OK. Integration plays have further room to improve on performance and user experience, but the technology arc has shifted towards adoption, so there may be less industry hype even while these technologies are making their way steadily into buildings.

Figure 1. Annual Global Corporate and Institutional Venture Investment in Smart Buildings



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This aspect of the technology hype cycle will be interesting to watch across smart building technologies in general. While venture investments are just one indicator of sector activity, it is interesting to note (1) the broader slow-down of activity in the last 3 years compared to a major ramp of investment up through 2011 (Figure 1) and (2) the much more

significant drop in early stage deal volume compared to later stage deals (Figure 2).

While only broadly illustrative, these trends do often indicate an industry generally re-focusing from technology innovation to a quieter scaling period.

Figure 2. Early Stage vs. Later Stage Deal Volume in Smart Buildings



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**Better financing options**

Financing for smart building technologies – or the lack thereof – was a key topic of discussion at the Summit. There is clearly a disconnect between the key stakeholders in the space, including technology developers, financiers, and customers, which prevents meaningful amounts of capital from being deployed.

Based on the discussion at our *Buildings Get a Brain* summit, it seems at least two points of contention exist at the highest level: (1) There is a massive amount of capital to go around, but it is not being deployed for intelligent buildings; (2) There are numerous existing financing models for building equipment, so combined with the first point, it does not seem that they are being utilized to the extent possible. Why the disconnect?

## **Building a better dialogue between customers and buyers**

The exact mismatch between capital supply and demand is not immediately clear, but it is certainly related to two other major themes raised at our two consecutive building summits: aligning stakeholders and elevating the conversation about building performance beyond basic efficiency numbers.

Many new building technologies are asked to prove stringent ROIs that are not always asked of other corporate investments or expenses. This is a complex issue related both to legitimate technology performance uncertainty around new solutions as well as to inefficient decision-making processes within buyer organizations, which we will not fully discuss here.

On the latter front, however, the typical sales conversation for building systems entrepreneurs seems incredibly disjointed and is recounted by several Summit participants roughly as follows:

1. Buyer claims that management of occupant comfort is both the biggest concern and the biggest use (and often waste) of time
2. Seller offers optimization platform that delivers energy cost savings while simplifying the process of keeping occupants comfortable
3. Buyer rejects offering on notion that ROI is not quick enough despite not having quantitative evaluation metrics to justify the existing manual, time-consuming systems and operating rhythms currently being used in the first place

The root causes of this situation are not necessarily straightforward, but certainly include a threat of obsolescence felt by operations and maintenance personnel, overly stringent ROI demands from mid-level or senior finance staff that are removed both from day-to-day operations *and* from C-suite strategy, and of course real technological integration challenges and capital risks.

The disjointedness of this sales dialogue continues to hamper the scalability of intelligent building systems, and has left some of our Summit participants a bit more discouraged than one year ago.

# A New Exercise Regimen: Bright Spots for Continued Self-Improvement and Industry Progress

It's not all gloomy for smart buildings. Despite a bit of soul-searching in regards to a less-than-exhilarating pace of market evolution, Summit participants noted continued strong progress both on the development of new solution offerings and on the accelerating deployment of recently commercialized solutions:

## Driving new technologies and solution offerings

The *Buildings Get a Brain* summit strives to reframe the conversation about intelligent buildings beyond energy efficiency. Several areas of building technologies that do reach beyond efficiency evoked optimism from the event participants, including:

1. **Air quality:** Indoor air quality has always been a major consideration for the design of HVAC and other building systems, but is gaining greater interest especially among major corporations that place emphasis on occupant health as a differentiator, and among building operators in major growth economies like China and India, where urban air quality is abysmal. Emerging companies that focus on particulate matter, allergens, and other air contaminants have an opportunity to stand out if they are able to offer turnkey solutions that can not only deliver real air quality improvements and fight through the pseudo-science that hangs over some air purification devices, but can provide other benefits such as engaging occupants on personal health or reducing HVAC energy consumption.
2. **Comfort:** Thermal comfort (or rather lack thereof) continues to be the number one issue raised by building occupants. While there has been great progress in creating holistic building optimization solutions that manage for comfort, as well as more personalized and localized controls, there is still room to deliver clever thermal comfort solutions. This is especially the case for the massive number of buildings with no building management system or other sophisticated controls. (This white paper is being written in a New York City office with several windows open to 18°F air to counteract overzealous radiators.) The future has room for both high-tech mobile solutions like those of [Building Robotics](#) and lower-tech solutions like those of [Radiator Labs](#) (coincidentally, the former offering called Comfy, the latter called Cozy).
3. **Space utilization:** Buildings are of course not just physical skeletons and electromechanical components, but the organizations and occupants that occupy them. As such, building performance includes the real estate value as determined by factors such as occupancy rates and rents. Young companies like [WeWork](#) and [LiquidSpace](#) have experienced dramatic demand and consequent growth as they have been able to match real estate supply and demand for high volumes of small tenants. WeWork further adds another layer of value as it strives to provide tenants with quality amenities and to curate meaningful interactions among occupants. Major real estate firms and other investors are watching closely. WeWork, for example, raised an impressive \$355 million growth equity round in December 2015 at a valuation of \$5 billion, less than five years after its founding.

The market signal to the smart buildings community is clear: it's not just about incremental benefits from individual gadgets; rather, success will come to those that radically transform real estate management paradigms altogether.

4. **Operational/management tools:** Not every aspect of building operation can be automated. Fortunately, there are emerging innovations for those parts that cannot and must still be performed by operations and maintenance personnel, property managers, or construction crews. [FotoNotes](#) and Happy Inspector are two players that provide such streamlined mobile tools. Combined with construction document management and workflow tools like [PlanGrid](#), such solutions have the capacity to bridge major gaps in the buildings ecosystem, such as those between engineering firms and commissioning agents, or between tenants and property managers.

### More effectively scaling existing solutions

Beyond technology development, a number of common recommendations at the event were targeted at some of the open challenges described earlier. These opportunities are consistent with those discussed at last year's Summit and in the accompanying white paper, but are called out again here given the participants' general optimism that there is still significant collective energy oriented at addressing them. These include:

1. **Better communicating the value of solutions to customers:** In order to succeed and thrive, building innovators will need to continue to refine their pitch strategy. The open challenge will remain fine tuning their messages to the right

audiences at the right time. For example, a building optimization platform provider must pitch performance and ease of use to the operational end user, while proving bottom line results to CFOs, and providing an overarching strategic value to the buyer more broadly. Especially for earlier stage companies, this requires a balancing act between engineering jargon, financial savvy, and marketing vision. At the end of the day, major purchasing decisions are likely to be made by individuals like a corporation's VP of real estate, who may have the most stringent demands of all, combining all of the above considerations, along with those like scalability across a campus or global real estate portfolio.

2. **Implementing consistent financial metrics and expectations:** As we have noted several times in this paper and Summit participants have raised repeatedly at our events, purchasing decisions for intelligent building solutions typically come down to financial metrics like ROI and IRR, especially as these projects compete with other capital priorities. While energy efficiency (or optimization of other resources) is easily quantifiable, some of the most promising intelligent building technologies – including those described in the section above – target health, comfort, light quality, workspace mobility and adaptability, and other benefits that are more difficult to quantify. However, unless corporate CFOs and property owners around the globe suddenly begin to make business decisions by gut feeling over robust financial logic, solution providers and other stakeholders will need to better quantify the financial costs and benefits of these diverse solutions in order to make them stick with potential customers.

3. **Increasing and augmenting communication across the value chain:** As we discussed in our 2014 white paper, one of the most difficult feedback loops to maintain in the buildings value chain is relaying occupant behavior within a building back to designers. Yet this is just one of the commonly cited communication gaps that limit the overall performance of well-intended building designs. As we wrote, “maintaining continued engagement at every step of the building’s life cycle is necessary to assure the value added at each stage is not lost in the next.”

Technologies for improved workflow and document management, such as those mentioned in the section above, will certainly help to align performance goals across the value chain. Furthermore, as more consistent financial and performance metrics are developed, these can be integrated into more holistic contracts and project plans that drive accountability for building performance as early as the design phase and through daily maintenance.

## Prophylaxis or Supplement? Making the Most of Policy

As mentioned above, some of the optimism of our 2014 Buildings Get a Brain summit gave way in 2015 to a few critical voices that helped set the tone and draw a more honest discussion from the event participants. While net optimistic, the sentiment in the room was that the intelligent buildings space is simply not evolving fast enough to meet societal or government goals (e.g., for mitigating climate change impacts or for increasing energy resiliency) or even industry’s own goals of technology adoption and customer solution innovation.

On the other hand, attendees pointed to a number of policy innovations driving change in the broader industry. For example, at the federal level, the continued drive of the GSA to make government buildings as sustainable as possible; at the state level, utility reform such as New York’s Reforming the Energy Vision (REV) aimed at making better energy solution providers out of utilities; at the municipal

level, major energy benchmarking and smart city initiatives from San Francisco to Seattle to Charlotte. Such policies and many others have been crucial to delivering funding for building innovation, for scaling early technologies, and for elevating all manner of building standards (i.e., beyond energy to safety and other critical considerations). In general, the industry should welcome further policy innovation, as it will help to unlock financing for energy efficiency and other smart building projects, help define performance standards, and generally set higher performance bars for the systematic improvement of the nation’s building stock.

Yet major corporations and real estate owners and managers should also be concerned, not just due to compliance costs, but because of the lost opportunity for differentiation. For example, major tech companies like Google and Apple have been using their buildings



(and consequently more competitive businesses) and to attract employees looking for dynamic environments with solid green credentials. Employee productivity and retention, environmental sustainability, and operational savings, among others, are all business differentiators driven by the quality of buildings. The stronger smart buildings policies get, the less impact these differentiators will have compared to competitors. While the most progressive organizations can always continue to leap frog others

with creative takes on intelligent buildings, a broad swath of building owners and operators will miss any competitive opportunity if they continue to lag behind policy and modern building design paradigms.

Regardless, increasingly stringent public policy and industry standards on energy, water, health, and comfort will create a positive impact on occupants and the environment, but real estate managers must more quickly than ever decide whether to lead the way or to play catch-up to compliance and competitors.

## Conclusion: Let's Talk in a Year

Buildings have always been and will continue to be on a continuous improvement cycle. There is no single definition of “intelligent building,” but it is certainly clear when a new building has been designed with intelligence in mind, or when an old building makes a leap forward in the course of a retrofit. With many new solutions in the market targeting all facets of building performance, it will be difficult to gauge the exact trajectory of the sector. If other industries (e.g., solar, transportation) are any indication, we will see a number of surprises – in the emergence of clever business models, in major cost reductions in expensive hardware components, and perhaps in more “moonshot” bets by pioneering corporate leaders – before we see a broader scaling mechanism for intelligent buildings take precedence in the market.

However, as we at Cleantech Group have found, taking the pulse of the industry every year through open and honest dialogue is a major opportunity to reflect on the overall status of and progress within this innovation ecosystem. Rather than being disappointed about an overall slow rate of progress in the preceding twelve months, we found our 2015 Buildings Get a Brain

participants more engaged than ever and driven by a common goal to move the industry forward. Many challenges in the buildings space are ingrained from decades of commonly adopted property and financial management practices that have lagged behind the pace of technology innovation, and will not be solved overnight. As always, collaboration and communication prove to be the best initial catalysts for progress, and we anticipate increasingly solutions-oriented dialogue between our executive participants over the coming year.

We welcome those interested in the broader discussion to join us in fostering a network of corporates, entrepreneurs, investors, financiers, and other service providers that are committed to an honest, healthy debate about the future of the built environment, especially new paradigms for scaling innovation in this space. Cleantech Group is proud to serve as a catalyst for engagement in this space – whether through our i3 platform and services, our global events, or our network at large. We invite you to get in touch about how you can join this network and help drive the industry forward.

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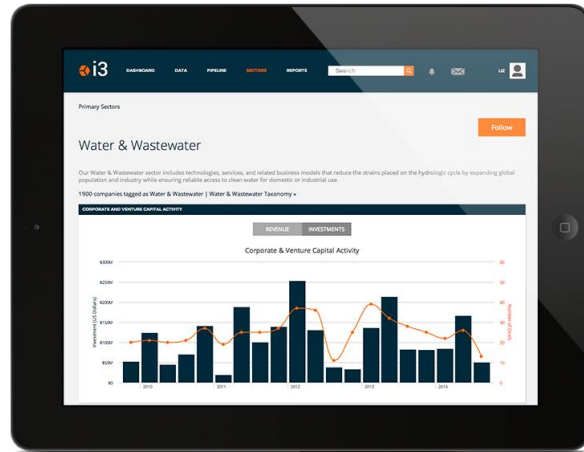
# About

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# About

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Company	Country	Status	Amount
ista International	United States	Private	\$4,100,000,000
United Envirotech	Singapore	Public	\$1,400,000,000
Enviva Water Technologies	United States	Private	\$85,650,000
PerryChem	United States	Private	\$200,000,000
Intracorp	United States	Public	\$150,000,000
Aclara	United States	Acquired	\$150,000,000
Rohose Lifesciences	India	Private	\$54,000,000
Underground Solutions	United States	Private	\$45,000,000
Quench	United States	Private	\$38,500,000
Liquid Environmental Solutions	United States	Private	\$31,600,000

Company	Country	# of Deals
Sud Environnement	France	2
Hyfam	United States	2
LG Chem	Korea Republic	1
HydroLogix	United States	1
Stone Enso	Finland	1