

# DatacenterDynamics FOCUS

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## LONDON

### CAPITAL OF DATA CENTERS

## DCD DISCUSSIONS: MODULAR DATA CENTERS

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**GEORGE SLESSMAN, IO**

*"I do not believe that Shipping Containers play a role in the next generation of data centers for Enterprise users."*



**PETER GROSS, HP**

*"The incessant cost escalation of the facilities is not sustainable-a new approach is needed."*



**GUY RUDDOCK, COLT**

*"Many of these facilities are simply time served, they do not possess the power or space to be redeveloped and they will fade away."*

# DATACENTER DISCUSSION

FOCUS gives three leading engineers in modular data centers the opportunity discuss the future of their businesses and the industry

A discussion between three of the world's leading proponents of modular data centers may seem like an exercise in stating the obvious, but that is not the case.

One believes traditional data centers will exist alongside modular and containerized solutions. Another believes that traditional data centers are doomed to extinction because of high costs and long construction times and that ultimately traditional data centers no longer fit the purpose for which they are designed: that is to house IT equipment. One believes containers have no place in housing enterprise IT.


While the three individuals taking part in this discussion clearly share much common ground, they are also rivals. Each believes in modularity but each also has very strong and particular opinions about the direction of the industry.

The format was simple, each participant submitted three questions to be answered by the other two. The questions, and who asked them, are as interesting and illuminating as the answers given. There are subtle, and not so subtle differences, which as ever, are in the detail.

The modularity discussion — would you buy a pre-manufactured data center — has only just started.



**PETER GROSS**  
VP and Managing Partner  
HP Technology Consulting



**GUY RUDDOCK**  
VP Design, Delivery and Operations  
COLT Data Center Services



**GEORGE SLESSMAN**  
CEO  
IO

**Q DCDFOCUS ASKS:**  
Assuming no prior knowledge on behalf of the audience, explain your company's modular data center proposition in as few words as possible.

**Peter Gross Answers:**  
We recognize the fact that traditional data centers are no longer capable to properly respond to the business and technology demands in terms of agility, performance, speed to market, energy efficiency, flexibility and most importantly, cost. A new approach that transforms the conventional brick and mortar artisanal, customized solution to a highly standardized product is needed in today's fast changing technology world.

To respond to these pressure points, HP has developed a set of solutions covering the different segments of the market — the FlexDC as a prefabricated modular data center and a family of containerized data centers that we call PODs and EcoPODs.

**Guy Ruddock Answers:**  
Colt's modular data center is transforming the traditional datacenter market. We deliver flexible, configurable, highly efficient datacenters to

our site or yours. All delivered in four months.

What is different about the Colt product is its flexibility. With well over 100 configurations our customers have a range of options to suit their power, space and cooling requirements. We are also constantly innovating so new requirements are fed back into our design process for even greater flexibility in future.

**George Slessman Answers:**  
IO designs, engineers and delivers data center infrastructure for the world's largest enterprises, governments and service providers. IO owns and operates data centers for hundreds of enterprise customers, and leveraged this experience to build a next-generation Data Center 2.0 technology platform.

IO Anywhere modular data centers provide enterprise-class infrastructure that can be delivered as Data Center-as-a-Service and rapidly deployed as a product to customer sites anywhere in the world. IO developed the first data center infrastructure operating system, IO OS, to provide the intelligent control needed to maximize utilization, resiliency and energy efficiency. (www.io.com)

**Q GUY RUDDOCK ASKS:**  
Is there any future for the shipping container as a component in a modern data center design and if so, why?

**Peter Gross Answers:**  
I am convinced there is a future, and that future is now. Shifting the bulk of the complex labour associated with building a data center from site to factory, will not only yield tremendous cost savings, but will reduce the entire delivery cycle and will improve reliability, through repeatability.

By shipping prefabricated, tested and commissioned modules to the site, the project emphasis now shifts to supply chain management and logistics. The data center becomes a product.

**George Slessman Answers:**  
I would agree 100% with Peter's response. Manufactured modular data center infrastructure is the future and in fact is happening today (IO has 50 modules currently in production at our factory and 30+ modules deployed for customers, since March).

However, to unlock the potential of true efficiency, sustainability and service level attainment there MUST be an integrated software component like the IO Operating System to enable application to data center communication and optimization.

Furthermore, I do not believe that shipping containers play a role in the next generation of data centers for enterprise users.

## Q GEORGE SLESSMAN ASKS:

Over the next five to ten years, what do we think happens to all of the traditionally designed and constructed data center "1.0" capacity currently deployed (abandoned, repurposed or still useful)?

### Peter Gross Answers:

This is already a serious situation. The average age of enterprise data centers is 14 years and IDC estimates that 85% of facilities built before 2001 are already obsolete. More importantly, most legacy data centers lack the flexibility required by the present dynamic environment. Cloud has exacerbated the need for agility and adaptability to new levels of power density, adjustable redundancy and higher energy efficiency.

The vast majority of enterprises are looking at consolidating their data center portfolio and this trend is linked not only to cost reduction objectives, but also to the need to abandon many such obsolete facilities.

Furthermore, there is a large number of retrofit projects, attempting to bring legacy data center to higher standards.

### Guy Ruddock Answers:

The design criteria for data centers are always targeted at the technology demands of the day, offset by the commercial constraints of the owner/operator. As a result, without factoring in refresh cycles, all of these facilities have a natural useful life. Historically, it was a straightforward exercise to fund the construction of a new facility and to take into account certain likely technology advances as part of that design, as a result the Board was well used to developments of this type.

However, over the past five years the data center requirements and the available approaches have completely changed. The technology housed within the facilities has become significantly more powerful and environmentally aware; the data center itself has become an engineered product with fluid dynamics at the heart of its design and the increasing cost has become a significant factor in the procurement.

This forces the owners of the data center '1.0' onto the horns of a dilemma. Many of these facilities are simply time served, they do not possess the power or space to be redeveloped and they will fade away. Others can be reinvigorated for a while by replacing cooling systems and power infrastructure and if the facility has the capability these have a new life. However, most sites will require redeveloping making use of the utility and communications infrastructure already on site, which is a difficult task, often being undertaken while the data center is live!

The only viable way of undertaking such a task is to utilize modular data centers. They can provide swing space while the facility is redeveloped, avoid the massive technical design costs of a new traditional build but are able to utilize the utilities already available on site. In this way at least one of the significant risks has been removed and others mitigated — the task is not going to be easy but at least the design risk can be removed.

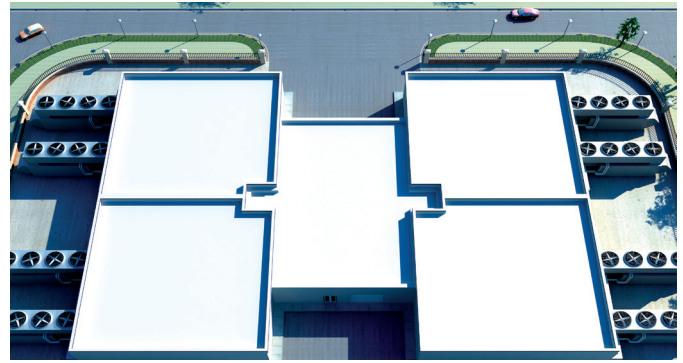
## Q PETER GROSS ASKS:

Do you see a more significant impact of data center infrastructure management, compared to the traditional data center?

### George Slessman Answers:

I believe that advanced DCIM applications (like the IO Operating System) are the basis for data center innovation for the next several decades. The diseconomies of the traditional data center stem from its "thick provisioned" nature. Each traditional data center design decision is made at a single point in time while attempting to predict the future of IT infrastructure and applications over a projected useful asset life of up to 30 years. The flaw is obvious, and results in expensive, poorly utilized, and highly inefficient data centers.

Major components of the current data center infrastructure construct —



HP Flex Data Center

energy, back-up, storage, and conditioning — will need to be significantly reduced or even eliminated to maintain the unit economics demanded by the digital revolution. This can only be accomplished with standardized data center hardware like the IO Anywhere platform that is intelligently controlled by a fully integrated operating system. This operating system will provide the necessary intelligence so that applications can attain their functional objective: to stay connected to users.

### Guy Ruddock Answers:

DCIM is becoming a key component in data center operations and design activities. This is largely an industry factor and not a modular data center element. Clearly, the modularization of data centers allows the DCIM systems to be far more effective simply because the standard nature of the facility allows a more comprehensive use of the technology to be made and invested in. After all, if the DCIM is for one hall it is far more expensive per installation than something amortized over many hundreds. In my view the impact will be seen more in the modular units for this fact alone.

## Q PETER GROSS ASKS:

What are, in your opinion, the operational benefits of the modular, pre-fabricated data center?

### Guy Ruddock Answers:

Standardization and simplification are the watchwords of an engineered data center, be it a modular or a containerized facility. From an operational viewpoint this means that the processes and procedures are consistent across the estate. Assuming the product to be well engineered they should also be straightforward, because they will have been suitably 'polished' during the lifecycle of the product. Finally the basis of the design is such that the form factor tends to be smaller across the facility and as a result the materials are usually standard stock items, which often makes them cheaper.

However, the greatest benefit is usually realized at 3am on a wet Tuesday morning by a maintenance engineer called in to deal with a remote alarm. He knows what the unit does, how it works and the likely failures — because this one is exactly the same as all the other ones he has in his estate.

### George Slessman Answers:

Based on our experience in running IO Phoenix DC6 and IO New Jersey DC1, which are both multi-MW modular data centers using the IO Anywhere platform and the IO Operating System, the top five operational benefits of a true modular data center platform are:

1. Reduction in data center capex of 50% or more;
2. Operating expense reduction for energy, maintenance, and support of up to 30%;
3. A 90-day procurement cycle, matching the IT procurement cycle for everything else;
4. Just-in-time delivery and provisioning that allow staged capital deployment and the ability to scale up or down as the need demands;
5. Dramatically higher effective PUE's from higher utilization rates and integrated system operations, because power and cooling are designed and manufactured to work together.

## Q GEORGE SLESSMAN ASKS:

What do you see as the single most significant barrier to adoption of a modular data center 2.0 strategy by enterprise data center users?

### Guy Ruddock Answers:

Image is a big part. Many data centers are used as both housing for important equipment and as a 'tourist location' for executive teams and customers.

Often these teams are unfamiliar with modern data center design, but are aware of traditional monolithic halls with rows of identical cabinets and hence expect to see exactly that. As many of these people have a very strong impact on the funding of data center projects, it is inevitable that the CIO will wish to see something that meets these additional corporate requirements. As many modular data centers tend to use shipping containers these will always have an image problem in those critical high level meetings.

Functionality, flexibility and accessibility is critical to the on-site engineers and data center managers. In the Colt product this was one of the design briefs — the data center must look like a traditional data center to the casual onlooker — alongside that we needed to make them flexible to cater for a wide range of customer requirements — as a result the visitors to our data centers are wowed when they walk in. They expect a container, they get a traditional look and feel and more options than you can shake a stick at.

### Peter Gross Answers:

There is no secret that the data center industry has always been extremely risk averse which unfortunately has, to a certain degree, stifled innovation. Modular and containerized data centers are relatively new and many decision makers in the data center space want more validation before making a decision, and that only comes with time. However, compared to other developments that took a very long time to gain acceptance, the pre-fabricated modular or the containerized solutions have had a rapid favorable reception. After all, in today's environment, it is difficult to reject a solution that costs less, is more energy efficient, more flexible and has a much shorter deployment cycle.

Ultimately though, all three options, conventional brick and mortar, prefabricated modular and containerized will have a place in the data center spectrum. The decision will be driven by the solution that is best aligned to the business needs.

## Q GUY RUDDOCK ASKS:

With the simplification of the data center product, will we see the advent of a move from 'beautiful' to 'functional' data centers?

### Peter Gross Answers:

It is a bit difficult to assess the importance of the facility look, although historically, there are many examples of data centers expected to also make an architectural statement. Things are very different today; users want anonymity and security, in addition to performance and functionality. They don't want the outside world to look at their data centers or even know they exist. The data center of the future will be industrialized and highly standardized. That's the only way to reduce costs and delivery cycle. Whether this trend will translate into an esthetically pleasing facility is a highly subjective matter.

### George Slessman Answers:

We should aspire to elegance in engineering and design no matter what the delivery method for IT infrastructure. I would be surprised that the right answer to this problem would be anything but elegant and beautiful.

## Q GUY RUDDOCK ASKS:

Will the speed and efficiency of new data center delivery models, change the way the clients consider the purchasing process, specifically the speed of the decision-making and how they plan for future capacity?



Colt Modular Data Center

### Peter Gross Answers:

Yes, the fundamental difference is that the modular and the containerized data centers are essentially products, which changes drastically the way they are purchased. Instead of going through some form of the traditional design-bid-build, they will be purchased based on a specification that documents the performance requirements. Ultimately, these types of data centers will be purchased very similarly to the way servers or other infrastructure components are bought.

As Guy mentioned earlier, some customers are keen on preserving the general attributes of a conventional data center; others don't seem to care, as long as the main objectives—cost, speed, energy and flexibility are met. Either way, standardization will drive the emphasis towards supply chain management and logistics.

### George Slessman Answers:

Absolutely yes. Otherwise we have not solved the real economic problem of data centers: they take too long to deploy and they cost too much.

## Q PETER GROSS ASKS:

In terms of power and cooling, what are in your opinion the best suited technologies for the modular, pre-fabricated solutions?

### Guy Ruddock Answers:

The real core of this question is in fact the reverse, specifically what you can not use!

All of the usual suspects work just fine, free and fresh air cooling being the most obvious, with dx or chilled water backup probably the most common. As a strategy adiabatic requires great care, you never get something for nothing and with careful engineering this environmentally dubious technique is unnecessary.

We should not ignore some of the more unusual approaches either, ground water and river or industrial water cooling all of which we have used in the past work just fine.

Power tends to be more mainstream (for those modular builders who supply it with their product) but even here the form of the equipment is likely to change—monolithic switchboards are ripe for change

As for ups and generation, fuel cells may finally get the power high enough to meet the reduced requirements and that could see the advent of the mechanically driven ups units, probably flywheels, again as the power needed to maintain the facilities reduce

In short, any flavour but be prepared for change.

### George Slessman Answers:

Today, due to practical constraints, it is difficult to move away from systems that can provide for a targeted service level objective of 100%. Currently, the best technology for cooling is still a chilled water solution utilizing hydronic economization and modified air-to-air economization to drive

system efficiency. Currently, on the power systems side, online UPS's continue to be the best tool for energy conditioning utilizing chemical and kinetic energy storage. But the best solutions for modular data center cooling and energy power systems are still in the laboratory today — so stay tuned. With the standardization of data center hardware provided by the modular approach and application integration provided by advanced DCIM tools, the traditional tools must transform, and soon.

**Q GEORGE SLESSMAN ASKS:**  
**What have you seen as the single most common reason (right now) for Enterprises to consider and adopt data center 2.0 technology?**

**Guy Ruddock Answers:**  
 Although there are a fair few flavours running through our customers with respect to reasons for considering a modular data center and in truth many of these objectives overlap somewhat, the one piece of the commercial jigsaw that always comes up is the fact that the risk of the decision is much lower than any other method of data center provision.

Standing in a data center that looks identical to the one you want proves it works (if that is the concern). Seeing one installed in the timeframe quoted proves it can be delivered, likewise the costs are fixed at the start... and so on.

In effect, the risk reduction allows the CIO to claw back control of the data center implementation — a fixed scope, schedule and budget; minute change control provision and a clear understanding of the commercial benefit. From the CIOs perspective, a simple solution to a rats nest of issues.

**Peter Gross Answers:**  
 The three main reasons used to justify solutions based on data center 2.0 technology are speed of delivery, flexibility and scalability. However, I



IO's Next-Generation Modular Data Center

believe that the strongest underlining argument is cost. A traditional high-end 2 MW data center cost approaches \$50m (since economies of scale work well in this space, the cost per MW for large facilities is significantly lower).

This is the reason the vast majority of small and medium-size data centers (less than 5MW of critical load) are headed to colocation facilities. In today's economic environment, while the cost of hardware continues to decline, the incessant cost escalation of the facilities is not sustainable—a new approach is needed and the modular, pre-fabricated solution could very well be the answer. High energy efficiency, multi-tier and ability to provide different density zones are also attractive attributes.

**HAVE YOUR SAY:**  
 Join This Discussion Online: [www.datacenterdynamics.com/focus/themes/modular-design](http://www.datacenterdynamics.com/focus/themes/modular-design)



## Data Center 2.0

At IO, we know data centers. Our intimate knowledge of the data center enabled us to build a next-generation Data Center 2.0 modular technology platform, called IO Anywhere®. What this means is that you can now purchase data center infrastructure hardware, coupled with our IO OS® data center operating system software, just like

your other IT resources. Your own data center can be operational in as little as 90 days with new or expanded capacity delivered just as seamlessly, eliminating stranded capital and the need for you to overspend. With IO, you have the full power of your data center infrastructure at your command. **That's intelligent control.**

