



A CMI Business Brief White Paper:

IBM PureSystems™: A New Computing Pattern for a Complex World

By Alexander Price, CMI





The new “PureSystems™” family of products combines compute, storage, networking, virtualization and management in a single cloud-ready machine that can be configured within minutes and managed from one console. The ultimate goal: to replace the sprawling enterprise computing model with one that lets IT managers focus on mission-critical tasks and innovation instead of “scut work.”

Following a four-year, \$2 billion investment in R&D and acquisitions, IBM unveiled its new PureSystems™ product line in April 2012 to unprecedented fanfare. Hailed by IT analysts as the dawn of a new and simpler era of computing – a new platform on which to build the modern data center – PureSystems™ integrates all IT elements (physical and virtual) into a single machine that’s easy to install, automate, update and manage.

This “expert integrated system” aims to replace enterprise computing – a model comprising multiple and disparate systems that has grown ever-more costly, inefficient and unwieldy – with a converged infrastructure that IT managers can easily install and manage right out of the box. The rack-based system features a single management interface and a catalogue of smart software “patterns” that will enable IT staff to focus on valuable business-critical tasks instead of endless system maintenance, updates and other “scut work.” In short, PureSystems™ is designed to slash the costs, inefficiencies and complexities associated with managing today’s data center, while also allowing companies to quickly enter the cloud.

No Money for Innovation

It’s estimated that companies currently spend 70 percent of their IT budgets on simple operations and maintenance, leaving little to invest in innovation.

- Only one in five corporate IT departments devotes the majority of the IT budget to innovation.ⁱ
- Nearly two-thirds of organizations fall behind schedule when deploying new IT capabilities.ⁱⁱ
- It can take as much as four to six months just to establish hardware and software infrastructure.ⁱⁱⁱ

To resolve such problems, IBM’s PureSystems™ offers standardized configurations and pre-installed application “patterns” on which companies can build more quickly than when constructing their systems from scratch.

PureSystems™ currently comprises two products:

PureFlex™ integrates server, storage and networking resources into one highly automated and secure, simple-to-manage system.

PureApplication incorporates repeatable software patterns and industry-specific processes known as “patterns of expertise.” The software incorporates the knowledge and best practices acquired through decades of launching and managing data centers, software infrastructures and applications across the globe.

Together, these two products automate many of the tasks associated with installation, maintenance and



updating of the data center, reducing the time, effort, cost and skills required to architect, procure and deploy infrastructure and applications.

Bigger than the Mainframe?

“From an IBM perspective, in my lifetime, I have not seen so much of IBM behind one thing with software, hardware and services,” said Ambuj Goyal, General Manager of Development in IBM’s Systems and Technology Group. “It’s like 50 years ago when we announced the mainframe. In many ways, it is as big as that, but designed for a different world.”^{iv}

Is Mr. Goyal correct? Is PureSystems™ really the Second Coming of the Mainframe? Compared to enterprise computing, how does this converged infrastructure system improve operational efficiencies and reduce cycle times? And -- how does it compare with the converged infrastructure products offered by companies such as Cisco?

To answer these questions, we must first examine the recent history of the corporate data center. We need to understand why IT has increasingly become “a barrier to innovation rather than an enabler of it.”^v

Barriers to Innovation

The modern data center is a very heterogeneous environment – one that encompasses a lot of applications running on a variety of platforms, often on a variety of operating systems, and with a litany of management tools, all, often, from a host of vendors. Within this complex environment, there is a growing need to accommodate ever-increasing workloads while simultaneously enhancing operational efficiencies and cutting costs.

Over the last decade or so, IT managers have turned to virtualization technologies and blade computing to achieve these goals. They have consolidated resources, cut costs and expanded data center capabilities – in part by becoming more and more reliant on x86 servers – to the point where these servers now represent more than 64 percent of the worldwide server market. During this period, blade server revenue increased to 19% of the x86 market. Once considered suitable only for lightweight applications, bladed servers are increasingly used to support an expanding range of high-value, mission-critical applications. In turn:

Overprovisioning server resources has been a prevailing tactic to ensure application performance and service levels. Only ... five years ago, the predominant computing x86 model in the datacenter consisted of one application per physical server. As server virtualization has found a foothold — driven initially by the need to consolidate servers to reduce capital expenses — the number of virtual machines has increased significantly. In 2005, only 5% of physical servers shipped with some level of virtualization; today, virtualization adoption has risen to the point where 1 in 5 physical servers is shipping with virtualization.^{vi}

Although virtualization has improved server utilization rates and lowered capital spending for server



hardware, a new problem has emerged. As growth of the physical infrastructure has flat-lined, the number of virtual machines has spiked dramatically. The ability to grow networked storage environments in tandem with virtual server environments has become one of the biggest challenges for IT managers.

Virtualization can help alleviate some complexity by reducing hardware costs and creating a more dynamic and mobile infrastructure, but successfully implementing and managing virtualization isn't easy. Complex, inflexible infrastructures limit a company's ability to respond to changes in its business, making it difficult to provide new applications, innovate and launch new projects. Lack of automation has mired IT personnel in repetitive, lower-level work, leaving them little time to innovate and perform more business-critical tasks.

While virtualization has reduced datacenter costs by 25%, IT is still spending 80% of its annual budget on maintaining and managing existing systems and only 20% on value-added activities and initiatives, such as building new IT services and developing innovative business services. What is driving the need for converged infrastructure is the need to flip the 80/20 equation by reducing the time and money spent on maintaining what already exists and instead applying more resources toward the value-added activities that support and drive new business.^{vii}

Taming the Monster

As we've seen, put simply, today's data center is suffering from physical and virtual sprawl, because enterprise computing has become a Frankenstein monster – not unlike Mary Shelly's literary creature. Cobbled together from disparate parts (computing, storage and networking hardware/software) acquired from various corpses (IT vendors), enterprise computing monster has grown ever-more complex, unpredictable and inflexible with each passing month. Once considered a solution to many IT challenges, enterprise computing has now become one of the biggest sources of problems.

The solution, or a key part of the solution, to these problems lies with converged systems and automated processes – systems and processes that create a more agile IT environment while minimizing the need to perform manual tasks.

Let's look at an example. A rack system containing IBM Power-based or Intel x86-based blade servers, PureSystems™ features storage, networking and

The Case for Converged Infrastructure Systems

A converged infrastructure system incorporates servers, data storage devices and networking equipment, as well as virtualization and management software, into a single computing package. The convergence includes virtualized I/O, converged networking, virtual switching, load balancing and storage connectivity.

Managing a converged infrastructure is performed with integrated tools that create server/infrastructure profiles, and integrated toolsets replace individual point products that were used to manage a static physical infrastructure.

Also known as “unified computing,” “fabric-based computing” and “dynamic infrastructure,” converged systems provide business and technical efficiencies in the form of decreased complexity and lower costs, thanks to the pre-integration of the various technology components, the pooling of IT resources and the automation of IT processes.

The chief benefits include:

- Lower capital expenses produced by higher utilization rates, less cabling and fewer networking connections.
- Lower operating costs resulting from the decreased need for labor, thanks to automated data

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choices of Windows, Linux or Unix operating systems. More than a stack of pre-integrated components – a server here and some database software there to support a fixed application at the top – PureSystems™ represents a whole new category of products, thanks to patterns of expertise. The software builds operational expertise directly into the systems, converting technology expertise into downloadable packages. The patterns are available in three forms:

1. IBM Patterns: Factory-loaded and based on knowledge gleaned from top IT managers, engineers and technology experts, these sets of patterns automate time-consuming tasks such as configurations, deployment and ongoing upgrades. Applications that used to take days to deploy can now be rolled out in minutes. A recent study estimates an average reduction in management set-up time of 66 percent. Companies can get their systems up and running in as little as four hours.^{viii}
2. ISV Patterns: More than 100 independent software vendors (ISVs) offer applications certified as “PureSystems™-ready.” The PureSystems™ online catalog of ISV patterns simplifies how applications are deployed and managed. For example, a customer relationship management program that once took three days to deploy can now be deployed in under an hour.
3. Customer Patterns: IT organizations can package the knowledge of their own handcrafted applications into a Pattern. As a result, a company interested in expanding into new markets can do so even when the necessary skills aren’t readily available in the new regions or markets.^{ix}

center management and consolidation of the storage and network management infrastructure.

- Increased agility achieved through virtualization of IP and fiber channel storage networking, and the ability to manage the system from a single console.^{xv}

Converged systems are “a perfect platform” for private and public cloud computing services. They are especially well-suited to companies that want to build hybrid internal/public cloud environments that integrate with infrastructure-as-a-service (IaaS). Pioneering IT teams are already using public clouds to fuel their companies’ expansions, since IaaS features low entry costs, ease of use and security.^{xvi}

It’s estimated that nearly two-thirds of the infrastructure that supports enterprise applications will be packaged as converged solutions by 2017.^{xvii}

**Conventional and PureFlex™ Systems-enabled
Cycle Times - Examples**

| Task | Conventional Systems | PureFlex™ Systems |
|----------------------------------|----------------------|-------------------|
| Provision new server | 2-6 hours | 5-10 minutes |
| Provision storage for new server | 3-5 hours | 20-25 minutes |
| Provision network capacity | 30-60 minutes | N/A |
| Add capacity to virtual server | 60-90 minutes | 1 minute |
| Install new UNIX OS | 6-8 hours | 30 minutes |
| System set-up | 10-20 hours | 2-3 hours |



Cost Reductions Through Use of PureFlex™ Systems

| Installation | Consolidation Type | PureFlex™ Systems Percent Less | | |
|--------------------------------------|--------------------|--------------------------------|------------|------------|
| | | Facilities | Energy | Personnel |
| IT Services Company | Mixed platforms | 92% | 87% | 51% |
| Manufacturing Company 1 | UNIX servers | 94% | 94% | 36% |
| Distribution Company | UNIX servers | 80% | 78% | 34% |
| Retail Company | Mixed platforms | 66% | 59% | 60% |
| Manufacturing Company 2 | x86 servers | 80% | 71% | 30% |
| Diversified Company | x86 servers | 65% | 68% | 35% |
| AVERAGE FOR ALL INSTALLATIONS | | 89% | 85% | 44% |

“Patterns of expertise balance, manage and optimize the elements – from the underlying hardware resources up through the middleware and software – necessary to deliver and manage today’s modern business processes, services, and applications. The collective knowledge of thousands of deployments, established best practices, innovative thinking, IT industry leadership and the distilled expertise of solution providers is captured into the system in a deployable form.”^x

By automating and optimizing difficult or time-consuming tasks, IT managers can: automate delivery and deployment tasks for faster time-to-value; eliminate manual, repetitive tasks to reduce maintenance costs, reduce dependence on high-cost, high-demand IT experts for simpler skills requirements; and reduce the chances of human error.

Under the enterprise computing model, it has become increasingly complex and costly to support the full lifecycle of applications and infrastructure. Highly paid IT professionals must devote their expertise to procure, configure, deploy, integrate, tune and scale system components, resulting in longer project timelines and higher costs.

PureSystems™ combines a simplified experience (for both IT staff and the businesses using IT resources), since the technical staff no longer has to manage a jigsaw puzzle of pieces produced by various hardware and software makers that was fitted together over the course of many years – or even decades.

In this model, IT need only manage a single integrated system that’s composed of two parts: platform (PureApplication) and infrastructure (PureFlex™).

PureApplication

PureApplication is specifically designed for transactional web and database applications. Flexible and workload-aware, the platform is easy to deploy, customize, safeguard and manage. To date, users have experienced:

- Deployments up to 30 times faster, thanks to patterns of expertise.
- 55% reductions in operational costs and required management time.
- A 98% reduction in unplanned outages with virtualization capacity.



- Up to 2X the computing power per square foot of data center space.

PureFlex™

PureFlex™ combines compute, storage, networking, virtualization and management into a single machine that can be controlled from one console. Designed to reduce costs and relieve staff from tedious work toward business-critical missions, the system’s optimization expertise makes it possible for the infrastructure to flex, so IT can meet unexpected usage demands without the need for expensive surplus capacity.

In addition, PureFlex™ helps organizations expand the IT infrastructure in a less disruptive manner. New compute, storage and network resources may be added and existing resources upgraded without replacing entire servers, storage frames or switches.

The value of IBM PureSystems™ compared to traditional computing

| Value delivered | From traditional Systems | To IBM PureSystems™ |
|---|--|--|
| Faster time to value | “Up and running” in months | Full infrastructure stack, operational in hours |
| Automated workload scalability | Overpurchased and overprovisioned | Built -in workload elasticity |
| Integrated services and software management | Requires multiple tools per component | Single point of management |
| Simplified acquisition and support | You receive “piecemeal” order and support of hardware and software | Full, preintegrated software and hardware |
| Integration into current environment | Customized, so that they can work with what you have | Easier integration using open-standards computing |
| Easy adaptation to address current needs | Hard-to-maintain, complex and “brittle” customer solutions | Well-managed flexibility and simpler extensibility |

“One Throat to Choke”

Because PureSystems™ is assembled and distributed by one manufacturer, it is easier to deploy than those consisting of multiple vendor products requiring assembly in the field. Instead PureSystems™ offers IT managers one convenient “throat to choke” when it comes to installation, maintenance and troubleshooting.

According to an industry study that tracked six deployment cases, use of the PureFlex™ system to consolidate older servers, storage systems and networks significantly reduced administrative staffing. Three-year personnel costs averaged 44% less for PureFlex™ Systems than for existing environments.



Facilities and energy costs were reduced by even wider margins. The three-year costs of using this converged infrastructure system averaged 89% and 85% less, respectively. The combined costs for all installations averaged 54% less.

In two cases of UNIX server consolidation, the combined costs averaged 57% and 43% less. In the case of x86 server consolidations, the costs averaged 38% and 40% less, and for mixed UNIX and x86 environments, the costs average 58% and 60% less.

Compared to conventional server, storage and network environments, the converged infrastructure system enables organizations to significantly reduce the amount of time required for provisioning, installation, configuration and other processes to change or expand infrastructures.

Reduced infrastructure cycle times translate into administrator time savings and greater responsiveness to internal customer needs. They provide value by improving the efficiency of existing environments, as well as in replicated and new system deployments. Shorter implementation times and project durations help reduce the costs of providing internal and external services.^{xii}

Cloud-Ready System in a Box

PureSystems™ is cloud-ready right out of the box, allowing organizations to quickly create private, self-service cloud offerings that can be scaled up and down automatically. The system was designed to let applications run between on-premise and cloud infrastructures. This permits an application developer, for example, to configure a cloud environment app without any help from the IT department.

PureSystems™ integrates the same technologies and software used by IBM's public SmartCloud Services. As CMI's CTO Kris Neely says, "Clients can take an application which is running in their data center today -- and with one push of a button, move it to the IBM SmartCloud. Applications can be engineered, tuned, and optimized to run seamlessly on either the cloud, on-premise, or both – depending on the application configuration and purpose. We anticipate that well over 80% of our clients are talking about – or outright planning – on running applications on the cloud within three years."

PureSystems™ currently only offers seamless interoperability with SmartCloud, but other cloud providers are expected to provide similar interoperability in the future. Currently, more than 500 systems integrators and solution providers have been fully trained to work with PureSystems™.

Head-to-Head Showdown

PureSystems™ isn't the only converged infrastructure system on the market, but these products have key technical advantages over competing systems, specifically Cisco's Unified Computing System (UCS). The advantages translate into more efficiencies, cost reductions, flexibility and scalability.

UCS technology marries Cisco's high-end blade servers with its networking expertise in a tightly managed platform, but the system is limited to Intel-based servers and, in many cases, doesn't include storage in the stack. In addition, UCS Manager only manages Cisco Blades, Rack Mount Services and other



UCS components. And because the UCS Manager software is embedded in UCS Fabric Interconnect switches, the only way to obtain UCS Manager is to buy one of the switches.

Though Cisco has released a cloud-solution known as CloudVerse®, it is not a stand-alone out-of-the-box system. Instead, it is a framework that comprises several discrete offerings, including Unified Data Center, Cloud Intelligent Network, Cloud Applications and Cloud Services. In order to have even basic cloud capabilities, customers have to purchase additional software from other vendors and either do the integration themselves, or have a reseller or system integrator provide the service.^{xii} This hardly constitutes a “fast-to-deploy” and “easy-to-use” cloud computing solution.

And while PureSystems™ offers the benefit of “one throat to choke” re: installation, maintenance and troubleshooting, IBM avoids the “dark side” of the one-vendor equation – vendor lock-in – through its PureSystems™ Centre, which enables ISVs and IBM business partners to continually develop, package and sell new solutions. While PureSystems™ presents the customer with “one throat to choke,” it is actually the product of a collective, ongoing multi-vendor effort. To promote the creation of new software products featuring patterns of expertise, ISVs have been provided with a development toolkit, as well as a free trial of the PureApplication System.

Overall, PureSystems™ is a more complete offering than UCS in terms of its breadth and system integration.

Migration Challenges

According to a recent survey, the most significant challenge in transitioning from enterprise computing to the converged infrastructure model is cultural. “In many organizations today, decisions about storage, networking, and system management are often made by different individuals in the IT organization. So while converged infrastructure offers operating cost advantages,” C-Level management may face “political” resistance inside some “entrenched IT organizations.”^{xiii}

In short, some IT managers will view converged infrastructure offerings – at least initially – as something that poses a threat to their control of the data center and, possibly, as a threat to their jobs. To overcome such resistance, management should stress the tangible and intangible benefits of converged systems – the cost savings and flexibility that can result from automating systems management and shifting IT personnel to more value-added services.

It should be stressed, above all, that PureSystems™ is designed to free IT managers and staff from repetitive and time-consuming tasks, so they can place more focus on mission-critical tasks and innovation – much as word-processing software freed corporate support staffs from endless hours of retyping and photocopying documents.

For enterprise datacenters, the migration to converged infrastructure needs to follow an evolutionary approach leveraging standards. A converged infrastructure doesn't require forklift upgrades. In addition, enterprise datacenters should deploy integrated physical and



virtual fabric switch management allowing for discovery and management of VMs across the network. In addition, IT managers should recognize that in the short term, datacenter convergence allows for close alignment of server, networking, and storage management. In the longer term, converged infrastructure will enable IT managers to manage datacenters as discrete units of enterprise computing.^{xiv}

What's Old is New Again

In some respects, converged infrastructure represents a return to the roots of IT. Over the last 30 years, the IT model has evolved from one featuring a single, tightly integrated system (in the form of the self-contained mainframe) to byzantine networks subject to uncontrollable sprawl. As layer upon layer of hardware, software and communications technology was added to these systems to address new (and usually) unforeseen challenges, these systems grew from simple and rudimentary networks in the 1980s to labyrinthine systems distributed across LANs with SANs.

With converged systems, IT has once again returned to the simplicity of the self-contained model. What's old is new again – old and improved.

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- ⁱ IDC Analyst Matt Eastwood, IDC Directions Presentation, 2011.
 - ⁱⁱ IBM Market Insights Study, 2011 Business Benchmarking Time-to-Value Study.
 - ⁱⁱⁱ From a commissioned study conducted by Forrester Consulting on behalf of IBM in 2011.
 - ^{iv} Darryl K. Taft, "IBM Launches New Expert Integrated PureSystems™ in Major IT Shift." eWeek, April 11, 2012.
 - ^v Gary Barnett, "The Road to Smarter Computing." The Bathe Group Ltd., 2011.
 - ^{vi} Matthew Eastwood, Jed Scaramella, "The Evolution of the Datacenter and the need for a Converged Infrastructure." IDC white paper, 2011.
 - ^{vii} Ibid.
 - ^{viii} PureSystems™ Fact Sheet, IBM External Relations, April 11, 2012.
 - ^{ix} Darryl K. Taft, "IBM Launches New Expert Integrated PureSystems™ in Major IT Shift." eWeek.
 - ^x "Businesses Are Ready for a New Approach to IT." IBM white paper, April 2012.
 - ^{xi} "Value Proposition for IBM PureFlex™ System. Case for IBM PureFlex™ System for Cloud-Enabled SAP Enterprise Environments." International Technology Group Management Brief, 2012.
 - ^{xii} "Comparing IBM PureSystems™ and Cisco UCS." Harvard Research Group, Inc., 2012.
 - ^{xiii} Matthew Eastwood, Jed Scaramella, "The Evolution of the Datacenter and the need for a Converged Infrastructure."
 - ^{xiv} Ibid.
 - ^{xv} David Vellante, "Converged Infrastructure Takes the Market by Storm." Wikibon, August 1, 2012.
 - ^{xvi} Matthew Eastwood, Jed Scaramella, "The Evolution of the Datacenter and the need for a Converged Infrastructure."
 - ^{xvii} David Vellante, "Converged Infrastructure Takes the Market by Storm."



Status Check: By Kris Neely, CMI's Chief Technology Officer

One of the themes that weaves its way through this White Paper is this: welcome back, everything old is new again. And to a certain degree that's true in the world of infrastructure. After all, mainframes, which have been with us since the beginning of the 1960s, represent a version of converged technology: they have virtual machine capability, shared resources (storage, I/O, printers, etc) and you can run a thousand partitions on one with an on-duty operations staff or one.

The same is true of the current Power technology available from IBM, as well as the legacy AS/400 or iSeries platforms, also from Big Blue. Take an iSeries: shared memory, DVD drive, disk, printers, I/O, VPN, virtual Ethernet, single sign-on, LPARs, and multiple different OS versions (i5, Linux, AIX, Windows) running at the same time.

My point is this: converged technologies form the basis of computing (mainframes), the 'trend' of computing (AS/400-i5) and the future of computing via PureSystems™. There are fashions in computing, to be sure. Yet I remember reading once that fashion may come-and-go, but true style is eternal. I submit the same can be said for the style of computing known as converged: it will always have a place in computing.

For those of us who have had to support hundreds or thousands of simultaneous users running, for example, highly transactional software we know that a mainframe can do that with aplomb. Ditto those with experience running, say, multi-tier applications on multiple OS, supporting thousands of users. A large iSeries can do that without breaking a sweat with an on-duty staff of one.

We'll see the same thing with PureSystems™: all the non-functional operational requirements of complex computing (availability, scalability, etc) on/in one platform.

No argument in computing is as simple as I've portrayed it here, but you see my point I'm sure. Converged architecture makes sense, has a place, and is very worth investigating for yourself.

See You Next Time,

Kris Neely

CTO, Chouinard & Myhre, Inc.



Reality Check: A CFO Reviews this White Paper

I have consulted for over 50 companies, ranging from brand new startups to billion dollar multi-national corporations. We have all seen a wide range of IT set ups, from the “rats nest” of the start-up, with different brands of equipment connected by a variety of multi-colored wires, to the orderly lines and hum of the large scale data room. However, looks can be deceiving. While it can be easy to point at the hardware in the start up’s server room and say “they need an IT manager when they grow”, often the larger companies that look to be neat and tidy are hiding similar problems when you look at what is happening actually on the network.

It is really not a fault of the IT team. The reality is that IT infrastructure naturally grows like a Jenga tower. Not only do companies expand, but new technology comes along, new OS, new applications, new hardware and new software paradigms. Things are added to the core infrastructure and it naturally creates inefficiencies and hidden costs. It results in the company being 80% defensive in terms of IT, focusing on maintenance and basic tasks rather than value added ones.

We have become more accustomed as home users in recent years to much simpler hardware and installations – gone are the days when every PC buyer had to consider what motherboard, what graphics card, what sound card and how much memory – many systems can be bought off the shelf, fully installed and optimized and they can run whatever application you want without hours of fine tuning. The analogy is now being applied to the standard company IT infrastructure.

We are now in a time when inefficient use of your IT team is more costly than ever. The new cloud technologies and virtualization techniques that are available can change the way many companies do business. However, building them on an outdated framework takes extra time -- or worse -- there is not enough resource to even consider something innovative that can have game-changing effects on your company.

These converged systems are themselves game-changers, they free up the potential of your infrastructure and resources. The cost savings in manpower alone make sense, but the upside in terms of the ability for your IT team to innovate and look ahead is the real benefit. Any time you can take a step to shore up and simplify the core, it makes sense, or the Jenga tower will eventually topple.

IBM PureSystems™ allow you to do exactly that – free up your resources, shore up your core IT infrastructure, and open the door to innovation. It is this simple: out of the box, it is cloud



enabled. Out of the box, it presents a unified management interface. Out of the box: it addresses and invites simpler, more cost-effective computing.

Being able to focus your IT department from being 80% defensive to 80% offensive can make an enormous difference, not just as a cost saving but also as a driver of new opportunities and long term increased profitability.

Best of Luck,

Kevin

Kevin Weston is the former CFO Digital Domain Productions, VP Finance and Operations of LucasArts and CFO/SVP Finance and Operations at Eidos Interactive Inc.