

The Emerging Value of Virtual Labs

*Addressing the
'Pressure Points' in
Technical Training*

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Alan Greenberg

Wainhouse Research

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Contents

Executive Summary	4
Overview	5
Learning and Training, Methods and Tools	5
Tension Between the Synchronous and Asynchronous.....	6
Demonstrations and Simulations.....	6
Issues Surrounding Live Training	7
Dedicated Classes.....	7
Virtual Classrooms	8
Courseware.....	8
Critical Business Issues	8
The Learning Gap.....	9
Virtual Labs.....	10
Virtual Labs Defined	10
Technology and Application	10
Virtual Lab Management.....	12
Virtual Lab Delivery	13
Virtual Labs and Web Conferencing Technologies.....	14
The Benefits of Virtual Labs	15
Virtual Lab Deployment Case Studies	15
Wily Technology	16
Microsoft Corporation.....	17
Key Things to Look for in Virtual Labs Software	18
Appendix A – Acknowledgments.....	19
About Wainhouse Research	19
About the Author.....	19
About Surgient.....	19

Figures

Figure 1 Training Modes and their Relative Degrees of Immersiveness and Effectiveness.....	7
Figure 2 Components of the Virtual Lab “Solution Stack”	11
Figure 3 Key Elements of the Virtual Labs Ecosystem	12

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Executive Summary

The major methods of delivering technical software training – physical labs and classrooms, online e-Learning such as web conferencing and web-based training (WBT), and self-paced courseware – have many pluses in creating a blended learning environment. Wainhouse Research believes, however, that most organizations face a genuine challenge in determining how best to match their training delivery mechanisms to their training objectives – especially when it involves technical training. Today’s fragmented training development and delivery methods cannot keep up with complex, fast-changing, resource-intensive software products. Additionally, organizations become “invested” in certain delivery mechanisms, such as CD’s or live instructors, and over time lose sight of the possibilities offered by alternate approaches.

The most commonly found training techniques tend to be demonstrations and simulations, which are essential to successfully delivering technical training. Virtually every type of training, from beginning applications skills to complex programming and design tools, rely on these techniques. Demonstrations show a student how something is done, and simulations allow the student to independently learn and follow through the steps of an activity. Demonstrations, unfortunately, make some assumptions about acceptable levels of student passivity; they assume that simply watching someone else complete an action is sufficient for learning, whether or not accompanied by hands-on activities. And simulations are narrowly framed, often almost ‘linear’ in design. In effect, simulations are “near-hands-on” and not the same as actually using a software application.

In terms of learning, nothing is more critical in the area of technical training than hands-on experience. But simulations, while fine for some purposes, lack one thing: a compelling and personalized experience that gets built based on the learner’s state of interaction with the learning objects.

In terms of learning, nothing is more critical in the area of technical training than hands-on experience.

A newer form of technology – with a valuable underlying pedagogical approach to back it up – has only recently begun to be noticed in e-Learning and training circles. It is still in its infancy but already being successfully used by early adopters in the field of technical training, and it is called Virtual Labs.

Virtual labs can help training groups address some of the underlying business issues their organizations face. Typically a training group can find itself facing disproportionately high costs, inadequate resources, inability to scale its offerings, inability to develop an online strategy, and slow time-to-market of new offerings.

Virtual labs combine virtualization, applications, and workflow technologies, along with tried and true training concepts, to create *on-demand hands-on training that can be delivered anywhere, anytime*. They are richly featured platforms for centrally managing software training via scheduled and on-demand delivery mechanisms, with fully automated processes for rapid deployment. This white paper explores how companies like Microsoft and Wiley Technology are deploying successful virtual labs, and already showing improved training delivery as well as significant, concrete ROI.

Overview

Learning and Training, Methods and Tools

Technical software training has come a quantum distance from the “good old days” of dedicated dumb terminals and/or PC labs that required students to compete for limited resources while attending classes during set hours. These days, the pressure is being “ratcheted up” on training organizations within enterprises to deliver software training faster and better than ever before. What was treated at one time as an afterthought or “secondary” role in the software delivery cycle has come to be understood as a crucial element in successfully introducing new or changed software applications – and in capturing an advantage over competitors.

A number of methods commonly are used for enterprises to deliver technical training to their employees, partners, and customers. Any combination of the following likely can be found in today’s typical enterprise:

- Physical, typically LAN-based labs and dedicated classrooms that continue to “host” students who attend class in person, with training delivered through combinations of live instructors and computer-based training (CBT).
- Online e-Learning delivered remotely through various combinations of web conferencing products, terminal emulation, web-based workspaces, archival systems, Learning Management Systems (LMS), and the like. These approaches can best be described as virtual classrooms or web-based training (WBT), depending on whether they are synchronously or asynchronously delivered.
- Delivery of self-paced courseware via CD’s or DVD’s that provide demonstrations, simulations, and in some instances learner testing.

Each of these methods has its pluses in creating a blended learning environment. Dedicated classes are effective because they are the most immersive and the most able to ensure sufficient instructor-student interactions. Virtual classrooms are highly effective because they are somewhat more scaleable; an organization can reach many remote learners more readily, can package training content in suitable modules, and deploy more rapidly. Online asynchronous libraries (such as web-based workspaces, Wiki’s, collaborative learning threads, and stored video, animations, or simulations) can be invaluable and highly scaleable. They also are more convenient for remotely distributed learners because they address barriers of time and distance. And remote delivery of CD’s and DVD’s can be useful because they can provide great reach and rich content, sometimes some of the deepest content possible.

While attempting to not get too tangential in a discussion of how people learn best – a topic best left to academics and researchers – Wainhouse Research believes most organizations face a genuine challenge in determining how best to match their training delivery mechanisms to their training objectives – especially when it involves technical training. Today’s fragmented training development and delivery methods cannot keep up with complex, fast-changing, resource-intensive software products.

Anyone involved in training understands the value of blended learning, whereby multiple forms of content and delivery methods are used, depending on the subject matter, student competency and role, and where the student is located on the learning cycle. Traps exist, however, in that organizations become “invested” in certain delivery mechanisms – say CD’s or live instructors – and over time lose sight of the possibilities offered by alternate delivery mechanisms.

More difficult to achieve is the ability to develop an understanding and create processes that best harness the capabilities of the different delivery mechanisms — capabilities that are constantly in a state of evolution.

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Tension Between the Synchronous and Asynchronous

Synchronous and asynchronous techniques originally perceived by many as opposing, competitive approaches to training are now understood to complement one another. Often learners learn best when they receive initial orientation and training that can be reinforced through asynchronous, “anytime” access to training objects. At other times asynchronous access is all that is needed for advanced or experienced learners to maintain or refresh their skills. How one handles the “tension” between the dual approaches to create an effective blended learning environment can make or break a training organization’s ability to achieve its objectives.

Demonstrations and Simulations

One area particular to any type of hard skills training is the use of demonstrations and simulations. In the technology arena, these techniques are essential to successfully delivering virtually every type of training, from beginning applications skills to complex programming and design tools. The key difference between the two is that demonstrations show a student how something is done, and simulations offer the student an opportunity to independently learn and follow through the steps of an activity. Demonstrations, unfortunately, make some assumptions about acceptable levels of student passivity; they assume that simply watching someone else complete an action is sufficient for learning, whether or not accompanied by hands-on activities. And simulations are narrowly framed, often almost ‘linear’ in design.

Even if a student uses simulations to learn in a more immersive fashion, they may not replicate a real-world environment. In effect, simulations are “near-hands-on” and not the same as actually using a software application.

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The following chart illustrates the relative impact of demonstrations, simulations, and virtual labs as technical training methods in relation to learner immersion and effectiveness.

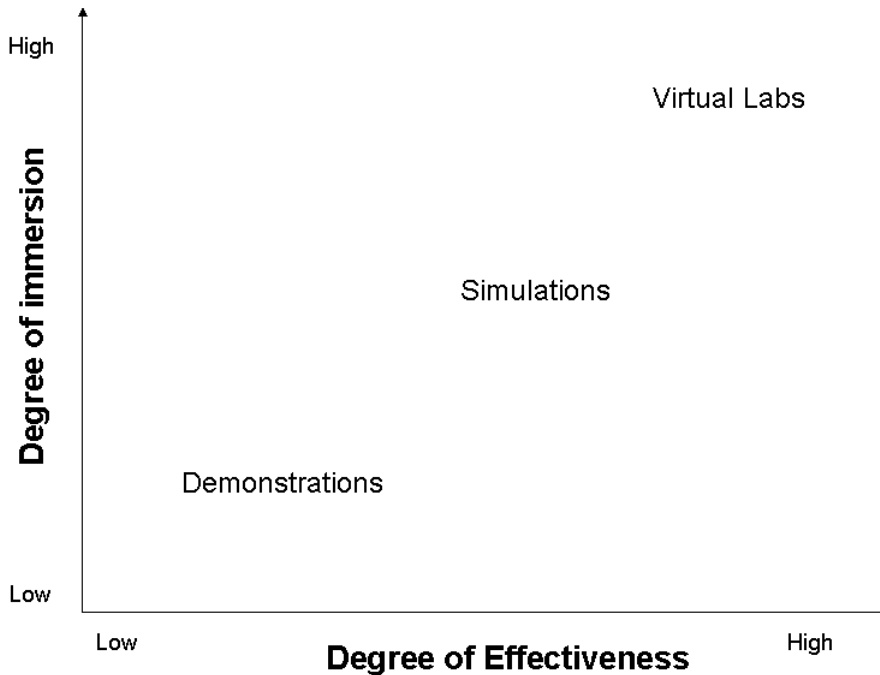


Figure 1 Training Modes and their Relative Degrees of Immersiveness and Effectiveness

Issues Surrounding Live Training

Dedicated Classes

Besides the general methods and tools for delivering training discussed already, it is important to consider when live training can address the challenges of delivering complex content, and when live training falls short. Dedicated classes, consisting of hands-on instruction taught in physical classrooms, are effective but not scalable to reach large numbers of learners. They also are extremely expensive, particularly when limited resources (equipment and instructors) must be sent into the field. Dedicated classes may require any or all of the following:

- Provisioning, configuration, and validation of equipment and software (not to mention the purchase expense)
- Provisioning of trainers
- Travel (trainers and sometimes learners)
- Technical support to ensure “everything works”
- Teardown, packing, and shipping – and perhaps travel on to the next live site destination.

Virtual Classrooms

Virtual classrooms (aka live e-Learning) is a highly effective and more scaleable approach to reaching larger numbers of students than is live, “bricks and mortar” training. But even virtual classrooms sometimes have their limitations, in terms of best types of training content delivered, scaleable instructor-student communications, effective automated processes for scheduling, and management of learning objectives. It can be challenging for an instructor using a web conferencing tool to be absolutely certain his students are “getting it,” even with polling and testing capabilities commonly found in some of the e-Learning tools. Similarly, a virtual classroom is still a remnant of the model whereby the instructor “does” and the students “watch.”

And archiving content to make it available for later viewing, while a key aspect of reaching students anytime and anyplace, does not guarantee that the instructor will ever see what the learner learned. Similarly, WBT is fine for reaching large numbers of learners, but in no way can be described as immersive or compelling – nor do they offer sufficient measurements to enable tracking of student progress. They typically rely on a learner learning by observation.

Courseware

Delivery of authored courseware via CD’s or DVD’s can be most effective at reaching large numbers of learners – but like asynchronous libraries, there is little method of ensuring that the learners learn and little ability to adapt the training if conditions change. Using these media can be effective to deliver rich-media-based training (such as animations, videos, and simulations) but can be extremely expensive to produce, deliver, and maintain. And they often overlook the value of the live instructor; there’s nothing wrong with self-paced materials, but they place the onus for learning on the student without backup of management or measurements. They rely on a student learning by “reading,” “watching,” or “simulating” the experience.

Lower down the content spectrum are very broadly used, popular tools such as PowerPoint slide shows, Flash demos, and video clips that demonstrate activities. These often are provided as stand-alone, passive training modules and often provide no means of measurement.

This is not to dismiss as invalid the tools under discussion here. But content and courseware are not an effective substitute for context and competency. All too often training organizations spend great efforts at creating the content, and all too often they fail to deliver it in such a way as to guarantee that competency-based learning – which is required to build and maintain software expertise – has taken place.

Critical Business Issues

In the final analysis, a training organization – whether or not it is treated as cost center, revenue generator, or simple cost of doing business – must face the fact that to become most legitimate, it must pay attention to its impact on an organization’s bottom line. All too often a training organization can find itself facing any combination of the following:

- The costs of delivering training can be disproportionately high in relation to its payback
- Resources are inefficient or inadequate to get the job done

- The reach of training offerings exceeds the actual ‘grasp’ – that is, even with lofty goals, the training organization just isn’t getting the job done
- It has not yet created an effective strategy for utilizing online tools
- It fails to find where it is missing opportunities for generating new revenues
- Its time-to-market of new offerings is simply too high – which can impact new revenues not only for the training organization, but for a business itself.

This is important: if a training organization says to itself that “we delivered our software training module on time to our employees, partners, or customers – and did a simple survey to ask if they found it useful, so it’s out of our hands now,” it is missing opportunities to accurately measure those parties and the effectiveness of the training. And the impact on that organization’s ability to conduct its business may be profoundly affected if those stakeholders fail to learn the software as they should.

The Learning Gap

After considering the tools and methodologies and the business issues surrounding technical training, the final item to consider is the learner himself. Consider the typical cell phone user. He may or may not read the manual(s) that come with the new model cell phone. But he will acknowledge that without actually beginning to use the cell phone, he would never claim to be proficient. One must place calls to learn to use a new phone. And the same applies to virtually any technology in modern life, from microwaves to VCRs. We learn by doing. And nothing is more critical than in the area of technical training, which carries with it so many dependencies and complexities.

In many respects the “near hands-on” aspect of simulations comes closest to providing the immersion necessary to learn new technologies. But simulations, while fine for some purposes, lack one thing: a compelling and personalized experience that gets built based on the learner’s state of interaction with the learning objects.

A newer form of technology – with a valuable underlying pedagogical approach to back it up – has only recently begun to be noticed in e-Learning and training circles. It is still in its infancy but already being used successfully by early adopters in the field of technical training, and it is called Virtual Labs.

Virtual Labs

Virtual Labs Defined

Virtual labs combine technology resources, reusable software environments, and automation, along with tried and true training concepts, to enable *hands-on training that can be delivered to anyone, anywhere, anytime*. They are not – as the name might imply – cyberspace chat rooms, nor are they server emulation tools. Instead, they are richly featured platforms for centrally managing software training via scheduled and on-demand delivery mechanisms, with automated processes for rapid deployment. They are meant to provide a compelling and personalized experience for learners, one that goes beyond just looking at content or interacting with simulations. In short, they enable hands-on training whenever and wherever it’s needed.

Technology and Application

Virtual lab technologies, as delivered by a handful of vendors such as this white paper’s sponsor, Surgient, consist of two major components:

- **Lab Management** – capabilities that enable training organizations to centrally define, manage, and schedule software labs
- **Lab Delivery** – capabilities that give learners a secure, personalized, and highly interactive experience

These components, described later in this section in greater detail, are delivered through the equivalent of a “solution stack” consisting of three functional layers. These are the:

- **Applications Layer** – A packaged, role-based business application that automates domain-specific processes involving complex, rapidly changing software environments.¹
- **Platform Layer** – An integrated collection of enterprise-class, value-added services for managing lab resources that enable the applications layer. Like the applications layer, the platform layer is provided by a virtual lab vendor.
- **Virtual Infrastructure** – Third-party virtualization software technology (supplied by vendors such as VMware or Microsoft) that enables high utilization of an organization’s physical computing, storage, and network resources.

In terms of underlying technology, virtual labs piggyback on many existing enterprise-based platforms while requiring some type of virtualization software, such as VMware GSX / ESX or Microsoft Virtual Server. These software products are enabling technology for virtual labs because they increase the utilization, while abstracting the complexity, of today’s operating environments – requisite capabilities for delivering software applications on-demand.

The following figure illustrates the components of the virtual lab “solution stack”.

¹ In addition to the training application, on-demand testing and QA, online product evaluations, and sales demonstrations are other application areas targeted by some virtual lab vendors.

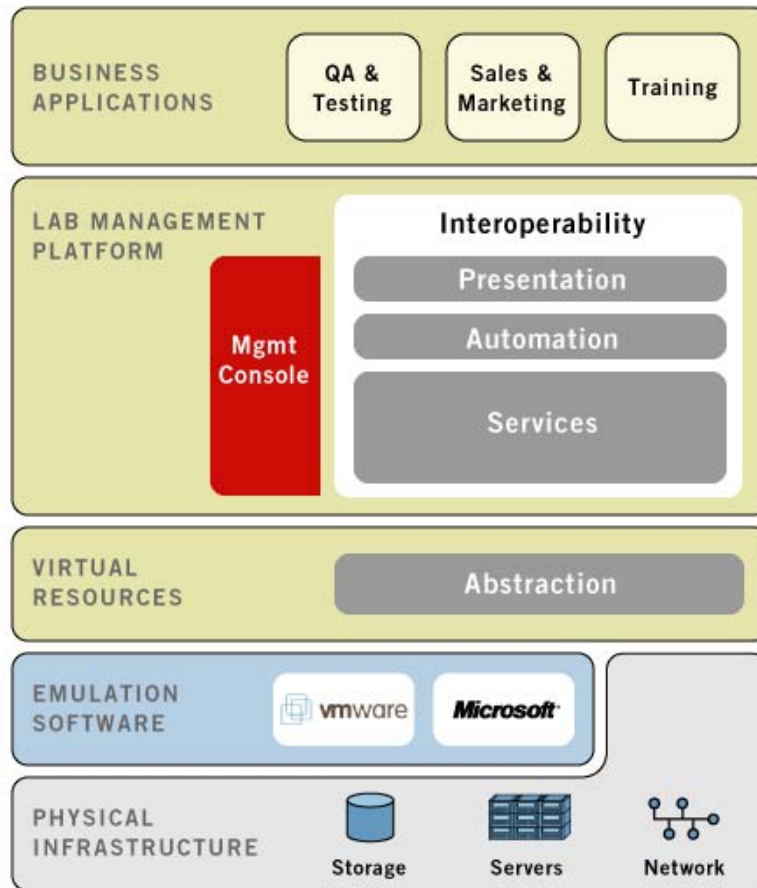


Figure 2 Components of the Virtual Lab “Solution Stack”

What takes place is the dynamic allocation of one or more lab resources (servers) along with the automated provisioning of software applications (disk images) onto those resources. Virtual labs are deployed in a hosted environment and securely accessed by learners in remote locations.

Typically, a virtual lab vendor’s installed browser plug-in on a client PC is necessary to provide the capabilities that allow users to access and interact with the remote server’s desktop similar to how they interact today with their own client PC’s desktop. And while LAN or broadband network speeds are most efficient, labs have been delivered over narrowband modem connections without negative impact. (Think of it as a ‘thin client’ application where all of the processing occurs on the server, and only graphics and user interaction data must travel across the wire.)

Another way to look at virtual labs in the context of training is that there are four key elements:

- The physical or virtual classroom (including self-paced students)
- The virtual lab management system
- Server-based repositories of software labs (instructor and student class loads)
- The infrastructure that supports training delivery (e.g. servers, storage, networking).

The following figure illustrates the four key elements of virtual labs.

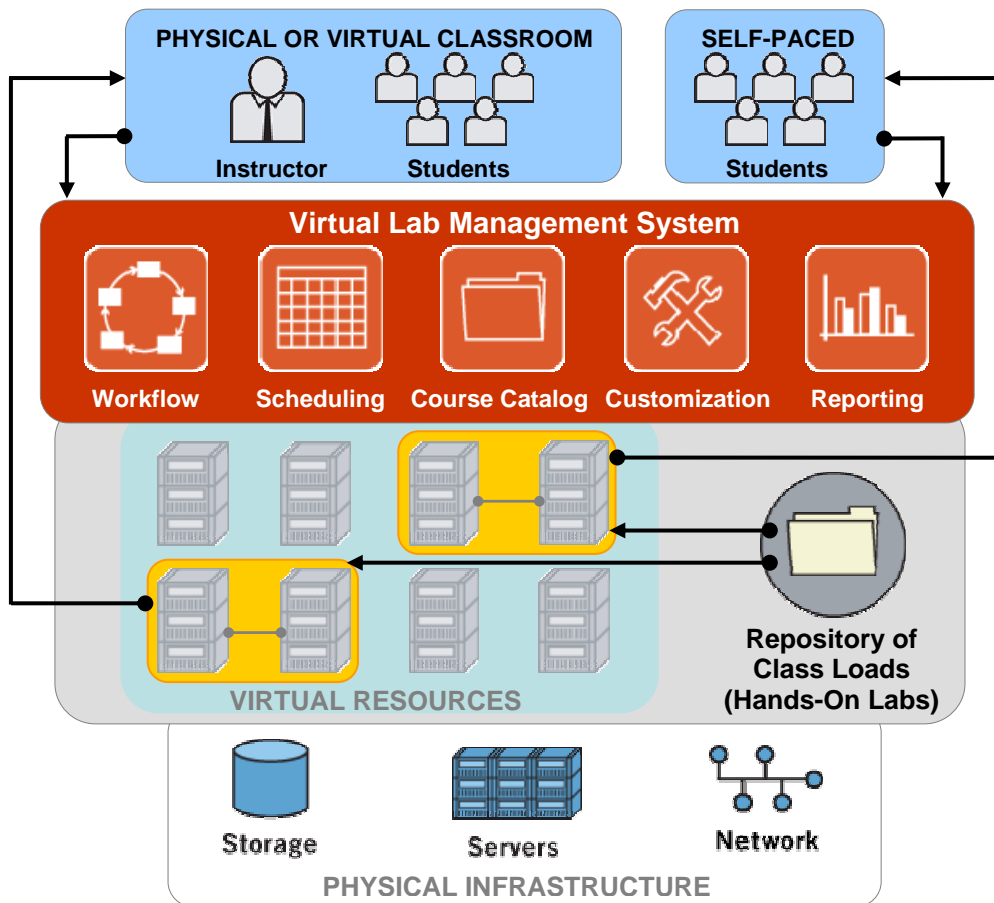


Figure 3 Key Elements of the Virtual Labs Ecosystem

Imagine a complex learning environment comprised of application, database, and web servers – all three resources must be accurately provided to satisfy the lab’s requirements. This ecosystem thus calls for a robust management system as well as mechanisms for delivering a holistic training experience – both of which are key to successful virtual lab deployment and adoption.

Virtual Lab Management

Those who provide virtual lab technologies are going to significant trouble to handle complexity. While some software applications are designed to be deployed on a desktop or single shared server, many enterprise applications consist of multiple components, supplied by multiple vendors, deployed on multiple servers. These applications represent a complexity that requires specialized capabilities to manage, control and ultimately “orchestrate” lab resources.

Management in the virtual lab context consists of the ability to keep track of an application’s composition, resource requirements, and deployment dependencies. *Something* must manage the underlying software stacks, the libraries and resources necessary for deployment, and the images necessary for interaction between learner and software, and that *something* is the virtual lab management system. The key components to a virtual lab solution typically address the following management capabilities:

- **Configurable Workflows** – Flexible scripting is required to implement a training organization’s business processes and logic – in particular, workflows that govern how software labs are deployed, configured, and ultimately accessed.
- **Scheduling** – A true management system includes robust scheduling to maximize productivity and eliminate resource conflicts. The scheduling system allows requests for software labs to be reliably analyzed (capacity planning) and systematically executed taking into account both scheduled and on-demand needs.
- **Course Catalogs** – These enable management of instructor-led and self-paced courses and the shared software labs they use. They are not insignificant in that they can provide an umbrella of Learning Management System (LMS)-type capabilities, such as instructor and student assignments, links to course materials (such as lab exercises), and surveys.
- **Customization** – Virtual labs are not off-the-shelf solutions; instead, they typically must be incorporated into an organization’s existing processes for training development and delivery. This means that they *may* be integrated with LMS platforms, virtual classroom tools, and online learning portals.
- **Reporting** – Virtual labs *should* include detailed usage and resource reporting to help measure and improve effectiveness. Should resources be overly burdened, solid reporting capabilities – just like any management solution – should be available to help organizations understand how resources are being used and how students are learning.

At a more technical level, a virtual lab solution has built-in services to intelligently manage and control the setup, configuration, and teardown of software labs regardless of their complexity, the number of students, or the duration of use – whether it’s a self-paced lab that’s needed for just a few hours, or a lab that’s part of a multi-day, instructor-led course. These services are exposed to *business users* – administrators, instructors, students – allowing them to perform their jobs, such as scheduling a course next month for 10 students or accessing a lab off-hours to refresh skills, without worrying about the impact of these actions on the resources required to perform them.

Virtual Lab Delivery

In addition to management, the ability to create a “living and breathing” automated delivery environment is key to virtual labs. In a typical “traditional” software training mode, the instructor and each student are given access to their own hands-on lab environment. Besides the capital expense associated with multiple lab resources, training organizations face considerable operating expenses provisioning software labs – even with the use of imaging tools like Symantec’s Ghost.

Cloning “master” software environments causes various post-deployment tasks to be performed, such as modifying network settings to eliminate conflicts, and establishing credentials for users to access the replicated environment. Steps that are normally performed on *each lab environment* by the instructor or IT personnel can be fully automated by the virtual lab software, thereby more rapidly delivering the software training with far less burden on the training staff.

The key components to a virtual lab solution typically address the following delivery capabilities:

- **Automated Lab Deployment** – Virtual lab delivery must be reliable and automated for it to provide sustaining value to the training organization. This means the software is able to deploy and clone labs on a scheduled or on-demand basis with no manual intervention.
- **Secure Access** – Virtual labs rely on students being able to access their own software environments from remote locations. Unfortunately, corporate policies and restrictive technologies such as firewalls frequently deny this type of access. Therefore, virtual labs must provide flexible solutions to accommodate varying learner access requirements.
- **Fully Immersive Experience** – Virtual labs give each student a dedicated hands-on lab that is isolated from the actions of other students. Unlike simulations, students are truly free to explore and interact with the *actual* software without fear of “breaking it” because virtual labs can be quickly reset to their initial pristine state.
- **Session Capture and Restoration** – Once a lab has been deployed, time-based elements may come to play. A class taught over multiple weeks or a self-paced course may require students to save their work. Virtual labs typically allow students to save their labs across multiple sessions without impacting availability of resources to other students; when a session is restored, the software seeks the same type of resources utilized previously.

Virtual Labs and Web Conferencing Technologies

For organizations that deliver instructor-led training online, the typical model is to use web conferencing technology such as those provided by Centra, Interwise, WebEx, Microsoft, and others. For simple training courses that do not require hands-on activities, virtual labs are overkill, and web conferencing provides all of the capabilities necessary for course delivery.

The times one needs virtual labs over and above web conferencing are when the technical training course is designed to satisfy the *same* learning objectives as its physical classroom counterpart – including hands-on labs for the instructor and each student. Today, in the virtual classroom model, training organizations are relying on any number of “near hands-on” methods such as:

- Instructor performs hands-on exercises while the students “observe”
- Students read and / or watch content such as PowerPoint, video, etc.
- Students interact with pre-programmed application simulations
- Students install and perform hands-on exercises using local resources.

None of these methods are effective substitutes or replacements for live, hands-on training – not to mention the considerable time and cost that they require to develop, deliver, and maintain.

In fact, many organizations are likely to find that virtual labs fill a vital gap and complement the synchronous instruction that occurs in a virtual classroom such as web conferencing, ultimately resulting in a more effective student experience.

Many organizations are likely to find that virtual labs fill a vital gap and complement the synchronous instruction that occurs in a virtual classroom such as web conferencing, ultimately resulting in a more effective student experience.

An important qualitative difference also exists for the trainer. Just as the instructor walks around a physical classroom and looks over a student's shoulder, virtual labs allow the instructor to monitor what students are doing in their own lab sessions (a "virtual" look over the shoulder) including accessing the lab resource if necessary. The combination of virtual classrooms and virtual labs is gaining considerable momentum in the technical training community.

The Benefits of Virtual Labs

Virtual labs provide a number of benefits, some of which should be clear from the discussion of the technology's features. A short discussion of the high-level benefits must include that virtual labs can:

- **Reduce Delivery Costs and Cycle Times** – Execute more effective training processes in less time.
- **Increase Resource Utilization and Agility** – Efficiently allocate, adjust, and consume training resources according to business policies and fluctuating demands.
- **Reduce Dependencies on IT Personnel** – Boost team productivity and empower instructors and students to effectively self-manage training tasks.
- **Increase Training Revenues and Renewals** – Quickly assemble tailored courses that increase satisfaction and ensure revenue targets are met.
- **Increase Reach and Leverage** – Extend training investment to all stakeholders (e.g. customers, partners, employees) regardless of locale or technical capabilities.
- **Align Training and Software Delivery Cycles** – Close the gap between when new or upgraded software is released and when training is available.
- **Measure and Improve Training Value** – Use valuable student experience data to make better, more timely decisions about training investments.

While these benefits are noteworthy for the training organization, the greatest benefit of all is for the learner: hands-on training is the most effective way to accelerate learning of technical subject matter. Many companies avoid it – thinking it is too difficult or costly to offer – when, in fact, it can be the most critical element in developing and maintaining a student's hard skills. Virtual lab solutions can eliminate the trade-offs and enable hands-on training to be cost-effectively delivered to anyone, anytime, anywhere. Some examples of the various benefits are described through case studies later in this white paper.

Virtual Lab Deployment Case Studies

The use of virtual labs is only emerging, so it is a bit early to expect mainstream best practices to exist. But several companies have compelling examples of possible applications, which range from the simple to the complex.

Wily Technology

Wily Technology (www.wilytechnology.com) – a leading provider of enterprise application management software which enables companies to successfully manage their critical Web applications – utilizes virtual labs across multiple training delivery methods. First, Wily offers instructor-led training and labs at their US and UK-based classrooms, and onsite at customer locations. To combat the time and costs associated with provisioning lab resources and to better respond to customer training needs, Wily adopted virtual labs, which allows them to centrally manage and deliver hands-on training via a browser regardless of where the class is being held.

Because of the depth of its software, Wily has also combined the simple concept of using webinars with follow-up virtual labs as a core training capability. Calling the various classes it offers *Wily Virtual Classes with Remote Labs*, the company delivers a hands-on training environment, with exercises that learners complete. Its trainers typically are not physically in the room with the student but provide – through the Surgient solution – shadowing and mentoring to help learners become successful.

Wily delivers training not only to its customers, but also its employees and partners. It was not cost-effective to have its small training staff traveling around the world and because training is delivered to partners at a significantly reduced fee and sometimes free, it was even more essential that something like virtual labs be made available to save money and reach more people, more quickly. Drawing partners or employees from the field to training events can be challenging, but learners pay attention when they can take a class after hours at their own convenience.

Wily’s training group provides product training on its flagship product, Introscope® as well as on add-ons that support additional functionality. Sometimes its virtual labs are used to provide proof points by providing visibility into how software products interoperate or exchange data.

Wily conducts performance-based certification to ensure that customers know how to use its products. It finds virtual labs a welcome alternative to using some of the professional IT training service providers that can become cost-prohibitive. Being able to deliver classes via virtual labs lets its Education Services Director create a curriculum that creates a “Wily environment” in which partners can get beyond the limitations of scripting or simulations.

“Simulations are good if you’re showing something, but not if you need to let your learners play and experiment. I need them to push the software to its limits, which pushes them as well as us.” Christine Souza,
Director Education Services, Wily
Technology

As Christine Souza, Wily’s Director of Education Services said, “Simulations are good if you’re showing something, but not if you need to let your learners play and experiment. I need them to push the software to its limits, which pushes them as well as us.”

Microsoft Corporation

One might expect the world's largest software company (www.microsoft.com) to aggressively adopt new technologies; only somewhat surprising is how quickly virtual labs have spread through the organization and how quickly the ROI has become apparent. Microsoft early on adopted creative ways of using virtual labs for *marketing* as well as for training. Among these methods was the production of software demonstrations that would be delivered to the Microsoft field organization to use at local events. Its training groups would create preconfigured machine images and build highly scripted DVDs – an effective but time consuming and costly method of using virtualization software to deliver software demonstrations.

For a time the company used virtualization software because it was the only technique available, until companies came along that could host virtualization software and provide the other items necessary, such as bandwidth and scalability. It conducted early testing of the possibilities through event demand generation via email, and realized that it could reach an online audience much more quickly and *more broadly* than via brick-and-mortar events. This made it clear that it could have central control over a student's learning environment, eliminate the need to ship DVDs throughout the world, and could make this learning environment available 24 hours a day.

Other projects followed, including one that involved delivering software evaluations via virtual labs software. This project was hosted online and received significant traffic around the same time Microsoft acquired the company that built early versions of the product now known as Microsoft Virtual Server. This led to selecting Surgient, sponsor of this white paper, as the provider for its virtual labs.

As Martin McGurk, Lead Program Manager, IT Pro Audience Marketing said, "Building the infrastructure to support large-scale virtualized software training is not currently an investment priority for our group. Surgient's virtualization knowledge, practical applications and workflow technology saves us time and ultimately dollars in content development expenses.

Microsoft is able to provide tens of thousands of customers with guided hands-on experience with its products and technologies at a relatively low cost-per-touch compared to a live event.

We're able to extend the reach of our hands-on events to tens of thousands of customers with whom we might otherwise not connect. And we can do it at a relatively low cost-per-touch compared to a live event." As of fall 2004, various virtual labs that range from training, software demonstrations, and software evaluations are deployed and live. Both developer and server products are being delivered to the field using virtual labs, which shows the breadth of its use to Microsoft.² Some of these include:

- **The .NET Developer Jumpstart Program**, a self-paced, on-demand training program used to educate developers and partners on Visual Studio .NET.

² Readers interested in experiencing a virtual labs class may visit <http://microsoft.demoservers.com/MSDN>

- **Experience Visual Studio**, a hosted trial/evaluation to promote Visual Studio .NET.
- **TechNet Virtual Labs** (an IT Pro Program), a multi-tier Windows 2003 Server software environment which can function as an evaluation platform for pre-sales service, as well as post-sales maintenance, trouble shooting, and continuing education.

Others being deployed as this white paper was being completed include the IT Prolympics, which features contests with online knowledge assessment testing followed by timed virtual labs sessions for completion of scenarios. This kind of event can actually be used to create community, as it will be hosted by Windows IT Pro Magazine, sponsored by Microsoft, and is being used as a community gathering point. The company will create study rooms and 24-hour chat rooms, along with scheduled webcasts delivered by experts. Another new program is a Security e-Learning program that provides self-paced Microsoft Security Guidance Training courses with hands-on labs.

Microsoft has found the cost-per-touch for reaching customers and partners using virtual labs to be extremely reasonable when the deeper capabilities are factored in and compared to the reach of other online vehicles, such as webcasts. With the many benefits of the training and lab element, as well as the 24 x 7 availability, the value is even greater. And virtual labs can help reduce the costs of broad distribution of media such as DVD evaluation copies of software, enabling the company to be more targeted with its direct marketing activities.

Key Things to Look for in Virtual Labs Software

The marketplace for virtual labs software is so new, it is still early to begin identifying characteristics to seek in a software provider. While virtualization software has been around for awhile, the notion of applying it robustly to software training, demonstrations, QA and testing, and marketing is only more recent. Nonetheless, Wainhouse Research believes a few distinguishing characteristics can be sought as an organization considers deploying virtual labs. These are that a virtual labs vendor:

- Supports a wide range of software, starting from simple development tools to complex multi-tiered applications
- Complements LMS and web conferencing (virtual classroom) technologies gracefully
- Can articulate a vision of both training and technology, neither privileging nor undermining either in the equation of delivering technical training
- Already has become aware of best practices and seems to be evolving to incorporate best practices into its software capabilities
- Offers flexible deployment options (a Wainhouse Research mantra but one worth repeating) that includes either service provider-hosting (typically in their data center) or packaged, enterprise-hosted versions
- Provides robust learner-oriented capabilities, such as the session Save and Restore capability, which allows learners to save their actions and changes over time while still leaving available the underlying lab resources to others.

Appendix A – Acknowledgments

The Emerging Value of Virtual Labs is based on this analyst's opinions and the result of interviews with several representatives of industry players and end users. Wainhouse Research wishes to thank the following individuals and their organizations, whose willingness to discuss their applications of virtual labs provided additional insight to this white paper.

- Martin McGurk, Microsoft Corporation
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About Wainhouse Research

Wainhouse Research (www.wainhouse.com) is an independent market research firm that focuses on critical issues in rich media communications, videoconferencing, teleconferencing, and streaming media. The company conducts multi-client and custom research studies, consults with end users on key implementation issues, publishes white papers and market statistics, and delivers public and private seminars as well as speaker presentations at industry group meetings. Wainhouse Research publishes *Conferencing Markets & Strategies*, a three-volume study that details the current market trends and major vendor strategies in the multimedia networking markets, a variety of segment reports, and the free newsletter, *The Wainhouse Research Bulletin*. Its subscription content service can be found at www.wrplatinum.com.

About the Author

Alan D. Greenberg is a Senior Analyst & Consultant at Wainhouse Research. Alan has worked in the telecommunications, videoconferencing, software and services, and multimedia arenas for more than 20 years, holding marketing positions with VTEL, Texas Instruments, and several Austin, Texas-based startups, and consulting to many organizations. He has conducted research into dozens of distance learning and e-Learning programs and authored white papers such as *Best Practices in Live Content Acquisition for Distance Learning Networks*, is lead analyst on the Wainhouse Research WebMetrics research program, and has authored research notes on Macromedia, Oracle, Elluminate, Centra, and others located at www.wrplatinum.com. Alan holds an M.A. from the University of Texas at Austin and a B.A. from Hampshire College, Amherst MA. He can be reached at agreenberg@wainhouse.com.

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