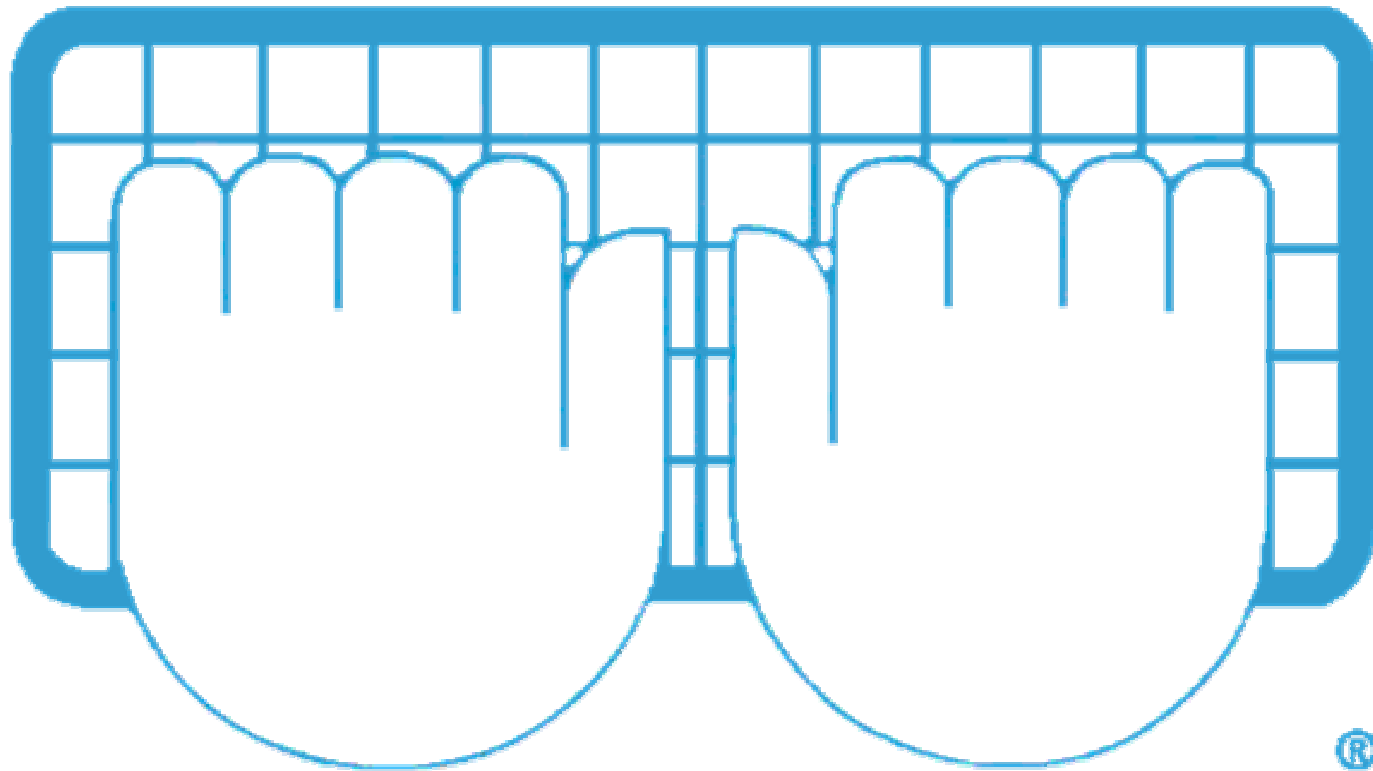


Economic Justification for IT Training



Business Case for Training



- In order for a Fortune 1000 company, government municipality, healthcare provider, consulting firm, or software company to arrive at the decision to schedule training for its information technology and business professionals, there has to be an underlying economic justification.
- It is standard SYS-ED policy to work with the client to assess the subject matter and presentation delivery medium in terms of the underlying economics within budgetary, cost center, profit center, and return on investment criteria.

Business Case for Training: Measuring and Evaluating



- At the client's discretion, pre course, modular lesson, and post course validation assessment can be utilized to quantify and measure the effectiveness of the training outcome.
- In the early 1980's, the business case and rule of thumb was far simpler; two weeks per year of training for each data processing employee.
- The inputs, choices, and the decisions associated with information technology training is far more complex in the 21st century.

Reasons to Train - 1



- The business case for information technology training translates into organization-specific operational objectives.
- Based upon our experience, common reasons to train are:
 - IT training for developing a skillset.
 - IT training in order to ensure mastery of subject matter; a de facto covenant for the employee to deliver satisfactory work and output back on the job!
 - IT training to promote the acceptance of software and improve employee and collective productivity.
 - IT training as part of a project assignment.
 - IT training to identify and motivate peak performers.

Reasons to Train - 2



- Based upon our experience, common reasons to train are:
 - IT training in which the selection and proper utilization of software results in improved efficiency and greater throughput with the existing hardware infrastructure.
 - IT training in order to evaluate and realize cost savings with free and open source software.
 - IT training as a component of research and development.
 - IT training as an actualization of a business model and strategic plan formulated by management.
 - IT training as educational consultancy.

Reasons to Train: Advancements in Technology



- Information technology training is required to build upon and implement hybrid technologies.
 - "Green" initiatives provide efficiencies and cost savings in data center power and cooling requirements and high-carbon-footprint products such as storage devices.
 - Virtualization can be used for reducing the number of physical machines in data centers without reducing the number of underlying applications; these efficiencies serve to streamline cost on hardware, power, rack space, and cabling.
 - Operating systems leverage virtualization in order to provide flexible, scalable, and cost effective cloud computing infrastructures.

Reasons to Train: New Protocol-driven Software



- Information technology training is required for implementing new and emerging software:
 - Integrating new protocol-driven software with a commercial IT infrastructure which in many cases was introduced and brought "on-line" - 30+ years ago.
 - Open source software.
 - Software as a service.
 - Web apps for mobile computing devices.
- As part of a flexible and strategic repurposing of an investment in legacy programming languages.

IT Training: Staffing Decisions



- Information technology training is being used to ensure the proper balance between “outsourcing” and “insourcing”.
 - A significant degree of information processing has been outsourced over the past decade.
 - Many organizations have expressed a need to retain the capability to perform a portion of their own coding, debugging, and maintenance capabilities.
 - The bulk of the work can still be outsourced or contracted to a third party consulting or software firm.

IT Training within Multinational Organizations



- Information technology training for implementing integrative and enabling software:
 - Prototyping and coding software on hardware in geographically dispersed locations.
 - Accessing, securing, and presenting data and multimedia content to employees in multiple locations.
 - Social networking and engagement as an extension to organizational communication and outreach.

IT Training within Nation States



- Information technology training as part of a geopolitical strategic commitment to single and multiple operating environments and information technology infrastructures.
- There are divergent trends evolving in continents and countries.
 - Web browsers and connectivity to the Internet.
 - Internetworking as opposed to a Microsoft centric network.
 - UNIX- and Linux- variants as workstations and servers.
 - Integration of web browsers, web servers, enterprise databases and development platforms in commercial, open source, and hybrid development environments.
 - The role and extension of IBM mainframe system software, WebSphere MQ middleware, and its Rational cross development platform.

Open Source and Free Software Challenge



- Information technology training on open source software provides the opportunity for cost reduction and strategic insurance against arbitrary changes in the product life cycle, licensing policies, and support services provided by software companies.
- Training and the commitment of resources is required in order to acquire the knowledge and skillsets for utilizing open source software either in place of or in conjunction with commercial software.
- Hybrid internetworking, scripting, databases, and development platforms make this a challenging task.

Open Source and Free Software: Commercial IT Infrastructure - 1



- Information technology training is required to create and update web content.
 - Access and manage HTML and multimedia file content.
 - Open source web browsers - Mozilla FireFox, Google Chrome, and Opera with commercial software.
 - Apple Safari and Microsoft Internet Explorer.
 - Web Design and Content Management
 - Open source Joomla and Drupal in conjunction with commercial software.
 - Adobe - Flash, Macromedia Dreamweaver, and Microsoft Expression.

Open Source and Free Software: Commercial IT Infrastructure - 2



- Information technology training is required to implement and manage web servers.
 - Web servers can be used to control data and resources and programmatically create and distribute content to web browsers and a variety of other system software.
 - Open source Apache can be implemented in an open source environment or to interoperate in conjunction with commercial web servers.
 - The major commercial web servers are IBM-WebSphere, Oracle WebLogic Server and Oracle Application Server, and Microsoft Internet Information Server.
 - They offer varying degrees of interoperability with each other.

Open Source and Free Software: Commercial IT Infrastructure - 3



- There are a variety of open source, hybrid, and commercial scripting platforms that can be used.
 - The predominant open source web server scripting platform is Apache Tomcat.
 - The two major commercial hybrid web server scripting platforms are highly integrated with open source software and designed to scale for enterprise application development:
 - IBM WebSphere Server and Rational Oracle.
 - Oracle Application Server and Oracle WebLogic Server.
 - The commercial Microsoft Corporation implementation is designed to support and extend Microsoft software.

Open Source and Free Software: Commercial IT Infrastructure - 4



- Information technology training is required to implement web server and scalable scripting platform environments.
 - The general industry standard open source scripting platform is LAMP:
 - operating system: **Linux**
 - web server: **Apache**
 - database: **MySQL**
 - scripting program: **PHP**

Open Source and Free Software: Commercial IT Infrastructure - 5



- Information technology training is required to implement web server and scalable scripting platform environments.
 - There are two general hybrid web server scripting platforms:
 - WIMP and WAMP
 - WIMP
 - operating system: **W**indows - Microsoft Family
 - web server: **I**nternet Information Server - MS
 - database: **M**ySQL - open source
 - scripting program: **P**HP - open source

Open Source and Free Software: Commercial IT Infrastructure - 6



- Information technology training is required to implement web server and scalable scripting platform environments.
 - WAMP
 - operating system: **Windows** - Microsoft Family
 - web server: **Apache** - open source
 - database: **MySQL** - open source
 - scripting program: **PHP** - open source

Commercial Software: Microsoft Scripting Environment



- Information technology training is required to implement a web server and scalable scripting platform environment.
- The Microsoft web server platform is a comprehensive commercial scripting environment.
 - operating system: Windows - Microsoft Family - MS
 - DC and file server: Windows Server 200x - MS
 - web server: Internet Information Server - MS
 - content management: SharePoint - MS
 - open database: SQL Server - MS
 - scripting program: MS PowerShell - MS
- There are also older Microsoft languages software which can be utilized.

Middleware Strategic Software: IT Infrastructure



- Information technology training is required to implement, administer, and develop applications with middleware software.
 - IBM WebSphere MQ is the commercial middleware software.
 - The primary open source middleware alternative is JBoss.
- The appropriate courses and subject matter will be specific to the infrastructure of the organizational enterprise.
- The vast majority of middleware is WebSphere MQ in conjunction with IBM mainframe system software: COBOL or Java, WebSphere Application Server, DB2/UDB, CICS Transaction Server, and IMS.

Middleware: IT Infrastructure Decisions - 1



- Within the web server and system software stack different and hybrid combinations of commercial and free open source software can be used with WebSphere MQ middleware.

- Web Servers:
 - Commercial
 - IBM - WebSphere Application Server
 - Oracle Application Server and WebLogic Server
 - Microsoft SQL Server
 - SAP Sybase
 - Free Open Source
 - Apache and Tomcat

Middleware: IT Infrastructure Decisions - 2



- Within the web server and system software stack different and hybrid combinations of commercial and free open source software can be used with WebSphere MQ middleware.

- Enterprise Databases:
 - Commercial
 - IBM - DB2
 - Oracle
 - Microsoft SQL Server
 - SAP Sybase
 - Free Open Source
 - Ingres, Postgres, and MySQL

Middleware: IT Infrastructure Decisions - 3



- Within the web server and system software stack different and hybrid combinations of commercial and free open source software can be used with WebSphere MQ middleware.

- Development Platforms:
 - Commercial
 - IBM Rational
 - Oracle WebLogic, JDeveloper, Oracle Fusion, and Roadmap

Middleware: IT Infrastructure Decisions - 4



- Within the web server and system software stack different and hybrid combinations of commercial and free open source software can be used with WebSphere MQ middleware.
 - Free Open Source
 - MQ File Mover
 - MQ Port Scan
 - Java Messages Services
 - JBOSS
 - Eclipse

Middleware Software: IT Infrastructure Decisions - 5



- Enterprise Databases:
 - Commercial
 - IBM - DB2
 - Oracle
 - Microsoft SQL Server
 - SAP Sybase
 - Free Open Source
 - Ingres, Postgres, and MySQL

- Development Platforms:
 - IBM Rational
 - Oracle WebLogic, JDeveloper, Oracle Fusion, and Roadmap

Reasons to Train: Business Professionals



- Business professionals require information technology training in order to be prepared for working in hybrid software environments which are becoming increasingly data centric and web-based.
 - Open source web browsers:
Google Chrome, Mozilla Firefox, Opera, and RockMelt.
 - Software as a Service:
Google Apps and Microsoft Office Web.
 - OpenOffice and StarOffice:
versus the Microsoft Office suite.
 - Linux-based desktop workstations interoperating with
with the Microsoft Windows family operating systems.
 - UNIX server variants in place of Microsoft Windows
servers.

IT Training for Implementing New Computing Infrastructures



- Traditional information technology infrastructure orthodoxy is being challenged and changing.
- IT training is required for taking advantage of the underlying economic potential associated with:
 - A decrease in hypervisor prices and management costs.
 - Decoupling technology which breaks the dependencies between hardware and the operating system and between the operating system and applications.

Emerging Modes of Infrastructure Virtualization



- Since the 1970's the operating system has been the strategic focus for new technologies; however, new modes of computing and infrastructure virtualization are challenging that assumption.
- Web browsers are emerging as thin clients and assuming the functionality of the operating system for software as a service applications and web apps.
- Gartner market research indicates that PC virtualization will be increasing rapidly.
 - Projections are that there will be 660 million virtualized PCs by the end of 2011.

Server Virtualization and Infrastructure



- The consensus among industry experts is that server virtualization will allow organizations to become significantly more efficient in the utilization of their existing infrastructure.
 - Projections are that there will be in excess of 4 million virtual machines by 2011.
- Virtualization can be also be implemented at seven different levels: 1- operating system 2- application server 3- application 4- management 5- network 6- storage 7- service.

IT Training for Implementing a Cloud Computing Model



- Cloud computing is evolving from concept to a practical implementation.
- IT training is required to have the infrastructure in place to evaluate, select, and if well suited to a business model implement a cloud computing service to replace or augment an existing utilization of software.
- It is shifting the emphasis from locally managed server-client installations and information technology related services to externally located web-accessible computing centers consisting of thousands of servers.
- However, there is no single uniform precise definition of cloud computing and there are different types of clouds.

Cloud Computing: Emerging Markets



- The computer world is morphing into two distinct markets: consumer and enterprise.
 - Apple, Google, and Asian hardware makers are the major players in the consumer market.
 - The major players in the enterprise market are IBM, Cisco, Dell, and Oracle.
 - The enterprise market will service large companies, government agencies, military, and healthcare providers.
 - Microsoft and Hewlet-Packard will compete in both markets.

Cloud Computing: Major Players



- Amazon and Salesforce.com offer cloud-based services such as e-mail, computer storage, and customer management software.
- Google operates a computing cloud built upon open source software which is optimized for Internet search.
- IBM's employs a hybrid commercial and open source cloud strategy developed from prototype projects with client companies and government agencies.
- Microsoft has its own software centric infrastructure for delivering cloud computing services.
- Other major technology suppliers which have cloud-related hardware and software products include Cisco, Dell, Hewlet-Packard, and Oracle.

IT Training and Legacy Programming Languages - 1



- Information technology training is required to maintain, update, and transition legacy programming languages.
- There are issues relating to programmer demographics which need to be addressed as the first generation of programmers reach retirement age and there is a scarcity of qualified replacements being produced by the colleges to code and maintain legacy programming languages.
- Decisions will need to be made on whether to integrate new technologies and application development platforms with a longstanding and existing investment in IBM mainframe system software.

IT Training and Legacy Programming Languages - 2



- Given the investment in application development and infrastructure in IBM mainframe systems, information technology training has to reflect management's short and long term operational strategies:
 - Maintenance, migration, phased obsolescence, etc.
- Training on legacy and low-level programming languages will be required in order to maintain and transition legacy languages:
 - Assembler, C, COBOL, PL/1, REXX, and RPG.
- The practice of software development continues to shift towards reusing legacy systems to handle the complexities of software development.

IT Training for Reuse of Code



- Object oriented programming enables the reuse of code by organizing the system into objects which utilize information hiding, encapsulation, and polymorphism to increase flexibility compared to non object oriented systems.
- However, with the original design and coding on IBM systems having been done 30+ years ago, in most situations, it will not be feasible to rewrite entire legacy applications with new design rules.
 - This will mean re-visiting the program design and documentation and interpreting the program logic.
 - This type of training will require a degree of educational consultancy.

Legacy Programming Languages: Tailored Training



○ **Examples of Strategies:**

- Migrate to Enterprise COBOL.
- Upgrade to web-enabled versions of the programming language.
- Modify the code and deploy system software to work with WebSphere MQ middleware.
- Develop and integrate business intelligence applications.
- Integrate and code for utilization on mobile devices.

Effective IT Knowledge Transfer



- Effective information technology training requires a multidisciplinary skillset:
 - Coding, debugging, and updating legacy programming languages.
 - Working in mainframe, client/server, and web-enabled environments.
 - Administering and programming commercial and open source software in hybrid operating environments.
 - Implementing virtualization and managing databases in cloud computing environments.
 - Designing, administering, and securing web apps for mobile devices.

Training for Implementing Hybrid IT Technologies



- Information technology is entering an age of compound and hybrid technologies.
- Few organizational enterprises will invest exclusively in a single source of information technology such as: IBM, Microsoft, Oracle, Hewlet-Packard, or SAP.
- Mergers and consolidation continue to impact software and hardware technology:
 - Oracle Corporation's acquisition of Sun Microsystems - Solaris, Java, MySQL, WebLogic software, and a number of other software firms.
 - IBM's acquisition of Cognos and SPSS.
 - SAP's acquisition of Crystal Reports.
 - Commercial software companies - sponsoring and acquiring open source technologies.

SYS-ED: Experience and Longstanding Excellence



- SYS-ED and CETi Technology Partners have been involved in the coding and implementation of each successive generation of information technology infrastructure for an international client base.
- Our training services in commercial, open source, hybrid, and interrelated information technology are highly respected by software and consulting companies for their application developers and clients.
- Few software companies or consulting firms, let alone training vendors, have been doing information technology training longer or better than SYS-ED.