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Engineering-Oriented Web Vision: Hosting the Present-Generation Enterprise Service Platform Based on Web Technologies Related Constructions

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ABSTRACT
Ones always explore and investigate either the present or future of web issues, i.e. web evolution, web 2.0, web service, web engineering, the optimization of web programming techniques and the latest one, cloud computing etc. They all work hard to try proposing the well framework, definition, and protocol for these issues. As a matter of fact, the perfect ones of these issues don't exist yet according to our surveys. As for Web Vision, a rather new field of research since 2013, is however not yet built in a very systematic way. We explore and apply it because web vision exposes designers, programmers, strategists and entrepreneurs to the new ideas and trends that are revolutionizing business and the world. In this paper, we present how methods of web technologies/cloud computing and models of web engineering can be used for hosting the platform with the implementation results and development experience. This paper also describes various web application frameworks and related emerging technologies pertinent to the platform from both a technical and business perspective. In summary, we propose the development disciplines to construct e-enterprise engineering by using our development of computerization experience and business rules for hosting the present-generation enterprise service platform which has been proven to be successful for assisting the enterprise to do business and deliver more value services on the cloud-computing platform.

Keywords
Cloud Computing, Web Engineering, Web Vision, Web Evolution, Web Programming, Virtual Machine

1. INTRODUCTION
As modern society continuously developing, infrastructure services that everyone can easily access to are commonly provided. Utilities such as water, electricity, gas, telephone, cable and network are deemed necessities for fulfilling daily routines that people can hardly survive without them. On the other hand, the amount consumers pay to service providers is based on the amount of their usage that is so-called the pay-per-use which is also applicable to e-enterprise business and all kinds of e-project cases.

Today, business and organizations use internet as primary means to communicate with public. It goes beyond geographical boundaries and time limit. It provides a virtual space for companies to find business partners, to look for products and services they need and to interact through one-to-many and many-to-many networks. The prevalence of the World Wide Web has already had a significant impact everywhere and to our everyday lives. During the past two decades, web technology evolved into a global environment addressing applications that range from small-scale and simple services to large-scale and complex enterprise applications distributed over Internet sites. Enterprises and companies use web to accomplish internal management to communicate with their partners, to integrate their back-end and databases, to perform all kinds of e-commerce transactions including B2B, B2C, B2G, G2C and C2C. Nowadays, the strengths and benefits of cloud computing services are widely recognized among industries. However, the cloud technology still is at beginning in terms of development and applications. Cloud infrastructure is the most important component in a cloud. It may comprise thousands of servers, network devices and disks, and typically serve millions of users globally. Such a large-scale data center will consume huge amount of energy. Cloud computing provides a pool of highly scalable and easily accessible virtualized resources, such as storages, functions, software, hardware, platforms services, it's capable of hosting end-user (vendor) applications developed in a pay-as-you-go model and pay-per-use way.

With saving cost benefit, many are seeing individuals and organizations coming to the cloud from many different directions and paradigms. Governments and enterprises across the globe are deploying cloud computing frameworks to achieve cost reductions and high availability/benefit of services. In 2012, there was financial/bank services moving to the cloud witnessed by BBC news [1]. Banking with its high security needs and strict policies, was always considered to be one of the last industries to enter into the cloud platform. But is now safe to claim that cloud computing proposes a security and trusted environment. Most should agree that Cloud Computing has resulted from the convergence of Distributed Computing, Grid Computing, Utility Computing and Web Service, which essentially represents the increasing trend towards the external deployment of IT resources, such as computational power, storage or business applications, and obtaining them as services [2], [4], [10]. Cloud computing is a model for enabling convenient, on-demand network access, to a shared pool of configurable computing resources, (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction [3]. Thus, the issue about an enterprise Cloud-Platform for optimizing IT infrastructure, hosting the enterprise service platform based on web technologies and web vision & engineering related enabling constructions, is really proposed and developed to extend the enterprise's core competence.

This paper aims to give an indicative overview over development web vision & engineering technologies and software engineering technologies - UML [12], [29], SPICE (ISO/IEC 15504 also known as SPICE - Software Process Improvement and Capability Determination) [27], CMMI (Capability Maturity Model Integration) [31], [32] that have proven to be useful and helpful for web engineering. We propose the development disciplines for web vision & engineering according to our development e-enterprise experience and business rules. We point

to ongoing research on the direction of development disciplines to address web vision & engineering issues, i.e. web technology's evolution – Web Framework, Web programming technique, Web Service, Cloud/Net Computing enabling technology, Virtual Machine, Data Virtualization, Web 2.0 or above and Next-Generation Web Vision which is changing and revolutionizing business and the world one byte at a time.

The rest of the paper is organized as follows: First, we revisit cloud computing and web engineering and objectives of hosting e-enterprise platform based on web technologies and web vision & engineering related enabling constructions; we follow this with a presentation of web technologies of our implementation along with detailed description. Then, we present the implementation results and contribution evaluations of constructing web vision & engineering with process models in the enterprise's e-project environment. Finally, we conclude the paper with future directions.

2. RELATED WORK

2.1 Revisiting Cloud Computing

The Internet is a technology for organizations providing means to communicate and deliver any services with the public. Consequently, one buzz and the latest term of web technology's evolution called cloud computing came into popularity in the beginning of 2006 to describe an innovative IT deployment architecture, originated from the cloud metaphor that was used to represent the Internet in various network diagrams as early as the 1990s. Cloud computing today is the beginning of "network based computing" over Internet in force. It is the technology of the decade and the beginning to the end of the dominance of desktop computing such as that with the Windows. It is also the beginning of a new Internet based service economy: the Internet centric, Web based, on-demand services, Cloud applications and computing economy [8], [9], [10]. In 1961, computing pioneer - John McCarthy had a prediction that Cloud Computing is a realization's statement, "computation may someday be organized as a public utility"; and went on to speculate how this might occur [5].

Currently, the term "cloud computing" is everywhere. A Google search list for "cloud computing" will return 413 million search results. Cloud computing is being marketed as the complex-free efficient method of accessing a lot of amounts of computing and storage as a service. Despite many definitions have been given by different researchers and authors to the term, the perfect one of its definition/protocol/framework doesn't exist yet. Everyone shall adopt and obey the NIST's definition of the cloud computing (America National Institute of Standards and Technology) when they develop issues of cloud computing. According to NIST [3], Cloud computing is "A pay-per-use model for enabling available convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications services) that can be rapidly provisioned and released with minimal management effort or service provider interaction." In marketing, cloud computing is mostly used to sell hosted services in the sense of application service provisioning that run client server software at a remote location. Such services are given popular acronyms like 'SaaS' (Software as a Service), 'PaaS' (Platform as a Service), 'IaaS' (Infrastructure as a Service), 'HaaS' (Hardware as a Service), 'NaaS' (Network as a Service) and 'XaaS' (Everything as a Service). End users access cloud-based applications through a web browser, thin client, remote server, mini-note or mobile app while the business software and user's big data are stored on servers at a remote location. Examples include Amazon web services and Google App engine which allocate space for users to deploy and manage in the cloud platform.

Figure 4: Use Case Diagram – the PaaS (Platform as a Service) Present-Generation e-enterprise Engineering

When the industry and academia are developing more pragmatic approach to cloud computing and discussing the topic, is cloud computing finally beginning to mature? We deeply confirm that it is now safe to claim that cloud computing proposes a security and trusted environment. Consequently, the datacenter hardware and software, as Software as a Service (SaaS), so we use that term, what we will call a cloud and adopt this concept to implement its service-oriented technique.

2.2 Revisiting Web Engineering

Web engineering is multidisciplinary and encompasses contributions from diverse areas, and web engineering is concerned with establishing and using sound scientific, engineering and management principles for developing web-based applications. Conallen also had a definition that a web application being "a Web system (Web server, network, HTTP, browser) in which user data input effects the state of the business" [12]. Traditional software engineering ensures efficient development and maintenance of software applications, web-based applications have to be "re-engineered", too. Though, it is not necessary to invent many new process models, notations or programming paradigms. Most web-based processes can be analyzed, designed, implemented and maintained by using existing techniques that have already been developed for object-oriented and component-based software. However, in contrast to software engineering, Web engineering is rather concerned with delivering a value service than a product around our life environment. The free encyclopedia (WIKIPEDIA) is a fabulous collection of references, disciplines and resources to current knowledge and understanding to web engineering, is neither a clone, nor a subset of software engineering, although both involve programming and software development. While web Engineering uses software engineering principles, it encompasses new approaches, methodologies, tools, techniques, and guidelines to meet the absolute requirements of web-based applications.

In particular, web engineering focuses on the methodologies, techniques and tools that are the foundation of web application development and which support their design, development, evolution, and evaluation. In virtue of the fact that Internet is popular everywhere, it deeply affects web application development. We really confirm that all kinds of topics about web development and engineering are rather concerned and investigated than non-web ones.

2.3 Theoretical Baseline and Developer's Tools

Today, is the beginning of "network based computing and service" over Internet, the era of web applications evolves web services development [36] - Figure 1 and six phases of computing paradigms [11] from terminals/mainframes, to PCs, Networking Computing, Internet Computing to Grid and Cloud Computing. An illustration of distributed computing [5] and cloud computing stack included service providers' examples is shown as Figure 3. The development software's outlines for hosting service Cloud-Platform with related enabling Web Vision & Engineering technologies is also shown as Figure 2.

Figure 3: An illustration of distributed computing and cloud computing stack included service providers' examples

3. OBJECTIVES OF HOSTING

3.1 Computer digitalization - All of Data

To analyze and investigate an emerging technology: Cloud Computing. Its evolution is one of the core platforms from computer science (academics) and information technology (industry) in the professional world. We deeply believe it is now a safe, security, trusted environment when we secure all of details [6], [7], including the database, network, programs, and encryption technologies (PKI, SSL3, Digital Signature, Java Security and Windows Authentication). The other one of computer digitalization's state-of-the-art technologies and emerging wisdoms – Web Engineering, Computer has been the most convenient and popular tool in business management. Formosa Plastics Groups (FPG), one of the biggest enterprises in Taiwan, adopted computer technologies since 1967. Since then, Formosa went step by step to apply Customer Relationship Management (CRM) and Supply Chain Management (SCM) systems, obtaining Electronic Data Interchange (EDI), Office Automation (OA), Internet/Web Engineering, etc. And eventually use computer to handle all purchasing and contracting business, i.e. Formosa Technologies Corp. (FTC) online E-MarketPlace and FPCUSA Purchasing Web Bidding system.

FPG digitalization that connects administrative sections into the ERP covers six management systems including personnel, material, finance, business, production and engineering. It was a generation when information technology was rare and digitalization was difficult in 1980s. During the past three decades, FPG is now proud of its excellence in management technologies which has became its core competitiveness in the world. State-of-the-art technologies help to integrate internal resources within groups and promote operation and management to reach its maxima efficiency. Moreover, FPC has a special global perspective. Where there are new factories there are digital technologies. No matter the new factories are in U.S., China, Vietnam or Indonesia, they all use the same computer system. It not only helps all related operation procedures to connect with and run smoothly, but also enhances vertical integration among corporations. In all, computer technology is a time saving and quality improving revolution.

3.2 Proposed definition - Web Engineering

In the paper [35], we had already proposed the new definition for Web Engineering, "*Web Engineering is the combination from both of software engineering development principles and web technologies evolution based on computer network. It is a rather new field of research, always has a great effect upon our life and work today and the future*.", and it is rather concerned with saving cost benefit under web applications development by the entrepreneurs, and here is the other discovered development value of Web Engineering: the Extension of the Enterprise's Core Competence, has been proven to be successful for assisting the enterprise to do business and deliver more value services on the Internet. Although many said that web engineering is multidisciplinary and collects contributions from diverse areas. We think web engineering encompasses two major areas including software engineering and web technologies. Obviously, software engineering as an engineering discipline has been specified in the guide to the Software Engineering Body of Knowledge (SWEBOK) [13]. The SWEBOK has already become an internationally accepted standard ISO/IEC TR 19759:2005 [14] and is also widely recognized as a foundational document within the software engineering community. As for web technologies, various technologies to develop web-based components from diverse areas have been proposed to achieve all kinds of users' requirements.

3.3 NIST definition – Cloud Computing

As for cloud computing, we shall adopt and obey the NIST's definition of the cloud computing (America National Institute of Standards and Technology) [3], "*A pay-per-use model for enabling available convenient, on-demand network access to a shared pool of configurable computing resources that can be rapidly provisioned and released with minimal management effort or service provider interaction*.", and focus on data encryption technologies – cloud security (PKI, SSL3, Digital Signature, Java Security, Windows Authentication and e-Seal). We apply this concept of cloud computing characteristics (On-demand-self-service, Broad Network Access, Resource Pooling, Rapid Elasticity and Measured Service etc) to the cloud-platform engineering, e.g. service model, deployment model, cloud management, cloud security and visualization (Item 23 in Table 4).

3.4 Proposed E-Enterprise Engineering

Computer technology is a time saving and quality improving revolution. We explore and develop cloud-platform engineering in the era of Web 2.0 or above. All duties, missions, needs and wants of different participants involved such as suppliers, sellers, vendors, purchasers, buyers, agents, administrators, employees etc. can be fulfilled in the e-enterprise engineering platform. Based on this concept, we also can envision and extend the next-generation e-world engineering in the world if web evolution keeps going on. The design of use case diagram for E-Enterprise Engineering and E-World Engineering is illustrated in Figure 4.

To summarize the objectives of hosting, the evolution of web technologies only has a goal that satisfies all of web-based requirements. Consolidating all the research reviews, analyses and multidisciplinary fields, here is the goal of web engineering and cloud computing: reduce the cost, increase reliability and flexibility, and finally enable the enterprise's core competence.

4. IMPLEMENTATION

4.1 Enabling Technologies

A number of enabling technologies contribute to e-enterprise engineering related constructions which are described below in details here, e.g. Web Programming and Framework, Web Service, Web 2.0 and SOA, Data Virtualization, Cloud Computing and Virtual Machine, Process Model and Quality Assurance etc. We also contribute and summarize development experience and software/hardware techniques indexed in appendix Table 4 - software and hardware techniques listing of implementing the Present-Generation enterprise service platform for Web Vision & Engineering.

4.2 Web Programming and Framework

In 1997, a new and exciting version of the Web's most predominant and popular mark-up language was officially announced as the new W3C recommendation, it was HTML 4.0 owned new features such as the support of CSS (Cascading Style Sheets). With this coming HTML 5, has become open to the public, many developers have been experimenting with the new possibilities for dynamic web development. According to TIOBE Software's latest Programming Community Index [15], TIOBE is a Netherlands-based provider of software quality assessment services based on the ISO/IEC 9126 standard. In November 2013, the index ranked Java at the top with the highest percent rating, just edging C, but with some distance from other top languages, including

C++, Objective-C, C#, and PHP etc. Nowadays Java is still at the top ranking index.

Another reason Java continues to be popular, is that it is ever evolving. "Java is not static," one also said. And there are dozens and dozens of open source frameworks for Java out there. So if developers don't like the way the JDK works, there are a thousand other ways to do it. Java is incredibly entrenched technology, which is backed by some of the world's largest and most influential software companies, including IBM and Oracle, are two of the leading brands, IBM using WebSphere [16] as the core of its e-business and Oracle also adopting JDeveloper for e-commerce solutions. One said that these are companies that still have a strong influence and transaction-oriented applications on e-business. Consolidating these above, Java is still the most popular programming language in e-business field for the enterprise's web engineering from other top languages, including C++, C#, Objective-C, Python, VB.NET, and PHP etc. Here are our contributions and summaries about web programming languages and frameworks indexed in appendix Table 3 [35] - many possible development solutions of the 3-tier architecture for Web Programming.

4.3 Web Services

The term "Web Services" describes a standardized way of integrating Web-based applications using the XML, SOAP, WSDL and UDDI open standards over an Internet protocol backbone. XML is used to tag the data, SOAP is used to transfer the data, WSDL is used for describing the services available and UDDI is used for listing what services are available. Web services are not tied to any one operating system or programming language. For example, Java can talk with Perl; Windows applications can talk with UNIX applications. It doesn't require the use of browsers or HTM and it is sometimes called by application services. The implementation codes for using Web Service applications are shown as Figure 5, return HTTP status codes (i.e. 200: OK, 401: Unauthorized 500: Internal Server Error, 503: Service Unavailable and so on), Table 1 show the breakdown of HTTP status codes. In recent years, several Web service portals or directories have emerged such as WebServiceList, RemoteMethods, WSIndex, and XMethods.net [17]. However, due to the fact that these Web-based service directories fail to adhere to original Web services' standards such as UDDI [18]. Based on these reasons, there is a need to establish a well-defined web service principle that can potentially be obeyed for web service development that hits well-defined web Services architecture, Figure 1 show that web applications evolve Web Services development. The trends of development technology programming languages for Web Services, the index ranked Microsoft C# at the top with the highest percent rating, followed by Java and PHP.

Seq.	Code	HTTP Responding Name	Description
1	200	OK/ Successful[a]	*a*: Users should verify that this value is 200 indicating that a good send/receive has occurred.
2	301	Moved Permanently	Service is removed or changed to the other sites.
3	400	Bad Request	Request is not valid.
4	401	Unauthorized[b]	*b*: the HTTP status code associated with the service call. A 401 value indicates a bad username or password.
5	403	Forbidden	Descriptions are the same with HTTP respomding names.
6	404	Not Found	
7	405	Method Not Allowed	
8	406	Not Acceptable	
9	411	Length Required	
10	500	Internet Server Error	Server is not linked correctly or is down.
11	502	Bad Gateway	Gateway problem.
12	503	Service Unavailable	Service does not exist.
13	Others	Remote Server Error/ Invalid URI/ Invalid Service Response	Request isn't listed in service.
14	Customized definitions[c] (602/700/1001)	Unknown Address/ Outside USA/ Not retrieve ste codes	Address is not known. Address is not within USA. Link to Server Failed. *c*: Customized definitions depend on your request and development.

4.4 Web 2.0 and SOA

Web 2.0 is an emerging technology describing the innovative trends of using web technology and web design that aims to enhance creativity, information sharing, functionality, and improve the interconnectivity and interactivity of Web applications. The term was coined in 1999 by Darcy DiNucci and was popularized by Tim O'Reilly at the O'Reilly Media Web 2.0 conference in 2004 [19], [20]. Although Web 2.0 suggests a new version of the World Wide Web, it does not refer to an update to any technical specification, but rather to cumulative changes in the way web pages are made and used. Currently, the term "Web 2.0" has clearly taken hold, with more than 1380 millions citations/search results in Google. But there's still a huge amount of disagreement about just what Web 2.0 means, with some people decrying it as a meaningless marketing buzzword, and others accepting it as the new conventional wisdom [19].

As Tim O'Reilly mentioned years before, if Netscape is the symbol of Web 1.0, Google undoubtedly represents the era of Web 2.0. Google discards traditional model to let companies look for target customers. On the contrary, it totally goes opposite direction to let consumers search for advertisements and products voluntarily. In the paper [35], we had discussed both of social and commercial impact, the power of data connection and communication in Web 2.0 shows a potential of building up a closer society among virtual communities. Of course, the most important of impact is the future of web evolution. According to our surveys, we accept and vote it as the new conventional wisdom. Many always ask about the difference between Web 2.0 and Web 1.0. Web 2.0 refers to how we are using the internet today. In virtue of no perfect one definition of Web 2.0 (some believe it is just a marketing term), ones say is that they don't think there's a trade or service mark on "Web 1.0." But O'Reilly has the service mark on Web 2.0. That's a big difference too.

Service Oriented architecture (SOA) is a software design and software architecture design pattern based on discrete pieces of software providing application functionality as services to other applications. It is called as Service-orientation. It is independent of any vendor, product or technology. The idea of SOA is to turn functionalities of both existing and new applications into a set of components. SOA has encouraged software vendors to offer their products as services that clients can use and compose together to fulfill business requirements in an adjustable manner. This adjustability applies to cloud-computing platform and makes it easier to access relative available hardware and software resources. While there are no set standards for Web 2.0, it is characterized by building on the existing Web server architecture and using services. Web 2.0 can be regarded as displaying some SOA characteristics [21], [22]. Therefore topics that have experienced extensive coverage involve the relationship between Web 2.0 and Service Oriented Architectures (SOAs). A possible combination of principles from both Web 2.0 (user self-service) and SOA can facilitate the wide dissemination of many resources. Examples include professional business applications, value-added services (including location-based services), and interoperability services (for example, applications that can be affected by trading partners to initiate B2B transactions) [21]. The imagined result of this

combination between Web 2.0 and SOA, e.g. AJAX, SOAP-based Web Service, can achieve an integration of fast and business requirements and applications.

4.5 Data Virtualization

The term "virtualization" was coined in the 1960s to refer to a virtual machine (also called "pseudo machine"), and the creation and management of virtual machines has been called "platform virtualization" or "server virtualization". Hardware virtualization is a technology that organizations are widely adopting to enable better utilization for available computing resources and big-data centers. The other one - data visualization, there are different approaches on the scope of data visualization. One common focus is on information presentation. Virtualization technologies partition hardware and thus provide flexible and scalable computing platforms. Virtual machine techniques in Table 4, such as VMware offers virtualized IT-infrastructures on-demand functions. Virtual network advances, such as VPN support users with a customized network environment to access all kinds of Cloud-Platforms resources (e.g. datacenter, database, storage, virtual networking, virtual servers, Virtual machines and so on). Implementers will need to learn how to use resources and services of selected providers. Its related fields include data acquisition, data analysis, data governance, data management and data mining etc.

4.6 Cloud Computing and Virtual Machine

Cloud computing, or the cloud, used to describe a variety of different types of computing concepts that involve a large number of computers connected through a real-time communication network such as the Internet. Cloud computing is a term without the perfect and commonly accepted unequivocal scientific or technical definition. In science, cloud computing is a synonym for distributed computing over a network and means the ability to run a program on many connected computers at the same time. In marketing, cloud computing is mostly used to sell hosted services in the sense of application service provisioning that run client server software at a remote location. Such services are given popular acronyms like 'SaaS' (Software as a Service), 'PaaS' (Platform as a Service), 'IaaS' (Infrastructure as a Service) and 'NaaS' (Network as a Service) [23], [24]. End users access cloud-based applications through a web browser, thin client or mobile application while the business software and user's data are stored on servers at a remote location. Consequently, the data-center hardware and software, as Software as a Service(SaaS), so we use that term, what we will call a cloud and adopt this concept to implement its service-oriented technique.

Virtual Machine Manager (VMM) is a management solution for the virtualized datacenter, enabling users to configure and manage virtualization host, networking, and storage resources in order to create and deploy virtual machines and services to enterprise, private or public clouds that users have created, depending on the requirements of users. The Virtual Machine Manager was developed by Red Hat in the Python language to control the life cycle of VMs, including provisioning, virtual network management, and statistics gathering and reporting as well as providing simple graphical access to the VMs [25]. The trends of development technology for VMM, the index ranked by some of the world's largest and most influential software companies, including IBM, Microsoft and Oracle, are three of the leading brands. In present IT's duty [28], the large-scale enterprise really needs to optimize their big-data center for delivering more value services and doing more business.

4.7 Process Models and Case Studies

Reviewing software engineering development, it includes five major topics: 1. Analysis→2. Design→3. Implementation→4. Testing→5. Maintenance. Currently, Software engineering also covers all the major topics associated with software architecture [26]. Various models to evaluate the process of software engineering have been proposed, among them CMM (1987-1997), CMMI (In 2002, version 1.1 was released) and SPICE. SPICE (ISO/IEC 15504 also known as SPICE - Software Process Improvement and Capability Determination) is especially appropriate for a small organization or company that needs to be able to show the results of specific improvement efforts. Because the result of a SPICE assessment is a profile of individual capabilities i

many areas, it can make more small-scale improvements than the CMM assessment [27]. Capability Maturity Model Integration (CMMI) is a process improvement training and certification program and service administered and marketed by Carnegie Mellon University and required by many Government programs for government contracts, especially software development. Under the CMMI methodology, processes are rated according to their maturity levels, which are defined as: Initial, Repeatable, Defined, Quantitatively Managed, and Optimizing. Currently CMMI Version 1.3 is supported by the Carnegie Mellon Software Engineering Institute (SEI). CMMI is registered in the U.S. Patent and Trademark Office by Carnegie Mellon University. Thus, we obey all processes of the CMMI development softwares, and Formosa Technologies Corp. (FTC) was certificated by CMMI Level 2 in November 10, 2006. Being a bottom-up approach, we promote UML [29] as a modeling language that can be used throughout all five major stages of software engineering. In fact, it is a very popular modeling language that many implementing software engineers use in their projects and works everyday. The enterprise cloud-platform for Web Vision & Engineering with related enabling technologies and disciplines is illustrated its details in Figure 6. We evaluate e-business services depending on satisfaction of these, i.e. partners, customers, suppliers, purchasers, members, sellers, buyers and end users etc.

The United Nations Centre for Trade Facilitation and Electronic Business (UN/CEFACT) provides an excellent example of the combination of Web 2.0 and SOA, T. Janner et al. (SAP researcher), "From EDI to UN/CEFACT: An Evolutionary Path Towards a Next Generation e-Business Framework" [37]. This paper proposes a novel approach for the standardization of business processes. Instead of advising yet another fixed standard for the establishment of SOAs, the UN/CEFACT imagines establishing a publicly accessible repository featuring a basic set of modeling building blocks that can be used and extended by the users according to their actual business requirements. In another paper [38], it proposed a novel e-Business architecture that takes into account the specific needs of small and medium-sized enterprises (SMEs) and presented an approach that facilitates the automation of business processes. The other two EU-funded (European Union) projects (GENESIS and ITAIDE) dealt with next generation e-Business frameworks as well.

4.8 Project Evaluation and Quality Assurance

At the end of every web project, there should be a high-quality web application evaluation; because maintenance and documents are so essential that they should rather be seen as a part of the development. To evaluate a web application's quality in eight dimensions [30] – 1. Correctness (functionally) 2. Testability (against Specification), 3. Maintainability (for Web projects/applications, maintenance costs exceed development costs by far), 4. Portability and scalability, 5. Reusability, 6. Robustness and reliability, 7. Efficiency, 8. Documentation. There will be

quality assurance if all match with your project development. While the CMMI Level 2 is totally adopted for quality assurance, and its core process areas are listed below for development model. Maturity Level 2 [31], [32] – Managed (7 core process areas), a. CM - Configuration Management, b. MA - Measurement and Analysis, c. PMC - Project Monitoring and Control, d. PP - Project Planning, e. PPQA - Process and Product Quality Assurance, f. REQM - Requirements Management, g. SAM - Supplier Agreement Management. As for Maturity Level 3 – Defined (12 core process areas, e.g. CAM, DAR, IRP, IWM, OPD, OPF, OT, RSKM, SCON, SSD, SST and STSM), it is also adopted and obeyed by some representative projects/applications, therefore we are planning to get certificated by CMMI Level 3 on some trial projects.

5. BENEFIT ANALYSIS

5.1 Implementation Results

In the paper [35], to integrate e-business web applications for web engineering, it is also the successful presentation of implementing web engineering for the enterprise's e-business and e-commerce solutions. In the second paper [34], the implementation of integrating e-Procurement, e-Contracting and e-Invoice platforms for the B2B E-MarketPlace web-based system, it obeys totally the CMMI development processes and is a successful platform to do business for the enterprise and others, i.e. suppliers, purchasers, members, sellers, and buyers etc. And in the third paper [36], it aims the goal for extending the enterprise's core competence related studies after the construction of e-enterprise engineering. Consequently, the integration of e-business and e-project web applications can be also doing easily if web vision & engineering are adopted fully and executed successfully. Undoubtedly web vision & engineering bring the enterprise's computer digitalization and extend globally the enterprise's competence from the locality to the world's market.

5.2 Contribution Evaluations

a. In Figure 4, there is an interface between e-enterprise and e-governance/e-world. This agile interface applies to e-enterprise as well making it easier to access and communicate all kinds of resources within e-governance and e-world under the era of web applications.

b. To be continued, share all members information from both buyers and sellers by using e-enterprise agile and adjustable interface to connect e-governance/e-world, and the half month quantities of member and case in E-Enterprise (E-Business, E-MarketPlace, E-Commerce and E-Bidding) shown as Table 2.

c. According to Celent Communications LLC, an international financial research and consulting firm, sellers/buyers save up to USD$6~$15 per invoice by using digital ones. In the thesis of MBA master degree, the Author is FTC's president [33], FPG computer digitalization saves up 4134 people and up to NTD $3.8 billions (USD $126 millions) of personnel cost. Undoubtedly e-anything systems will bring the direct benefits about time and cost-saving.

d. We finally contribute and summarize development experience, web programming solutions - appendixed in Table 3 and extending software/hardware techniques appendixed in Table 4 [35], [36] - software and hardware techniques listing of implementing the Present-Generation (or Next-Generation) enterprise service platform for Web Vision & Engineering. These also provide that interesting authors continue to explore and investigate either the present or future of web issues.

6. CONCLUSION

In the professional world of computer science (academics) and information technology (industry), it is observed that technology scales by an immense order, and reinvents itself during the era of web evolving. Such are these philosophical cases with Web Service, Web 2.0 and SOA, Data Virtualization, Cloud Computing and Virtual Machine, Web Vision and so on. Despite their evolving progress is mature or immature, project managers and engineers have never forgotten anything they learned in their software engineering, programming and project management classes. In this paper, we present and illustrate the triangular relationship between software engineering and web vision & engineering with related enabling technologies and disciplines. It is the soundness of web application principles that is here to stay and go for Present-Generation/Next-Generation Web Vision & Engineering. We acknowledge the web applications era, to solve and satisfy the existing issues for maximum necessity is required.

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Table 2: (Updated) Quantities of member and case in Formosa Plastics Groups

E-Enterprise (E-Business, E-MarketPlace, E-Commerce, E-Bidding)

Date	Sup-pliers	Vendors	E-Invoice members	Purchase cases	Contracting cases	E-Invoice Quantities	Bidding cases[d]	Web Bidding Vendors[e]	Web Bidding cases[e]
11/21	13953	9539	7910	11204	1935	243	395	11537	243
11/22	13964	9541	7963	11027	1902	131	422	11540	309
11/23	13968	9544	7963	11011	2258	124	389	11540	0[e]
11/24	13970	9545	7963	10894	2247	117	353	11540	0
11/25	13979	9548	7965	10928	1850	223	372	11547	267
11/26	13772	9548	7965	11770	1835	244	358	11550	267
11/27	13796	9550	7970	11355	1925	235	320	11550	89
11/28	13821	9551	7985	11045	1876	152	297	11550	62
11/29	13837	9559	7985	11037	1817	214	282	11551	68
11/30	13840	9559	7985	10510	2155	94	245	11551	0
12/1	13841	9558	7985	10467	2147	128	243	11551	0
12/2	13848	9558	7985	10909	1826	233	266	11551	85
12/3	13862	9562	7985	12316	1773	166	281	11552	308
12/4	13875	9566	7985	12526	1847	206	274	11560	190
12/5	13885	9567	7985	12214	1865	257	259	11563	176

a: Buyers: 13, Contractees: 7, E-Invoice Core members: 166, Bidders: 6, b: E-Invoice core members in Buyer side: 87, E-Invoice core members in Seller side: 79, c: Formosa Technologies Corp. (FTC) open website in Chinese http://www.e-fpg.com.tw, d: Bidding cases in Taiwan, e: Bidding vendors

and cases in USA, and there is no bidding cases on Saturday and Sunday
http://www23.fpcusa.com/bidding/logon.do

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