

Using the CMMI Model to Determine the Quality of a Web Project

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Abstract: There is no widespread method to determine the quality of a Web application. At the same time for the customer it is essential that to develop or to work out a system with which an Internet based project became estimatable, either it is an internal project or it is to find the perfect developer partner. As the software developers reach a suitable, higher quality level, they become more reliable.

To take notice of that, to assess the quality of Internet applications and websites, the measurement is often subjective, and there are a few guide-lines, and those only for the requirements for the conventional desk applications. Most of the times the measurement of a software quality means analyze of the functionality and the ergonomony, so just the result, the output of the application, and not the whole developing and user processes.

That is why I tried to discover a web site and web application measurement tool to assess and classify the quality.

To exact forecast the quality of the web applications, the development organizations as well as the work processes of that have to be known. It is necessary furthermore to deal with the claims of the procurer.

These expectations determine that quality level, what the developers have to achieve. When the achieved level of the development organization is lower, than the expected level by the procurer that threatens the success of the project.

To measure the quality of the web developing process I used the Capability Maturity Model Integration (CMMI) model.

1 Specialities of Internet Applications

With the development of the Internet culture applications also got simpler, the users have less knowledge and still from only readers they are becoming the creators of the content. Internet applications should meet these expectations and for that the programmer has to consider that while creating the logic of the application and the framework [5].

There are several reasons why internet applications are spreading so fast. First of all there availability is a lot wider, does not come down to only one computer or

one network on which it was installed. Also the quantity of accessible information now and before is not even comparable. Not counting the applications which need broadband or need high counting capacity (for example video editing), Internet applications are reaching the functionality of there fat client architected associates. The most serious disadvantage of internet applications is that the resources of the client computer are not accessible or only in a restricted way.

The development of the application logic is similar to the conventional desktop, fat client development. While the code of an Internet application runs on the server except of the smaller program parts that control the input, which are only downloaded to the client computer when in use. One of the benefits of doing so is the platform independence. Looking at it from the side of a developer another benefit is that the code runs in a tested environment, this way behaviour of the program does not depend on the environment and it is calculable. It is always the last version of the complete and constantly developed program is what is running everywhere. In all other cases the corrections must be sent to the user, they have to install it and this could lead to other confusions (such as: compatibility problems with other applications). All this can take a lot of time and the complete upgrade is never possible.

2 A Capability Maturity Model Integration (CMMI)

A CMMI model provides a structured view of process improvement across an organization with the essential elements of effective processes. The model defines 5 levels of process areas and project management methods to achieve a 'CMMI Level Rating' in a developing or engineering organization. It also means system and software planning, software purchasing procedures. One of the primary goal is to reduce the operational charge and the potential troubles.

2.1 The 5 Levels of CMMI

The developing of an organization's processes at the most of the times it not means significant and enormous innovation but means a set of small steps or instructions. The CMMI makes a frame to these steps to organize them into 5 levels in order to the gradual organizational process development. The levels are defining a scale to measure the software processes and the capability of software processes.

The individual maturity levels are consisting of more ingredients except of the first, initial level. Every level defines particular performances and also includes several key processes as goals. The procedures have many common attributes, to achieve the target they contain some basic exercises, examples describes specific or less specific activities.

At the bottom of the scale the companies do not have repeatable processes, the works and the activities are mainly chaotic, ad hoc. At the top of the scale the corporations uses well defined and repeatable processes, and collect metrics to help improving the processes constantly.

The key methods of CMMI are contribute the organization to achieve the goals concerning on costs, scheduling, functionality and quality of planning, developing and maintenance.

Every mature level defines goals on the development process to stabilizes the capability of the organization with a few element of the software developing process.

3 Using CMMI to Develop Web Applications

Correspondingly to the traditional software development the web applications also can capitalize with a software planning tool and with a project management method like the CMMI model. Furthermore it presents some difficulty that only a few web development system include version tracking, reusable component libraris and collaboration management or designer tools.

Levels of Maturity of Internet Applications

Lot of people – also amateur developers – are developing websites and are writing Internet applications. I will show you one of the possible approaches on the following examples. The most obvious thing to do is to take a look at the development of a web-developer company. It is also a must to deal with the needs of the procurer. These expectations are the ones determining the quality level that should be reached by the developer. In case the quality level expected by the customer and the one reached by the developer are not the same, the success of the developing project can be at risk.

3.1 Initial Level

Most of the web programmer or even more people who are writing HTML are working on an initial level. Web-developer companies who have only a few employees and are creating simple websites for smaller customers are usually on this level. This also involves companies programming there own website. They do not use nor CSS nor HTML templates and most of them use only a WYSIWG editor program or a conventional word processor that is capable of saving in HTML format. These developments follow very few optimization guidelines (for

example download time, legibility, ergonomics). Creating new applications or new pages development always starts from the bases over and over again. They rarely use test cases. In most cases the look, the content and the logic of the program (if there is one) do not differentiate from one another.

Most of the time those who develop static websites are found on this level.

3.1.1 From the Aspect of the Customer

Those customers can be on this level to whom the only thing important is being present on the Internet and do not need dynamic content and do not want to operate a web-shop or electronic helpdesk. The content changes rarely or/and slowly. These websites are often called electronic prospectuses and do not afford much information. Disadvantage of these pages is that the rate of returning visitors is very low. The customer is not familiar with the benefits of being present on the Internet. This website does not meet the customers business strategy nor to their real business goals. This way the success of it is not measurable and the fulfilment of the goals can not be audited. The target audience must be determined and so should be the service offered by the website, the content and the message of the page to the visitors. All this should be done to improve rate of visitors coming back.

Customers who have goals like these need a developer on a higher level.

3.2 Managed Level

The next level is reached by those developers who use reusable components, templates. Usually those reach this level who have more customers and so they have experience. They are aware of the fact that some elements and expectations are the same in different projects. On this level content and look are starting to get separated and the logic of the program is starting to appear. Application development is faster and the created applications and websites correspond more to the expectations of the customers. Compared to the initial level here the development is faster however there are more risk factors because of the use of third-party components.

3.2.1 From the Aspect of the Customer

Development can reach this level if the customers realize that the updating of the content is also important and the maintenance of the website is necessary. The maintenance, the updating and the operation are most often done by the developer. The customer provides the content to the developer for example via e-mail who will upload it to the Internet. So updating will have its limits, it takes more time. If the customer updates the website frequently the development of it – even if not

the whole page – is also the developer's or the customer's system administrator's duty. Updating and development however require other kind of knowledge by the 'updater' person. We can not expect a person who is responsible for maintenance of a network and computers to develop professional internet applications. Another solution can be the use of a content management software. With that the customer himself/herself can upload content to the site. With doing so we reach an even higher level.

Developers often make a mistake when they use the latest technology on the website and they overcrowd it with animations. From these kind of developments only web designers benefit. Animations rarely contain useful information, the page downloads will be much slower because of them and it becomes far more complex than needed and they also distract the attention of the visitors. Using the latest technology already rolls out some of the visitors and it also raises the costs of the development which takes a lot more time this way but this does not show in the value added.

3.3 Defined Level

3.3.1 From the Aspect of the Customer

The customer already has a forming marketing strategy and the website is accommodating to business goals. The objectives of the customer are clear they have concrete expectations. From now on not the developer is the one who is determining the application but the demand and expectation of the customer. E-business, web-shop, electronic helpdesk and other electronic services come to the front just as keeping in touch with clients.

During maintenance security and constant, high availability becomes important aspects.

There will be higher expectations regarding web services and so the project is in need of a more professional developing group.

3.3.2 From the Aspect of the Developer

On this level companies who are dealing with development are starting to create developing procedures, methods, documentation principals mostly based on their experiences in the past. The use of these is required by continuous software-support. Determining security levels and implementing security related procedures also becomes important because of occurring failures and lacks in security. Applications are becoming better planned and testing more farseeing. Previous to development serious planning takes place and the contact with the customer is constant.

The number of the developing organization is bigger, it has more complex developing projects which number is also increasing so the communication and management inside the organization becomes very important. Training of the members of the organization is necessary.

Documenting is in the centre because planning is a lot better, software support is available and furthermore using complete components, functions, procedures, modules ect. later is a lot easier. Another advantage is that the tracking of the project also becomes simpler for the management. This level is usually reached by middle sized developing companies. Data is stored in databases, developing rolls are separated. There are separate rolls like the roll of the programmer, database administrator, web server administrator and designer.

3.4 Quantitatively Managed Level

3.4.1 From the Aspect of the Customer

With higher and higher expectations and with the increasing number of the functions of web services meeting the business goals is not possible without the Internet and without being present on the Internet. Beside this services should be measurable and other efficiency aspects should be dealt with.

In most cases a Content Management System – CMS can be used for these. These do not provide too much freedom for the company in creating the website totally as they planned, but they do fit the requirements. With CSM the customer himself/herself can upload content on the Internet and this way the customer can constantly keep the website updated.

The inside portal, the Intranet for the company itself and the outside portal for the partners, for the customers are separated. The communication and data exchange between the employees or between the company and it's partners can become faster and automatic by building up an Intranet.

3.4.2 From the Aspect of the Developer

Applications appear that are optimized for the separate platforms. Complex developments are important and it is necessary for the developers to use version tracking devices.

For increasing the efficiency of the development and the reliableness and decreasing the time of the project they use tools that help team management and collaboration. The outcome of the project are evaluated and used in the future. The achievements are monitored.

The more organized developments require changes also in the developing system. The fully Flash pages are changed to inbuilt Flash elements. The not managed

applications on the server side are changed to more manageable developing systems like J2EE or NET.

The development and the fact that the company's portal is organically built in the customers business procedures and to the ERP system makes it necessary for the system to be reliable and secure and this effects every area. Free database operators are rear on this level they are switched to database operators that are scalable, more secure, manageable and more efficient.

To every task they assign time, money and other resources. They rely on these when they determine human resources and the price towards the customer.

3.5 Optimizing Level

3.5.1 From the Aspect of the Customer

As companies grow and develop, integrating the isolated IT systems becomes necessary. It is also important to harmonize the data closed into different applications and the business procedures. This is possible with services that are provided by communication systems, however this way the IT system become more complicated.

Communication between business partners is constantly flaring. The market demands quick and flexible reactions. The expectations created on the electronic market must be satisfied. IT systems must adapt to these demands. This requires a developing team that can offer appropriate services. Above security and efficiency it is also very important to keep schedule.

3.5.2 From the Aspect of the Developer

Cost effective development and the customer's higher level of satisfaction requires changes and better managing on the side of the developers. With the use of development standards and project management methods developments become clearer, faster and do not suffer mistakes that much.

On this level the organization is constantly improving software procedures, searching and abolishing the real reasons of low efficiency and preventing future mistakes by the experiences of the past. There are several feed-back points in the developing procedure. From all this we can expect an increasing productivity and a decreasing period-time.

To improve project efficiency they use different knowledge management and project management methods. Focus is on constant development of procedures.

This is the highest level of development. The product with desirable quality level is shipped at the right time.

The steps of a software development cycle:

- 1 Project planning: set up the project team, define the deadlines.
- 2 Define the conception of the development together with the order.
- 3 Define the software requirements.
- 4 Software planning: design the logic and the appearance of the program. At this level the content is not yet important, the order will produce it later.
- 5 Segmentation of the development and the optimalization of the processes.
- 6 Software development
- 7 Testing
- 8 Software delivery and installing.
- 9 Software support and maintenance: This is a lot more important aspect when looking at web applications than at traditional fat client applications. The security definitions and levels require long access times while applications are a lot more vulnerable. Also the expectations regarding applications change faster more often and doing so they require faster response. Therefore there are special standards to maintain web applications. When planning them we should always be aware of the fact that we can never think of web applications as finished. The content – what apart from text can also be an image, voice or movie file – is uploaded by the user of the application, the customer itself without the intervention of the programmer.
- 10 Analyzing of the processes and the results. Applying of the received information at the further development. Adapt the information; reform the development procedures when required.
- 11 Continuing professional education of the developers.

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