Level of Ubiquity of Various Software Projects

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Abstract— **There is a lot of technology and complexity that goes on behind the scenes to make it look so simple and effortless. Which means looking at new technology and figuring out where that fit is for those technologies within a large business or within an enterprise. It used to be the business where technology started and ever then influence the consumer. In recent years context awareness has came forward as a term from ubiquitous computing or we can say pervasive computing which deals with connecting changes in the environment with the systems. Whereas location may inform us how particular processes in a device work, with the help of new technology and smart phones you can bring that same location finding capability within the walls of your organization enabling the users to save time and take advantage of entirely new capabilities that can transform your workplace. In this paper we would be discussing about formulating the ubiquity level of a software project with the help of ubiquitous characteristics**.

Keywords—software projects; ubiquity; characteristics;

I. INTRODUCTION

Where are you right now what's always been an important question but a new set of services are making even more relevant, it can save you money, save your time, even save your life. The services developed on the network makes easier for the user to know where he is, the key location as well as acts as a mobile network for those devices that are unplugged. The reason being the existence of these new services is that they not only tells us what happening around us but moreover increases the value of virtually every service delivered.

It is the ability of smart phone fitted with the GPS benefits the value of location based services to users. Today we rarely see an app that doesn't use location information to provide better user experience. Even if it is not a service we would nobody think of us location aware. Users now see mobile location as a natural part of the services they use, one that makes information more significant and that enhance the user experience.

Services based on location from mobile devices are also gaining interests from other stake holders and industries, think of advertising for Example safety and security logistics, tracking and public transport urban planning and governance.

As for a mobile user it is all about connectivity and accessing internet, but today it is about receiving the right application at right time and right place and that means that the network to be more intelligent. Readily available maps, guides, promoting tourists sites and locations of govt. Buildings are just some of the many applications which make the system useful for everyone from citizen, tourists to business travelers. It also makes the city an attractive destination for staging international events. So, Ubiquitous computing can be said as a vision of the world where everybody and everything is connected wirelessly throughout the World Wide Web. People, places and even objects have websites. People connected to a wide variety of smart wireless information appliances. It can know who you are, where you are and what's going on around you.

Where the outside of the new development into the enterprise driven in part by the excessive use of mobile devices context aware computing has the capability to enhance simply productivity and offer value to the company. Context can be seen as anonymous with the situation. A situation can be leveraged in computing to make things better, more efficient, to drive automation and to make a context sensitive recommendation.

From this we can convey a simple basic definition that a "context aware computing is the notion of having computer systems being aware of the context systems."

"Being aware here means that you can have systems that can recognize perceive to real world using sensors and can act upon those stimuli which they get from the real world. So giving the computers eyes and ears to act and interact more properly shows the way to context awareness.

It is a lot more than the most important and basic questions of our social life "where you are", also "how are you" and "what you are doing", who you are in acting with.

In context of information is, the most common question posed when communicating on mobile phones "where are you". Acting on a situation is called context aware computing. The elements that make up a given situation are person, place and thing. If we talk about the context about people then in that case people are normal employees. In context of a device it can be a notebook, server, Smartphone, tablet any of them, context about a place can be a conference room or campus. And what is the situation – which those devices find them in. Not just "deliver any service at anytime, anywhere" but rather "delivering the right service at right moment".

Taking an example of navigation systems on phones. The phones have GPS render it knows where it is and by this means it guides you, and the map moving if you are moving around the streets, this is the basic feature of context aware computing, some as a user I am freed from burden of positioning myself from the map, moving the map around, the context given by the location is doing it for me.

If we look into other models in navigation system it's not just the location, taking into another context such as traffic situation, time of day etc. All this is context information.

"Context awareness is the ability of computer systems to sense and leverage the rich context information in the dual space. It has been said to be a promising approach which

provides attentive service to the consumer by reaching the goal of invisibility"[1]. It's not a new idea. It's gone through number of different names. Names like ambient intelligence, ubiquitous computing, and pervasive computing.
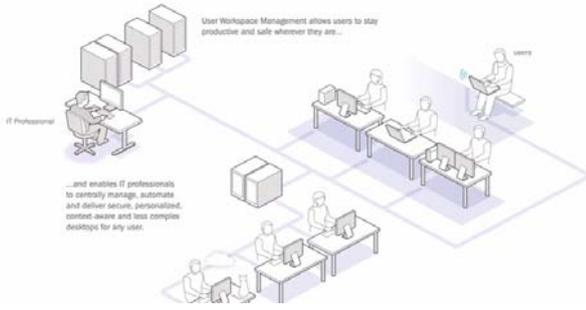
Diagrammatic Representation Of Context Aware Management

Ubiquitous Computing is a concept of software engineering in computer science where computing is forced to appear everywhere and anywhere. In comparison with desktop computing ubiquitous computing occurs using any device, in any location and in any format.

A user communicates with the computer which connects systems various forms which includes laptops computers terminals and tablets in everyday object as federal pair of glasses. The technology above is to support ubiquitous computing involves internet, advanced middleware, operating system, mobocode, sensors, microprocessors new user interfaces. This new phenomenon is also described as computing which is pervasive, and intelligence which is ambient. Each time it emphasis slightly different aspect. When primarily considering the objects involved, it is also known as physical computing, the internet of things, haptic computing and the things that think. A single definition was proposed for ubiquitous computing for these related terms. Numerous properties for ubiquitous computing has been proposed. From which various kinds of arenas of ubiquitous systems can be described. Ubiquitous computing talks about variety of research topics including computing which is distributed, mobile, location computing, mobile networking, context aware computing ,sensor networks, hci and artificial intelligence.[2]

Basic Concepts and models of ubiquitous computing experience a part of small, inexpensive robust network processing devices, spread throughout everyday life. For eg a domestic ubiquitous computing environment might interconnect lighting and environmental controls with personal biometric monitoring when threaded into clothing so that illumination and heating conditions in a room might be modulated impeccably and in continuous streams.

Ubiquitous Computing came up as a grand challenge across computer science in systems design and engineering, in systems modeling and a user interface design.

For increasing the ubiquity of a software project it should be able to satisfy that the characteristics present in them are at appropriate level. Three main constraints which should

be taken into account for increasing the ubiquity of any environment are firstly the outdoor lightening level secondly person's activity which includes whether the person is present or absent at that particular moment lastly but most important the time zone whether it is dark outside or an afternoon.

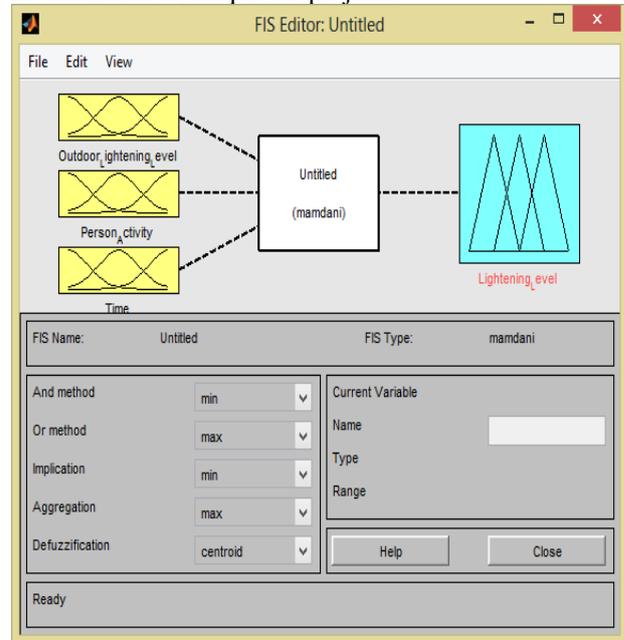These constraints are directly proportional to the characteristics of ubiquitous projects.

Fig 1

II. CONSTRAINTS OF UBIQUITY

Here the constraints of ubiquity are those parameters or inputs which are responsible for increasing the ubiquity level of an environment. These constraints are outdoor lightening level and the person's activity. The outdoor lightening level indicates the temperature outside in the environment whereas the person's activity indicates whether the person is present or not at that particular moment. [4]
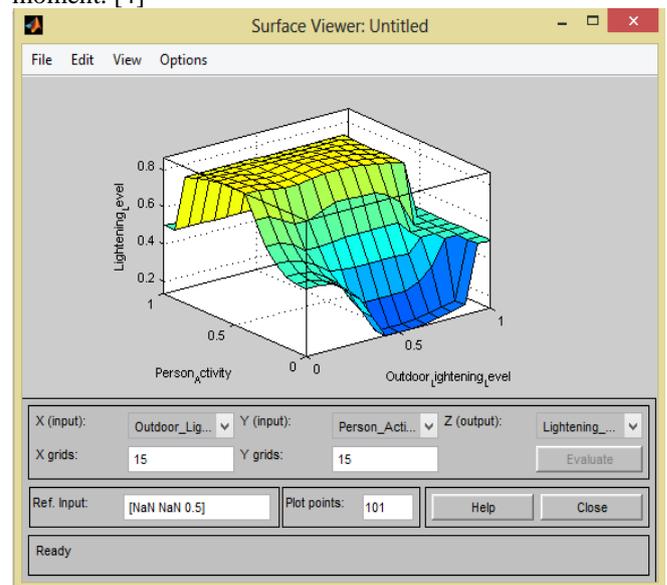

Fig 2

Taking these three constraints and applying rules, we have generated a graph showing the level of ubiquity based on some parameters. This figure describes the way by which we can increase the ubiquity level of an environment.

III. ESSENTIAL CHARACTERISTICS SHOWING THE UBIQUITY LEVEL OF SOFTWARE PROJECTS BASED ON THEIR IMPORTANCE

- **SERVICE OMNIPRESENCE (SO):**
  It is the most essential characteristic of ubiquitous computing which makes user feasible to walk around with a sensation that the user itself is carrying computing services along with them.

- **ADAPTABLE BEHAVIOUR (AB):**
  The environment in which the user lives is generally crowded by various kinds of network capabilities, devices and context. These devices must be aware of changes taking place in the environment. Services based on software must adapt themselves according to the environment by generating resulting into user satisfaction. And these services should suppsort the user with the preferred services at a certain point of time

- **EXPERIENCE CAPTURE (EC):**
  Everyday experiences are captured and the records obtained from them are made available for later use. Experiences, such as streams of information their correlation and integration and synchronization of time amongst them. [3]

- **SERVICE DISCOVERY (S.D):**
  It makes computing easy, provides communication among computers, with the goal to approach zero administration overhead thereby making it simpler for the users from excessive administrative and grouping work. This feature acts explicitly to the user, resulting into a simple outcome.

- **SPONTANEOUS INTEROPERABILITY(S.I)**
  Execution of programs, transferring of data and software's capability to communicate among various functional units irrespective of heterogeneity is termed as interoperability. It is said that when data is exchanged across various platforms of software, the software should be able to inherit that information and react to it accordingly.

- **FUNCTION COMPOSITION(F.C)**
  The basic idea behind this feature is that the user is provided with the service. In simple terms it is said to be recorded as forming a service as per the need by the user based on basic services which are already there.

- **INVISIBLITY(INV):**
  As the name suggest the capability of this feature is to act invisibly and automatically sense the environment involving an interpretation that devices or objects are providing these services or a kind of "intelligence". This is hence followed by RFID, sensors, smart card, information artifact and tiny smart devices. A real example can be wearable computing. [5]

Table 1

Project name	Defination	S.O	A.B	E.C	S.D	S.I	F.C	INV
Reactive Room	Intelligent Control of audiovisual	P	P	P	A	A	P	P
Cyber Guide	Tour Guide	P	A	P	P	P	A	P
Smart Home	Intelligent Control Of audiovisual	P	P	P	A	A	P	P
Kids Room	Interactive narrative space	P	P	A	A	P	A	P
Responsive office	Office environment Control	P	A	P	A	P	A	P

P : PRESENT
A: ABSENT
A.B—ADAPTABLE BEHAVIOUR
S.O—SERVICE OMNIPRESENCE
INV--INVISIBLITY
S.I—SPONTANEOUS INTEROPERABILITY
E.C—EXPERIENCE CAPTURE
F.C—FUNCTION COMPOSTION
S.D—SERVICE DISCOVERY

The above table shows the absence or presence of various characteristics. On basis of these characteristics we have evaluated the ubiquity level.
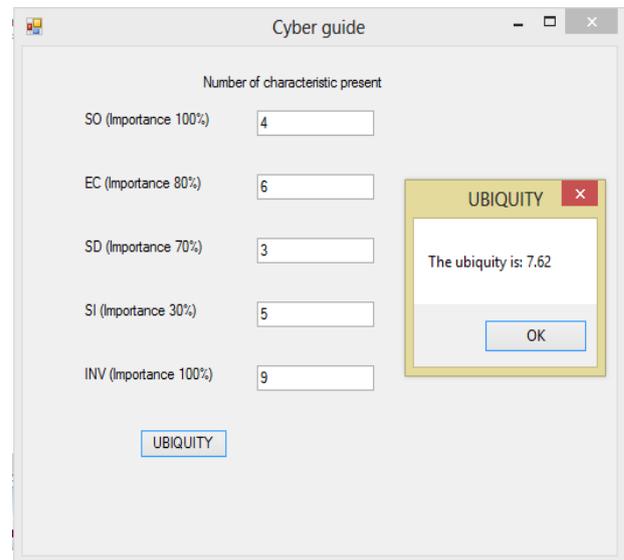

Fig 3

In this figure we have shown the projects for which we have to calculate the ubiquity level. The user can select any project he wishes to calculate the ubiquity.
Each characteristic is given its importance. And the user can enter the value till 10. Above 10 it will not accept. This 10 value is given according to the importance of each characteristic. If we assume that in a normal environment we can have at most 10 sensors not up to that as per our requirement so the reason behind setting this value is dependent mainly on the environment.

A. Equations

Hence from the above figure we conclude that the ubiquity level is evaluated by applying a general formula stated below.

$$\frac{\sum_{i=1}^{n} a_i b_i}{n}$$

Where a = frequency of characteristics
b= importance of each characteristic
And   n= total number of characteristics.

IV. CONCLUSION AND FUTURE WORK

Opportunity is hiding in your data, put it in context, and analyze it so you can dynamically shift your course of action. From this you come to know in real time when to talk often to customers or boost efficiency by focusing on activities that provide the highest returns. This context aware computing make big sense of data in a real time, determine the true context of situations and connects you to wide data. So you can substantiate the actions with the most impact. Also becomes easier than ever to deploy time-money saving location services within your organization. Therefore from this paper we can evaluate that the presence of ubiquitous computing can be seen when computational services or facilities become available to the user's in a way that there is no need of computer at that particular time. Therefore to access these services or facilities a specific tool is not required. The services or facilities can happen themselves at any time or place, transparently, through the use of devices. To make it happen it is important that systems verifying this area look into consideration the above mentioned characteristics.

These days software engineering is in advanced stage. The latest trends talks about characteristics but there is no such model developed which will evaluate the exact ubiquity of a software project.

Thus, in future we would like to develop a model by taking these characteristics as input and checking these characteristics on controlled environments which will thereby generate an output named ubiquity. That model will be based upon some controlled environments and parameters which will help us in evaluating the output as ubiquity.

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