BOOK CHAPTER | Multidisciplinary Perspectives on RE
dx.doi.org/10.22624/AIMS/REBK2022-P10

Multidisciplinary Perspective on Requirement Engineering In Africa

O. A. Eneh [1], D. U. Ebem [2], A. N. Aballa[1], J.A. Adeniyi[1] & Obasi Oka[1]
[1] Department of Biomedical Engineering
Federal College of Dental Technology and Therapy, Enugu, Nigeria
[2] Department of Computer Science, University of Nigeria, Nsukka.
E-mail: eneh.obinna@fedcodtten.edu.ng, deborah.ebem@unn.edu.ng*,
aballaagathankechi@fedcodtten.edu.ng, gajilo2013@gmail.com,
obasioka@fedcodtten.edu.ng,
Phone: (+234)7032674979, 8052810722; 7038772345; 7061899054; 7063636007
Google Scholar: Obinna A. Eneh, Deborah Ebem, Agatha A. Nkechi, Adeniyi John Ayodele.

ABSTRACT

In Africa, we have lots of projects and products worth huge amounts of money that are imported and some projects executed which do not necessarily conform with the immediate need of the people in the locality where they are sited or put in use. As a result such projects, products or services do not achieve their purpose of procurement or execution. Reason being that they are not suitable to the end-users/ consumers. The reason for such inefficiencies is that there was little or no prior thorough understudy of how best to meet the requirement of the end-users with respect to their environment where they are located before developing such products or carrying out such projects. For such occurrences to be curbed, the requirement of the stakeholders involved in the utility of the product has to be thoroughly considered so as to design a software or product model that will form a template for producing the right product that will meet the desired needs of the stakeholders or end –users correctly. This is the essence of requirement engineering in product development or project execution tailored to meet the need of the people they are meant for. Before carrying out product development, there should be inputs of professionals from different fields whose professional expertise is needful in developing a working template or model for the product in view.

Keywords: Requirement, Convergence, Innovative products, Software, Model

Definition Of Requirement

A requirement is a necessary quality in a system, a statement that identifies a capability, characteristics or quality factor of a system in order for it to have value and utility to a customer or user. Requirement is important because they provide the basis for all of the developmental work that follows. Once the requirements are set, developers initiate the other technical work, system design, development, testing, implementation and operation (Young, 2004)

Requirement Engineering

Requirement engineering is the disciplined application of working principles, methods, tools, and notation to describe a proposed system's intended behavior, and its associated constraints.It is explained as the procedure of defining, documenting, and maintaining requirements in the engineering design process. Requirement engineering provides the suitable mechanism to comprehend what the client desires, analyzing the need and assessing the feasibility, negotiating a reasonable solution clearly, validating the specific actions and managing the requirements as they are transformed into a working system (JAISWAL, 2022). Requirements engineering (RE) consists of understanding the needs of consumers, the contexts in which the to-be developed software will be used; analyzing, negotiating, and documenting the consumers' requirements; and managing requirement evolution.

This is achieved through a process called requirement engineering process. Therefore, the ability to improve software products in order to meet the needs of these consumers within today is challenging and fast. Successful RE involves understanding the needs of users, customers, and other stakeholders; understanding the contexts in which the to-be-developed software will be used; modeling, analyzing, negotiating, and documenting the stakeholders' requirements; and managing requirement evolution. The needs analysis is conducted jointly, producing descriptions and models that can serve as the starting-point of the different development activities of software applications, information systems, or work. These descriptions serve as the basis for analysis, negotiation, validation and then to documentation of requirements. This makes the RE a collaborative process and activity, which comes with challenges (Ishaya Gambo, 2014).

Process Of Requirement Engineering

The purpose of requirement engineering methodologies is to make the problem that is being stated clear and complete , and to ensure that the solution is correct , reasonable and effective (Jin, 2018).

Requirement process is as follows:

1) Requirements elicitation: These are various ways used to acquire knowledge about the project domain and requirements; which comprises of the techniques of interviews, brainstorming, task analysis, and prototyping and so on.
2) Requirement Specification: At this stage the formal software requirement models are created. The models used at this stage include; Engineering Requirement diagram, data flow diagram, function decomposition diagrams, data dictionaries and so on.
3) Requirement verification and validation: This is the process of right implementation of specified functions using software which was built to meet the client's requirements.
4) Requirement management: This is the process of verifying, documenting, tracking, prioritizing and agreeing on the requirement and controlling communication to relevant stakeholders (Kumara, 2022).

For the requirement of the stakeholders in product development to be effectual, there has to be a convergence of the expertise of some professionals whose inputs to the development of the product will be necessary, especially when it's relevant to the task at hand.

Convergence in connection with science and technology is a frequent topic in scientific and scholarly discourses. For instance is the convergence of computing equipment and domestic consumer electronics. It is the coming together of scientific discipline to solve problems common to these disciplines, initially through interdisciplinary cooperation (Daniel Andler, 2008)

Convergence is an approach to problem solving that cuts across disciplinary boundaries. It integrates knowledge, tools, and way of thinking from life and health sciences, physical, mathematical, and computational sciences, and engineering disciplines and beyond to form a comprehensive synthetic frame work for tackling scientific and societal challenges that exist at the interface of multiple fields. By merging these diverse areas of expertise in a network of partnership, convergence stimulates innovation from basic science discovery to translational application. It provides fertile ground for new collaborations that engage stakeholders and partners not only from academia, but from national laboratories, industry and clinical settings (kenan, 2014).

For instance, to produce a locally fabricated external defibrillator (which is a device that delivers an electric shock to the heart through the chest wall to restore regular heart rhythm in occasions of human cardiac arrest), using locally sourced materials; will need the convergence of some professionals from different fields. The experts comprise of a cardiologist, clinical engineer, anatomist, material engineer, public health worker, data analyst, software engineer, cost analyst and so on. The cardiologist makes inputs on the optimum design that will be suitable for operation of the heart which will maintain the correct heart rhythm and study the quality of the electrical impulse generated by the equipment.

The input of electrical electronics engineer is also very important in designing the circuit connections for the electronics components of the equipment. Public health officers generate health data from the local community on the frequency and nature of cardiac problems in the environment and make their recommendations. Material engineer will equally work in the team to analyze the locally sourced material and come up with the best material that will be best for the equipment design which will be compatible to the body during use. A clinical engineer will also be part of the team to make input on the design and holistic development of the defibrillator that will be suitable for use for any challenged patient.

The software engineer develops a software for the partial automation of the equipment. The cost analyst analyzes the cost implication of the innovative product and comes up with the blue print of how much finance it will cost to carry out the production.. A formidable synergy from the team of these professionals will invent a locally fabricated defibrillator which may be more affordable than the exotic samples, and also designed to meet the cardio health needs of our local population.

Conclusion

The use of the information from the end users or stakeholders in a product production line will aid in developing models of innovative and locally fabricated products that will be most suitable to meet the need of the clients they are designed for, curb our over dependence on exotic products ; and boost the economy of African countries.

References

1. Daniel Andler, S. B. (2008). Converging Technologies and their impact on the Social Sciences and Humanities (CONTECS). Karlsruhe, Germany: Sixth frame work programme.
2. Ishaya Gambo, A. S. (2014). Framework For Enhancement Of Requirement Engineering. International Journal For Computer Application VOL 93 - NO2, 0975-8887.
3. Jaiswal, S. (2022, April 12). 123RF. Retrieved from JAVA T POINT: s://www.javatpoint.com/software-engineering-requirement-engineering
4. Jin, z. (2018). Environment Modeling-Based Requirements Engineering for Software Intensive Systems. science direct, 13-27.
5. Kenan, W. R. (2014). Convergence; facilitating transdisciplinary integration of life sciences, physical sciences ,engineering and beyond. National Academics of Sciences , Engineering , Medicine , 1-2.
6. Kumara, G. (2022). software engineering. GeekforGeeks, 1.
7. Young, R. R. (2004). the requirement engineering handbook. Boston London: Artech House, Inc.