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A GROUNDED THEORY OF THE REQUIREMENTS ENGINEERING PROCESS

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ABSTRACT

This paper explores the requirements engineering (RE) process by conducting interviews with RE professionals and applying grounded theory to determine whether a theory of RE emerges. Analysis of the interviews revealed prominent data patterns that were used to model the RE process. The model depicts the RE process as one of establishing a match through discovery and streamlining, and which utilizes corrective measures in order to manage threats to establishing a match. The process involves many entities but is mainly conducted by RE professionals whose experience plays a major role in extracting complete requirements and detecting occasions of mismatch between customer needs and the software requirements, which represent their main concern during the process.

This paper contributes to the empirical analysis of RE by presenting evidence of the RE process in its basic form as carried out in industry, which may form as a building block for further RE research.

KEYWORDS

Requirements engineering, Grounded theory & Empirical software engineering

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REFERENCES

[1]   Brooks, FP (1987) "No silver bullet: Essence and accidents of software engineering", Computers, Vol. 20, No. 4, pp10-19. https://doi.org/10.1109/MC.1987.1663532

[2]   Nuseibeh B & Easterbrook S (2000) "Requirements engineering: A roadmap", Conference on the Future of Software Engineering,pp35-46. https://doi.org/10.1145/336512.336523

[3]   Zave P (1997) "Classification of research efforts in requirements engineering", ACM Computing Surveys, Vol. 29, No. 4, pp315-321. https://doi.org/10.1145/267580.267581

[4]   Institute of Electrical and Electronics Engineers (IEEE) (2014) Guide to Software Engineering Body of Knowledge (SWEBOK), version 3.0. http://www.swebok.org

[5]   Kotonya G & Sommerville I (1998) Requirements engineering: Processes and technique, John Wiley & Sons, Inc, Hoboken, NJ.

[6]   Jantunen S & Gause DC (2014) "Using a grounded theory approach for exploring software product management challenge",Journal of Systems and Software,Vol. 95,pp32-51. https://doi.org/10.1016/j.jss.2014.03.050

[7]   Hinds C (2008) "The case against a positivist philosophy of requirements engineering", Requirements Engineering, Vol. 13, No. 4, pp315-328. http://dx.doi.org/10.1007/s00766-008-0061-9

[8]   Robey D, Ross JW, Boudreau MC (2002) Learning to implement enterprise systems: An exploratory study of the dialectics of change. Journal of Management Information Systems 19(1): 17-46. Retrieved from http://www.coba.unr.edu/faculty/kuechler/788/learningtoimplementerpchangemetaanalysis.pdf

[9]   Mohr LB (1982) Explaining organizational behavior: The limits and possibilities of theory and research. Jossey-Bass, San Francisco, CA.

[10]   Glaser BG& Strauss A (1967) The discovery of grounded theory: Strategies for qualitative research. Aldine, Chicago, IL.

[11]   Adolph S, Kruchten P, &Hall W (2012) "Reconciling perspectives: A grounded theory of how people manage the process of software development", Journal of Systems and Software, Vol. 85, No. 6,pp1269-1286. http://dx.doi.org/ 10.1016/j.jss.2012.01.059

[12]   Chakraborty S, Sarker S, & Sarker S (2010) "An exploration into the process of requirements elicitation: A grounded approach", Journal of the Association for Information Systems, Vol. 11, No.4,pp1. Retrieved from http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.187.4915&rep=rep1&type=pdf

[13]   Coleman GO'Connor R (2007) "Using grounded theory to understand software process improvement: A study of Irish software product companies", Information and Software Technology, Vol. 49, No. 6, pp 654-667. http://dx.doi.org/10.1016/j.infsof.2007.02.011

[14]   Crabtree CA, Seaman CB & Norcio AF (2009, October) "Exploring language in software process elicitation: A grounded theory approach", In 3rd International Symposium on Empirical Software Engineering and Measurement, pp. 324-335. IEEE.

[15]   Daneva M, Van Der Veen E, Amrit C, Ghaisas S, Sikkel K, Kumar R, Ajmeri N, Ramteerthkar U &Wieringa R (2013) "Agile requirements prioritization in large-scale outsourced system projects: An empirical study", Journal of Systems and Software, Vol. 86, No. 5, pp1333-1353. http://dx.doi.org/10.1016/j.jss.2012.12.046

[16] Hansen BH& Kautz K (2005) "Grounded theory applied-studying information systems development methodologies in practice", The 38th Annual Hawaii International Conference on System Sciences, pp264b-264b. http://dx.doi.org/10.1109/HICSS.2005.289

[17] Hoda R, Noble J& Marshall S (2012) "Developing a grounded theory to explain the practices of self-organizing agile teams", Empirical Software Engineering, Vol. 17, No. 6, pp609-639. http://dx.doi.org/10.1007/s10664-011-9161-0

[18] Sorrentino M& Virili F (2005) "Web services system development: A grounded theory study", BLED 2005 Proceedings. Retrieved from http://aisel.aisnet.org/bled2005/51

[19] Würfel D, Lutz R& Diehl S (2016) "Grounded requirements engineering: An approach to use case driven requirements engineering", Journal of Systems and Software, Vol. 117, pp645–657. http://doi.org/10.1016/j.jss.2015.10.024

[20] Glaser BG (1978) Theoretical sensitivity: Advances in the methodology of grounded theory. Sociology Press, Mill Valley, CA.

[21] Adolph S& Hall W, Kruchten P (2011) "Using grounded theory to study the experience of software development", Empirical Software Engineering, Vol. 16, No. 4, pp487-513. http://dx.doi.org/10.1007/s10664-010-9152-6

[22] Strauss A& Corbin JM (1990) Basics of qualitative research: Grounded theory procedures and techniques. Sage Publications, London.

[23] Charmaz K (2006) Constructing grounded theory: A practical guide through qualitative analysis. Sage Publications, London.

[24] Glaser BG (1992) Basics of grounded theory analysis. Sociology Press, Mill Valley, CA.

[25] Glaser BG (2001) The grounded theory perspective: Conceptualization contrasted with description. Sociology Press, Mill Valley, CA.

[26] Gibbs G (2007) Analyzing Qualitative Data. In U Flick (Ed.) The Sage qualitative research kit. Sage, London.

[27] Creswell JW (2009) Research design: Qualitative, quantitative, and mixed methods approaches (3rd Ed.). Sage, Thousand Oaks, CA.

[28] Laplante, P (2018) Requirements engineering for software and systems, CRC Press, Boca Raton, FL.

[29] International Organization for Standardization (ISO), International Electro technical Commission (IEC), Institute of Electrical and Electronics Engineers (IEEE) (2010) ISO/IEC/IEEE 24765: Systems and Software Engineering – Vocabulary.

[30] Singh, M & Chopra, A (2019). Requirements engineering as science in the small. In Proceedings of the 41st International Conference on Software Engineering: New Ideas and Emerging Results, pp45-48.

[31] Lengyel L, Mészáros T, Asztalos M, Boros P, Máté A, Madács G, Hudák P, Kovács K, Tresch A & Charaf H (2015) "Quality assured model-driven requirements engineering and software development", Computer Journal, Vol. 58, No. 11, pp3171–3186. http://doi.org/10.1093/comjnl/bxv051

[32] Jiang L, Eberlein A& Far, BH (2008) "A case study validation of a knowledge-based approach for the selection of requirements engineering techniques", Requirements Engineering, Vol. 13, No. 2, pp117-146. https://doi.org/10.1007/s00766-007-0060-2

[33] Hadad, G, Doorn, J & Ledesma, V (2019). Dynamic Situational Adaptation of a Requirements Engineering Process. In Advanced Methodologies and Technologies in Network Architecture, Mobile Computing, and Data Analytics, pp1386-1399.

[34] Wagner, S, Fernández, D, Felderer, M, Vetrò, A, Kalinowski, M, Wieringa, R, ... & Lassenius, C (2019). Status quo in requirements engineering: A theory and a global family of surveys. ACM Transactions on Software Engineering and Methodology, Vol. 28, No. 2, pp9.

[35] Pacheco, C, García, I & Reyes, M. (2018). Requirements elicitation techniques: a systematic literature review based on the maturity of the techniques. IET Software, Vol. 12, No. 4, pp365-378.

[36] Sánchez, E & Macías, J (2019). A set of prescribed activities for enhancing requirements engineering in the development of usable e-Government applications. Requirements Engineering, Vol.24, No. 2, pp181-203.

[37] Cheng, BH& Atlee, JM (2007)"Research directions in requirements engineering", Proceeding of 2007 Future of Software Engineering (FOSE '07),pp285–303. http://doi.org/10.1109/FOSE.2007.17

[38] Lenberg P, Feldt R& Wallgren LG (2015) "Behavioral software engineering: A definition and systematic literature review", Journal of Systems and Software, Vol. 107,pp15–37. http://doi.org/10.1016/j.jss.2015.04.084

[39] Davis GB (1982) "Strategies for information requirements determination", IBM Systems Journal,Vol. 21, No. 1,pp4-30. http://dx.doi.org/10.1147/sj.211.0004

[40] Fernández DM, Wagner S, Kalinowski M, Felderer M, Mafra P, Vetrò A, Conte T, Christiansson MT, Greer D, Lassenius C & Männistö T (2017) "Naming the pain in requirements engineering", Empirical software engineering, Vol. 22, No. 5,pp2298-338. http://dx.doi.org/10.1007/s10664-016-9451-7

[41] Burnay C, Jureta IJ & Faulkner S (2014) "What stakeholders will or will not say: A theoretical and empirical study of topic importance in requirements engineering elicitation interviews", Information Systems, Vol. 46,pp61-81. http://dx.doi.org/ 10.1016/j.is.2014.05.006

[42] Goguen JA (1996) Formality and informality in requirements engineering. Second International Conference on Requirements Engineering,pp102–108. http://doi.ieeecomputersociety.org/10.1109/ICRE.1996.10005

[43] Halaweh M (2012) "Using grounded theory as a method for system requirements analysis", Journal of Information Systems and Technology Management,Vol. 9, No. 1,pp23-38. http://dx.doi.org/10.4301/S1807-17752012000100002

[44] Martin D & Sommerville I (2004) "Patterns of cooperative interaction: Linking ethno methodology and design", ACM Transactions on Computer-Human Interaction, Vol. 11, No. 1,pp59-89. https://doi.org/10.1145/986253.986260

[45] Coughlan J, Lycett M & Macredie RD (2003) "Communication issues in requirements elicitation: A content analysis of stakeholder experiences" ,Information and Software Technology, Vol. 45, No. 8,pp525-537. http://dx.doi.org/10.1016/S0950-5849(03)00032-6

[46] Khanom S, Heimbürger A & Kärkkäinen T (2015) "Can icons enhance requirements engineering work?",Journal of Visual Languages & Computing, Vol. 28,pp147–162. http://doi.org/10.1016/j.jvlc.2014.12.011

[47] Alsanoosy, T, Spichkova, M & Harland, J (2019). Cultural influence on requirements engineering activities: a systematic literature review and analysis. Requirements Engineering, pp1-24.

[48] Sedelmaier Y& Landes D (2017, April) "How can we find out what makes a good requirements engineer in the age of digitalization?", In Global Engineering Education Conference (EDUCON), 2017 IEEE, pp. 230-238. http://doi.org/10.1109/EDUCON.2017.7942853

[49] Al-Rawas A & Easterbrook S (1996) "Communication problems in requirements engineering: A field study", Proceedings of the First Westminster Conference on Professional Awareness in Software Engineering, London. Retrieved from https://ntrs.nasa.gov/archive/nasa/casi.ntrs.nasa.gov/19970005658.pdf

[50] Klendauer R, Berkovich M, Gelvin R, Leimeister JM& Krcmar H (2012) "Towards a competency model for requirements analysts", Information Systems Journal, Vol. 22, No. 6,pp475-503. https://doi.org/10.1111/j.1365-2575.2011.00395.x

An Analysis Of Software Requirements Specification Characteristics In Regulated Environments

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ABSTRACT

Requirements Engineering is the set of activities involved in creation, managing, documenting, and maintaining a requirements' set for a product. Engineering involves the use of systematic repeatability techniques to ensure that the Software Requirements are complete, consistent, valid, and verifiable. Software Requirements Specification is an organized process oriented toward defining, documenting and maintaining requirements throughout the development life cycle. Many authors suggest that requirements should always focus their claims on what the software product needs to address, without specifying how to implement them. However, the detail of Software Requirements is influenced by several factors such as: organizational thinking; existing specification standards; and regulatory needs. This work fits exactly with regulatory needs, where the characteristics of Software Requirements Specification in Regulated Environments such as aeronautics, railways and medical are presented and explored. This paper presents and analysis of software requirements specification characteristics in regulated environments. The four characteristics identified are: consistency (internal and external), unambiguity, verifiability, and traceability. The paper also describes the three standards used in these regulated environments (RTCA DO-178C, IEC 62279 and IEC 62304) and examines their similarities and differences from a Requirements Specification standpoint. The similarities and differences will be used to address a future requirements framework universal process that can be configured to address each standard by the usage of Software Process Lines.

KEYWORDS

Software, Requirements, Certification, Standards

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REFERENCES

[1] Marques, J., Cunha, A.M. (2015) "Use of the RTCA DO-330 in Aeronautical Databases". In: Proceedings of the 34th IEEE/AIAA Digital Avionics System Conference. United States.

[2] Marques, J., Cunha, A.M. (2018) "Tailoring Traditional Software Life Cycles to Ensure Compliance of RTCA DO-178C and DO-331 with Model-Driven Design". In: Proceedings of the 37th IEEE/AIAA Digital Avionics System Conference. United States.

[3] Fatwanto, A. (2012) "Translating software requirements from natural language to formal specification". In: Proceedings of the 2012 IEEE International Conference on Computational Intelligence and Cybernetics (CyberneticsCom). Indonesia.

[4] Ilyas, F., Zahra, K., Ambreen, N., Butt, W. (2016) "A Survey on Current Requirement Process Practices in Software Companies and Requirement Process Problems". In: Proceedings of the 2016 International Conference on Computational Science and Computational Intelligence (CSCI). United States.

[5] Sabrye, A.O.J., Zaainon, W.M.N.W. (2017) "A framework for detecting ambiguity in software requirement specification". In: Proceedings of the 2017 8th International Conference on Information Technology (ICIT).

[6] Munch, J., Armbrunt, O., Kowalczyk, M., Soto, M. (2012) Software Process Definition and Management. 1st edn. Springer-Verlag, Germany.

[7] Radio Technical Commission for Aeronautics (2011) DO-178C - Software Considerations in Airborne Systems and Equipment Certification.

[8] International Electrotechnical Commission (2015) IEC 62279:2015 Railway applications – Communications, signaling and processing systems – Software for railway control and protection systems.

[9] International Electrotechnical Commission (2015) IEC 62304:2015 Medical device software - Software life-cycle processes.

[10] Marques, J., Cunha, A.M. (2013) "A Reference Method for Airborne Software Requirements". In: Proceedings of the 32nd IEEE/AIAA Digital Avionics System Conference. United States.

[11] Marques, J., Cunha, A.M. (2017) Especificação de Requisitos de Software: Um Modelo Ágil para Ambientes Regulados. 1 st edn. Novas Edições Acadêmicas, Brazil.

[12] Radio Technical Commission for Aeronautics (2011) DO-278A - Software Integrity Assurance Considerations for Communication, Navigation, Surveillance and Air Traffic Management (CNS/ATM) Systems.

[13] International Standardization Organization (2011) ISO26262-6 Road vehicles – Functional safety – Part 6: Product development at the software level.

[14] European Cooperation for Safety Standardization (2009) ECSS-E-ST-40C Space Engineering – Software.

[15] International Atomic Energy Agency (2016) Specific Safety Guidance SSG-39: Design of Instrumentation and Control Systems for Nuclear Power Plants.

[16] Marques, J., Cunha, A.M. (2017) "Verification Scenarios of Onboard Databases under the RTCA DO-178C and the RTCA DO-200B". In: Proceedings of the 36th IEEE/AIAA Digital Avionics System Conference.

[17] Federal Aviation Administration (2018) AC20-115D Airborne Software Development Assurance Using EUROCAE ED-12( ) and RTCA DO-178( ).

[18] Society of Automotive Engineers (2010) ARP 4754 - Guidelines For Development Of Civil Aircraft and Systems.

[19] Yelisetty, S.M.H., Marques, J., Tasinaffo, P. (2015) "A Set of Metrics to Assess and Monitor Compliance with RTCA DO-178C". In: Proceedings of the 34th IEEE/AIAA Digital Avionics System Conference.

[20] Radio Technical Commission for Aeronautics (2011) DO-330 - Software Tool Qualification and Considerations.

[21] Radio Technical Commission for Aeronautics (2011) DO-331 - Model-Based Development and Verification Supplement to DO-178C and DO-278A.

[22] Radio Technical Commission for Aeronautics (2011) DO-332 - Object-Oriented Technology and Related Techniques Supplement to DO-178C and DO-278A.

[23] Radio Technical Commission for Aeronautics (2011) DO-333 - Formal Methods Supplement to DO-178C and DO-278A.

[24] Rierson, L.: Developing Safety-Critical Software (2013) A Practical Guide for Aviation Software and DO-178C Compliance. CRC Press, United States.

[25] European Aviation Safety Agency (2011) Certification Memo SW-CEH 002. Germany.

[26] Joung, E. J., Lee C. M., Lee H. M., Kim G. D. (2009) "Software Safety Criteria and Application Procedure for the Safety Critical Railway System". In: Proceedings of the 2009 Transmission & Distribution Conference & Exposition: Asia and Pacific, pp: 1-4. South Korea.

[27] Chen, T. (2017) "Non-safety-related software in the context of railway RAMS standards". In: Proceedings of the Second International Conference on Reliability Systems Engineering (ICRSE), pp: 1-5. China.

[28] Wigger, T. (2001) "Experience with Safety Integrity Level (SIL) Allocation in Railway Applications". In: Proceedings of the World Congress Railway Research.

[29] Magnuson, A. (2012) IEC/ISO 62304 Regulations for the Development of Medical Software Devices. Master's Thesis Chalmers University of Technology. Sweden.

[30] Marques, J., Cunha, A (2019) ARES: An Agile Requirements Specification Process for Regulated Environments. In: International Journal of Software Engineering and Knowledge Engineering Vol. 29, No. 10, World Scientific Publishing Company, pp: 1403-1438.

[31] Institute of Electrical and Electronics Engineers (1998) IEEE 830-1998 - IEEE Recommended Practice for Software Requirements Specifications.

[32] International Standardization Organization (2011) ISO/IEC/IEEE 29148:2011 ISO/IEC/IEEE International Standard - Systems and software engineering -- Life cycle processes --Requirements engineering.

[33] Dick, J., Hull, E., Jackson, K. (2017) Requirements Engineering. 4th edn. Springer. United States.

[34] Laplante, P. (2013) Requirements Engineering for Software and Systems, 3rd edn. CRC Press. United States.

[35] Lauesen, S. (2002) Software Requirements – Styles and Techniques. 1st edn. Pearson. United Kingdom.

[36] Gotel, O. C. Z., Finkelstein, C. W. (1994) "An analysis of requirements traceability problem". In: Proceedings of the IEEE International Conference on Requirements Engineering. United States.

[37] de Jong T. (2010) "Cross case analysis: Relating the empirical findings". In: Linking social capital to knowledge productivity. Germany.

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Understanding The Characteristics, Benefits And Challenges Of Agile It Project Management: A Literature Based Perspective

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ABSTRACT

The objectives of this study was to bring out the understanding of the concept of agile IT project management; what it is and what it is not. It was also aimed at comparing the pros and cons of both agile and traditional methods of IT project management in a typical industry setting; the challenges of going purely agile, and so on. It is purely a review of literature of peer reviewed papers sourced mainly from Google Scholar. It was revealed that agile outweigh the traditional methods in terms of benefits, but its implementation poses a lot of challenges due to a number of issues, paramount among them being organizational culture and empowerment of the project team. This has resulted in a number of industries sticking to the traditional methods despite the overwhelming benefits of agile. In another school of thought, the combination of the two paradigms is the way forward.

KEYWORDS

Project Management, Scrum, Agile, Software, Traditional

REFERENCES

[1] M. Bowles Jackson, "Agile: a decade in. PM Network," 26 (4), 58-62, 2012.

[2] M. Sliger, "Agile project management with Scrum", Paper presented at PMI® Global Congress 2011—North America, Dallas, TX. Newtown Square, PA: Project Management Institute, 2011.

[3] F. H. Cervone, "MANAGING DIGITAL LIBRARIES: THE VIEW FROM 30,000 FEET," Understanding agile project management methods using Scrum. OCLC Systems & Services: International digital library perspectives Vol. 27 No. 1, 2011 pp. 18-22 q Emerald Group Publishing Limited 1065-075X DOI 10.1108/10650751111106528, 2010.

[4] S. Hastie, "The Agile Mindset: what does it take to make this stuff work?" Software Education Associates Ltd, Agile Development Conference Wellington & Sydney, September 2004

[5] H. Berger and P. Beynon-Davies, "The utility of rapid application development in large-scale, complex projects," Information Systems Journal. 19 (6), 549– 570, 2009.

[6] I. Doherty, "Agile project management for e-learning developments". Journal of Distance Education. 24 (1), 91-106, 2010.

[7] W. Gonzalez, "Agile Project Management and the Creation of Intellectual Property". PhD dissertation. University of Maryland University College, 2011

[8] S. Aljaž, "AGILE PROJECT MANAGEMENT – A FUTURE APPROACH TO THE MANAGEMENT OF PROJECTS?" Dynamic Relationships Management Journal, 2013.

[9] S. Aljaž, "Agile Project Management in Product Development Projects". ScienceDirect. Elsevier. Procedia - Social and Behavioral Sciences 119, 295 – 304, 2014.

[10] L. Vikash, K. Somveer and P. Sameerchand,"PEOPLE FACTORS IN AGILE SOFTWARE DEVELOPMENT AND PROJECT MANAGEMENT". International Journal of Software Engineering & Applications (IJSEA), Vol.3, No.1, January 2012

[11] Agile Manifesto, "The Agile Manifesto," [Online]. Available: www.Agilemanifesto.org. [Accessed: 26th August 2019)

[12] A. Bustamante and R. Sawhney, "Agile XXL: Scaling Agile for Project Teams," Seapine Software, Inc., 2011.

[13] S. Jeff, "The roots of Scrum: How Japanese Manufacturing Changed Global Software Development Practices," JAOO, Aarhus, Denmark, 2005.

[14] R. Hoda, J. Noble, and S. Marshall, "Agile Project Management". In J. Holland, A. Nicholas, & D. Brignoli (Eds.), New Zealand Computer Science Research Student Conference, NZCSRSC 2008 - Proceedings (pp. 218-221). Christchurch, New Zealand. Retrieved from https://nzcsrsc08.canterbury.ac.nz/site/proceedings/NZCSRSC_2008_Proceedings.pdf

[15] D. Brandon, "Project management for modern information systems". Hershey: IRM Press, 2006.

[16] R. D. Gibbs, "Outsourcing and the IBM rational unified process". Upper Saddle River: IBM Press, 2006.

[17] L. M. Meade and J. Sarkis, "Analyzing organizational project alternatives for agile manufacturing processes: an analytical network approach". International Journal of Production Research. 37(2), 241-261, 1999.

[18] R. Thomsett, "Radical project management," Upper Saddle River (NJ): Prentice Hall PTR, 2002.

[19] J. Rothman, "Manage it. Dallas: The Pragmatic Bookshelf," 2007.

[20] B. W. Boehm and R. Turner, "Balancing Agility and Discipline: A Guide For The Perplexed", Addison-Wesley, Boston; London, 2005.

[21] B. Boehm, R. Turner, "Management Challenges to Implementing Agile Processes in Traditional Development Organizations". IEEE Software. 22(5), 30-39, 2005.

[22] L. Lindstrom and R. Jeffries, "Extreme programming and agile software development methodologies", Information Systems Management. 21 (3), 41-52, 2004.

[23] K. Forsberg, H. Mooz and H. Cotterman, "Visualizing Project Management," Hoboken: John Wiley & Sons, 2005

[24] D. Tore and D. Torgeir, "What Do We Know about Agile Software Development?" Voice of Evidence, IEEE Computer Society, 2009.

[25] N. Sridhar, M. RadhaKanta and M. George, "Challenges of Migrating to Agile Methodologies". COMMUNICATIONS OF THE ACM, Vol. 48, No. 5, May 2005.

[26] A. Mikio, "Web-Based Agile Software Development," EE Software, 1998.

[27] E. Whitworth, "Agile Experience: Communication and Collaboration in Agile Software Development Teams," M.A Carleton University, Canada, 2006.

[28] G. J. Miller, "Agile problems, challenges, & failures". Paper presented at PMI® Global Congress 2013—North America, New Orleans, LA. Newtown Square, PA: Project Management Institute, 2013.

[29] The Standish Report, "The CHAOS Report 2009 on IT Project Failure," [Online]. Available: https://pmhut.com/the-chaos-report-2009-on-it-project-failure [Accessed: 26th August 2019)

[30] S. W. Ambler, "2010 IT Project Success Survey". [Online]. Available: http://www.ambysoft.com/surveys/success2010.html. [Accessed: 20th July 2019], 2010a.

[31] D. G. Ancona and D. F. Caldwell, "Work-groups; Organizational-climate; Organizational effectiveness," Administrative Science Quarterly. 37(??)p. 634-65, 1992.

[32] P. Abilla, "Team Dynamics: Size Matters Redux". [Online]. Available: http://www.shmula.com/team-dynamics-size-matters-redux/182/. [Accessed: 27th April 2019]

[33] S. Pedro and K. P. Jeffrey, "Does Agile work? — A quantitative analysis of agile project success," International Journal of Project Management, Elsevier, ScienceDirect, 33, 1040–1051, 2015.

[34] S. Jim and L. Julien, "Factors associated with the software development agility of successful projects," International Journal of Project Management, SciVerse, ScienceDirect. Elsevier, 31, 459–472, 2013.

Analysis Of Gamification Elements To Explore Misinformation Sharing Based On U&G Theory: A Software Engineering Perspective

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ABSTRACT

Gamification elements provide apersonal drive to urge user experience, emotion, fun, and engagement, positively or negatively. These gamification elements may have been unintentionally employed through the designand implementation processof social media platforms to encourage users' behaviour towards misinformation sharing. This study intends to answer the subsequent question" What are the mostly used gamification elements that could possibly encourage users to share misinformation on social media platforms?". The study empirically investigates the usage of gamification elements and their relation to U&G theory with 286 participants. The results indicated that gamification elements usage scored high with regard tothe self-expression perspective (frequency=216), as well as the interaction & collaborations perspective (frequency=198). Whereas, the information seeking perspective scored low (frequency=59) and leaderboard were the least usage(frequency=43). The results may be useful to guide software engineering, developers, GUI specialists to cater for design elements settings and their possible negative effects in social media contexts.

KEYWORDS

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REFERENCES

[1] X. Chen, and S. Sin, "Misinformation? What of it?'Motivations and individual differences in misinformation sharing on social media," Proceedings of the Association for Information Science and Technology, Vol. 50(1), 2013.

[2] N. A. Karlova, and K. E. Fisher, "A social diffusion model of misinformation and disinformation for understanding human information behavior. Information Research," Vol. 18 (1), Retrieved from http://informationr.net/ir/18-1/paper573.html, 2013.

[3] O. Oh, M. Agrawal, and H. Rao, "Community intelligence and social media services: a rumor theoretic analysis of tweets during social crises," MIS Quarterly, Vol.37(2), 2013.

[4] K. Starbird, J. Maddock, M. Orand, P. Achterman, and R. Mason, R, "Rumors, false flags, and digital vigilantes: Misinformation on Twitter after the 2013 Boston marathon bombing," iConference Proceedings, 2014.

[5] C. Ross, E. Orr, M. Sisic, M. Jaime, J. Michelle, and M. Simmering, "Personality and motivations associated with Facebook use," Computers in Human Behavior, Vol. 25 (2009),2019.

[6] World Economic Forum, "Top 10 trends of 2014. The rapid spread of misinformation online," Retrived from http://bit.ly/1edZQQF, 2014.

[7] C. Budak, D. Agrawal, and A. Abbadi, "Limiting the spread of misinformation in social networks," Proceedings of the 20th International Conference on World Wide Web, pp. 665–674, 2011.

[8] X. Chen, "The influences of personality and motivation on the sharing of misinformation on social media," IConference Proceedings,2016.

[9] S. Deterding, D. Dixon, R. Khaled, and I. Nacke, "From game design elements to gamefulness: defining gamification," in Proceedings of the 15th International Academic MindTrek Conference: Envisioning Future Media Environments, 2011.

[10] P. Herzig, M. Ameling, and A. Schill, "A Generic Platform for Enterprise Gamification," In Proceedings of Software Architecture (WICSA) and European Conference on Software Architecture, (pp. 219-223), 2012.

[11] S. Nicholson, "A user-centered theoretical framework for meaningful gamification," Games Learning Society, Vol. 8(1), 2012.

[12] S. O'Donovan, J. Gain, and P. Marais,"A case study in the gamification of a university-level games development course," In Proceedings of the South African Institute for Computer Scientists and Information Technologists Conference, 2013.

[13] J. Simões, R. Redondo, and A. Vilas, "A social gamification framework for a K-6 learning platform," Computers in Human Behavior, Vol. 29(2), 2013.

[14] K. Robson, K. Plangger, J. Kietzmann, I. McCarthy, and L. Pitt, "Game on: Engaging customers and employees through gamification," Business Horizons, Vol. 59(1), 2016.

[15] L. Rodrigues, A. Oliveira, and C. Costa, "Playing seriously - How gamification and social cues influence bank customers to use gamified e-business applications," Computers in Human Behavior, Vol. 63, 2016.

[16] F. Dalpiaz, R. Snijders, S. Brinkkemper, M. Hosseini, A. Shahri, and R. Ali, "Engaging the crowd of stakeholders in requirements engineering via gamification," Springer International Publishing,2017.

[17] P. Sweetser, and P. Wyeth, P. "Game Flow: A model for evaluating player enjoyment in games," Computation Entertain-Theoretical Practical Computation Applications Entertain, Vol.3(3), 2005.

[18] A. Halavais, "A genealogy of badges: Inherited meaning and monstrous moral hybrids," Information, Communication and Society, Vol.15(3), 2012.

[19] F. Garcia, O. Pedreira, M. Piattini, and M. Penabad, "A framework for gamification in software engineering," The Journal of Systems and Software, Vol. (132), 2017.

[20] Y. Yang, A. Yousra, and D. Yogesh, "Examining the impact of gamification on intention of engagement and brand attitude in the marketing context," Computers in Human Behavior, Vol. (73), 2017.

[21] C. Lee, and L. Ma, "News sharing in social media: The effect of gratifications and prior experience," Computers in Human Behavior, Vol. 28(2), 2012.

[22] N. Park, K. Kee, and S. Valenzuela, "Being immersed in social networking environment: Facebook groups, uses and gratifications, and social outcomes," Cyber Psychology & Behavior, Vol. 12(6), 2009.

[23] G. Shao, G. "Understanding the appeal of user-generated media: A uses and gratification perspective," Internet Research, Vol. 19(1), 2009.

[24] O. Nov, M. Naaman, and C. Ye, "Analysis of participation in an online photo-sharing community: A multidimensional perspective," Journal of the American Society for Information Science and Technology, Vol. 61(3), 2009.

[25] J. Kim, M. Kim, and Y. Nam, "An analysis of self-construal, motivations, Facebook use, and user satisfaction," International Journal of Human Computer Interaction, Vol. 26(11–12), 2010.

[26] A. Dorling, and F. McCaffery, "The gamification of SPICE," International Conference on Software Process Improvement and Capability Determination, Springer, 2012.

[27] T. J. Brigham, "An Introduction to Gamification: Adding Game Elements for Engagement,"Medical Reference Services Quarterly, Vol. 34(4), 2015.

[28] R. Silverman, R. "Latest game theory: mixing work and play," Wall Street Journal, 2011.

[29] Y. Xu, "Literature review on web application gamification and analytics," Honolulu, HI, pp.11-05, 2011.

[30] K. Charmaz, "Constructing grounded theory: A practical guide through qualitative analysis," 2nd ed. London: Sage, 2006.

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Introducing Refined Agile Model (Ram) In The Context Of Bangladesh's Software Development Environment Concentrating On The Improvement Of Requirement Engineering Process

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ABSTRACT

The Software Companies of Bangladesh are using different types of agile models for software development. Although theoretically these models are worthy for small and medium projects, in practical case they are not so effective. In doing so, this paper tries to find out why do the agile models not suitable for Bangladesh's Software Companies and how do the problems that the Software Companies face for using the models can be solved. To reveal the answers, this study is based on survey and interview methods. Findings of this paper show that Bangladesh's Software Companies are facing different problems for implementing traditional agile models, such as, Communicational gap, lack of Documentation, unavailability of Prototype, Customer's lack of knowledge in the area of IT and many more. The study shows that if the Requirement Engineering Process is perfectly managed and some rules are modified in the traditional agile models, these problems can be solved. In doing so, a new model has been proposed by the study named Refined Agile Model (RAM) which is claimed to be better for Bangladesh rather than the traditional Agile Models. This model proposes a process flow which consists of Prototyping Cycle, Development Iteration Cycle and Additional Development Iteration Cycle. This new model also ensures a Requirement Engineer at Client End, sufficient documentation, preparation of prototype and presentation of frequent Demos. After ensuring these requirements in several real time projects, it was found that those projects were completed more effectively compared to all other old project experiences. Eventually, the paper concludes by mentioning that the Refined Agile Model (RAM) is the best model in the Bangladeshi software environment.

KEYWORDS

Agile methodology, Requirement engineering process, Software development life cycle.

REFERENCES

[1] Moretaza, T. (2016) Ensuring priority for local Software Companies first challenge. The Independent. [Online] 27th June. p.14. Available from: http://www.theindependentbd.com/post/49371. [Accessed: 03rd July 2016].

[2] BASIS (2016) BASIS Members Directory 2016. [Online] Available from: http://www.basis.org.bd/index.php/members_area. [Accessed: 28th July 2016].

[3] A. Tiwana, and M. Keil, "The one minute risk assessment tool," Communications of the ACM, 2004.

[4] M. Ben-Menachem, Software Configuration Management Guidebook, McGraw-Hill International (UK) Limited, 1994.

[5] C. Jones, Software Engineering Best Practices: Lessons from Successful Projects in the Top Companies, McGraw-Hill Osborne Media, 1st ed., 2009.

[6] K. Wiegers, Software Requirements, Microsoft Press. 1999.

[7] M. Sudhakar. Managing the Impact of Requirements Volatility. Master Thesis. Department of Computing Science, Umeå University, Umeå, Sweden. 2005.

[8] V. Rajlich, "Changing the paradigm of software engineering," Communications of the ACM, vol. 49, no. 8, August 2006.

[9] Costello, R. and Liu, D. (1995), "Metrics for Requirements Engineering": Journal of Systems and Software, Vol 29 (No. 1), pp. 39-63 MIL-STD-498. 1994. Software [10]Development and Documentation. U.S. DoD.

[11] T. JavedManzil, M. Quiser, and S. Durrani, "A study to investigate the Impact of requirements Instability on Software Defects", ACM SIGSOFT Software Engineering Notes, 29 (3), May 2004, pp:1-7.

[12] Zowghi, N. Nurmuliani, A study of the Impact of requirements volatility on Software Project Performance, Proceedings of the Ninth Asia-Pacific Software Engineering [13]Conference , APSEC 2002, Gold Cost, Queensland, Australia,04-06 Dec 2002, pp:3-11.

[14] Lamsweerde, A. Requirements Engineering in the Year 00: A research perspective. In proceeding of the 22nd International conference on Software Engineering (ICSE'2000), Limerick, Ireland, 5-19, ACM Press.

A Literature Survey Of Cognitive Complexity Metrics For State chart Diagrams

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ABSTRACT

Statechart diagrams have inherent complexity which keeps increasing every time the diagrams are modified. This complexity poses problems in comprehending statechart diagrams. The study of cognitive complexity has over the years provided valuable information for the design of improved software systems. Researchers have proposed numerous metrics that have been used to measure and therefore control the complexity of software. However, there is inadequate literature related to cognitive complexity metrics that can apply to measure statechart diagrams. In this study, a literature survey of statechart diagrams is conducted to investigate if there are any gaps in the literature. Initially, a description of UML and statechart diagrams is presented, followed by the complexities associated with statechart diagrams and finally an analysis of existing cognitive complexity metrics and metrics related to statechart diagrams. Findings indicate that metrics that employ cognitive weights to measure statechart diagrams are lacking.

KEYWORDS

UML, Statechart diagrams, Software metrics, Cognitive complexity metrics, statechart complexity metrics

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REFERENCES

[1] Anwer, S., & El-Attar, M. (2014). An evaluation of the statechart diagrams visual syntax. *In 2014 International Conference on Information Science and Applications (ICISA) (pp. 1-4).* IEEE.

[2] Briand, L. C., Bunse, C. & Daly, J. W. (2001). A controlled Experiment for Evaluating Quality Guidelines on Maintainability of Object Oriented Design. *IEEE Transactions on Software Eng*.2 (6): 513–530.

[3] Cruz-Lemus, J. A., Genero, M., Manso, M. E., Morasca, S., & Piattini, M. (2009). Assessing the understandability of UML statechart diagrams with composite states—A family of empirical studies. *Empirical Software Engineering*, *14*(6), 685-719.

[4] Daljeet, S., & Lavleen, K. (2012). Analyzing the Cohesion and Coupling of Statechart Diagrams using Program Slicing Techniques. *International Journal of Computer Science and Technology*,3, 69-72.

[5] Dori, D., Wengrowicz, N., & Dori, Y. J. (2014). A comparative study of languages for model-based systems-of-systems engineering (MBSSE). In *2014 World Automation Congress (WAC)* (pp. 790- 796). IEEE.

[6] Fahad A. (2012). State Based Static and Dynamic Formal Analysis of UML State Diagrams. *Journal of Software Engineering and Applications*, 5, 483-491.

[7] Fitsilis, P., Gerogiannis, V. C., & Anthopoulos, L. (2013). Role of Unified Modelling Language in Software Development in Greece-results from an exploratory study. *IET Software*, 8(4), pp. 143-153.

[8] Genero, M., Miranda, D., & Piattini, M. (2003). Defining Metrics for UML Statechart Diagrams in a Methodological way. *In International Conference on Conceptual Modelling*, (pp.118-128).

[9] IEEE Standard 1061 (1992). Standard for a Software Quality Metrics Methodology. *Institute of Electrical and Electronics Engineers*. New York.

[10] Jakhar, A.K & Rajnish, K. (2014). A new cognitive approach to measure the complexity   of software's. *International Journal of Software Engineering & its Applications*, vol. 8, no. 7, pp. 185- 198.

[11] Jakhar, A. K., & Rajnish, K. (2015). Measurement of complexity and comprehension of a program through a cognitive approach. *International Journal of Engineering-Transactions   B: Applications*, *28*(11), 1579-1588.

[12] Jamal, M., & Zafar, N. A. (2016). Formalizing structural semantics of UML 2.5 activity diagram in Z Notation. In *2016 International Conference on Open Source Systems & Technologies (ICOSST)* (pp. 66-71). IEEE.

[13] Jama, O.M., (2009). *A Case Study on Evaluating UML Modelling in Software Testing (Master's thesis, University of OSLO).*

[14] Kumar, A., & Khalsa, S. K. (2012). Determine cohesion and coupling for class diagram through slicing techniques. *IJACE*, *4*(1), 19-24.

[15] Kushwaha, D. S. & Misra, A. K., (2006). Robustness Analysis of Cognitive Information Complexity Measure using Weyuker Properties. *ACM SIGSOFT Software Engineer Notes*, 31(1), 1–6.

[16] Maheswaran, K., & Aloysius, A. (2017). An Analysis of Object Oriented Complexity Metrics. *International Journal of Scientific Research in Computer Science, Engineering and Information Technology*, 2, 768-775.

[17] Maylawati, D. S., Darmalaksana, W., & Ramdhani, M. A. (2018). Systematic design of expert system using unified modelling language. In *IOP Conference Series: Materials Science and Engineering* (Vol. 288, No. 1, p. 012047).

[18] Miles, R. & Hamilton, K. (2006). *Learning UML 2.0.* "O'Reilly Media, Inc.".

[19] Misra, S. (2004). Evaluating cognitive complexity measure with Weyuker's properties. *3rd IEEE International Conference on Cognitive Informatics (ICCI'04)*: 103-108.

[20] Misra, S. (2006). Modified cognitive complexity measure.*LNCS* 4263: 1050-1059.

[21] Misra, S. (2007a). Cognitive program complexity measure. *6th IEEE International Conference on Cognitive Informatics*: 120-125.

[22] Misra, S. (2011). Cognitive complexity measures: An analysis. *Modern Software Engineering Concepts and Practices: Advanced Approaches,* (pp. 263-279), IGI Global.

[23] Misra, S., Adewumi, A., Fernandez-Sanz, L., & Damasevicius, R. (2018). A Suite of Object Oriented Cognitive Complexity Metrics. *IEEE Access*, 6, 8782–8796.

[24] Muketha, G.M. (2011). *Size and complexity metrics as indicators of maintainability of business process execution language process models* (Doctoral dissertation, Universiti Putra Malaysia).

[25] OMER, O. S. D., & Sahraoui, A. E. (2017). From Requirements Engineering to UML using Natural Language Processing–Survey Study.

[26] Rambaugh, J., Jacobsen, I. & Booch, G. (2005). The Unified Modelling Language Reference Manual, second Edition. Pearson Higher Education.

[27] Siau, K., & Loo, P.P. (2006). Identifying difficulties in learning UML. *Information Systems Management*, 23(3), 43-51.

[28] Sikka, P., & Kaur, K. (2016). Mingling of Program Slicing to Designing Phase. *Indian Journal of Science and Technology*, *9*(44).

[29] UML, O. (2012a). Information technology-Object Management Group Unified Modelling Language (OMG UML), Infrastructure.

[30] Wang, Y. & Shao J., (2003). A new Measure of Software Complexity Based on Cognitive Weights. *Journal of Electrical and Computer Engineering*, 28(2), 69-74.

[31] Wang, Y. (2004). On the Cognitive Informatics Foundations of Software Engineering. *In Proceedings of the Third IEEE International Conference on Cognitive Informatics*, pp. 22-31.

[32] Zafar, N. A. (2013). Model analysis of equivalence classes in UML events relations. *Journal of Software Engineering and Applications*, *6*(12), 653.

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Software Requirement Change Effort Estimation Model Prototype Tool For Software Development Phase

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ABSTRACT

In software development phase software artifacts are not in consistent states such as: some of the class artifacts are fully developed some are half developed, some are major developed, some are minor developed and some are not developed yet. At this stage allowing too many software requirement changes may possibly delay in project delivery and increase development budget of the software. On the other hand rejecting too many changes may increase customer dissatisfaction. Software change effort estimation is one of the most challenging and important activity that helps software project managers in accepting or rejecting changes during software development phase. This paper extends our previous works on developing a software requirement change effort estimation model prototype tool for the software development phase. The significant achievements of the tool are demonstrated through an extensive experimental validation using several case studies. The experimental analysis shows improvement in the estimation accuracy over current change effort estimation models.

KEYWORDS

Software Change Effort Estimation, Software Requirement Changes, Change Impact Analysis and Software Development Phase.

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REFRENCES

[1]   J. Shah and N. Kama, "Extending Function Point Analysis Effort Estimation Method for Software Development Phase," presented at the Proceedings of the 2018 7th International Conference on Software and Computer Applications, Kuantan, Malaysia, 2018.

[2]   J. Shah, N. Kama, and N. A. A. Bakar, "ANovel EFFORT ESTIMATION MODEL FOR SOFTWARE REQUIREMENT CHANGES DURING SOFTWARE DEVELOPMENT PHASE," 2018.

[3]   N. K. b. Jalal Shah*a, Amelia Zahari, "AN EMPIRICAL STUDY WITH FUNCTION POINT ANALYSIS FOR REQUIREMENT CHANGES DURING SOFTWARE DEVELOPMENT PHASE," in ASIA International Multidisciplinary Conference 2017, Johor Bharu, 2017.

[4]   N. K. Jalal Shah, Saiful Adli Ismail, "An Empirical Study with Function Point Analysis for Software Development Phase Method," presented at the 2018 7th International Conference on Software and Information Engineering (ICSIE 2018), Cairo, Egypt, 2018.

[5]   S. Basri, N. Kama, and R. Ibrahim, "A Novel Effort Estimation Approach for Requirement Changes during Software Development Phase," International Journal of Software Engineering and Its Applications, vol. 9, pp. 237-252, 2015.

[6]   O. Fedotova, L. Teixeira, and H. Alvelos, "Software Effort Estimation with Multiple Linear Regression: Review and Practical Application," J. Inf. Sci. Eng., vol. 29, pp. 925-945, 2013.

[7]   A. Idri, M. Hosni, and A. Abran, "Systematic literature review of ensemble effort estimation," Journal of Systems and Software, vol. 118, pp. 151-175, 8// 2016.

[8]   A. Idri, F. a. Amazal, and A. Abran, "Analogy-based software development effort estimation: A systematic mapping and review," Information and Software Technology, vol. 58, pp. 206-230, 2// 2015.

[9]   M. Kaur and S. K. Sehra, "Particle swarm optimization based effort estimation using Function Point analysis," in Issues and Challenges in Intelligent Computing Techniques (ICICT), 2014 International Conference on, 2014, pp. 140-145.

[10] B. Sufyan, K. Nazri, H. Faizura, and A. I. Saiful, "Predicting effort for requirement changes during software development," presented at the Proceedings of the Seventh Symposium on Information and Communication Technology, Ho Chi Minh City, Viet Nam, 2016.

[11] V. K. Bardsiri, D. N. A. Jawawi, A. K. Bardsiri, and E. Khatibi, "LMES: A localized multi-estimator model to estimate software development effort," Engineering Applications of Artificial Intelligence, 2013.

[12] A. Hira, S. Sharma, and B. Boehm, "Calibrating COCOMO® II for projects with high personnel turnover," presented at the Proceedings of the International Conference on Software and Systems Process, Austin, Texas, 2016.

[13] F. Ferrucci, C. Gravino, and L. Lavazza, "Simple function points for effort estimation: a further assessment," presented at the Proceedings of the 31st Annual ACM Symposium on Applied Computing, Pisa, Italy, 2016.

[14] A. J. Albrecht, "AD/M productivity measurement and estimate validation," IBM Corporate Information Systems, IBM Corp., Purchase, NY, 1984.

[15] P. Vickers and C. Street, "An Introduction to Function Point Analysis," School of Computing and Mathematical Sciences, Liverpool John Moores University, Liverpool, UK, 2001.

[16] V. Anandhi and R. M. Chezian, "Regression techniques in software effort estimation using cocomo dataset," in Intelligent Computing Applications (ICICA), 2014 International Conference on, 2014, pp. 353-357.

[17] J. Shah and N. Kama, "Issues of Using Function Point Analysis Method for Requirement Changes During Software Development Phase.," presented at the Asia Pacific Requirements Engeneering Conference, Melaka Malaysia, 2018.

[18] B. W. Boehm, Software Cost Estimation with Cocomo II: Prentice Hall, 2000

[19] S. Basri, N. Kama, and R. Ibrahim, "COCHCOMO: An extension of COCOMO II for Estimating Effort for Requirement Changes during Software Development Phase," 2016.

[20] D. Kchaou, N. Bouassida, and H. Ben-Abdallah, "UML models change impact analysis using a text similarity technique," IET Software, vol. 11, pp. 27-37, 2017.

[21] Asl and Kama, "A Change Impact Size Estimation Approach during the Software Development," in 2013 22nd Australian Software Engineering Conference, 2013, pp. 68-77.

[22] B. Sufyan, K. Nazri, A. Saiful, and H. Faizura, "Using static and dynamic impact analysis for effort estimation," IET Software, vol. 10, pp. 89-95, 2016.

[23] N. Kama and F. Azli, "A Change Impact Analysis Approach for the Software Development Phase," presented at the Proceedings of the 2012 19th Asia-Pacific Software Engineering Conference - Volume 01, 2012.

[24] Kama and M. Halmi, "Extending Change Impact Analysis Approach for Change Effort Estimation in the Software Development Phase," in WSEAS International Conference. Advances in Computer Engineering Series, 2013. Proceedings. Recent

[25] J.-M. Desharnais and A. Abran, "Approximation techniques for measuring function points," in Proceedings of the 13th international workshop on software measurement (IWSM 2003), 2003.

[26] Q. S. Management. (2018, 10/04/2018). Function Point Languages Table (5th version ed.). Available: http://www.qsm.com/resources/function-point-languages-table

[27] K. Usharani, V. V. Ananth, and D. Velmurugan, "A survey on software effort estimation," in 2016 International Conference on Electrical, Electronics, and Optimization Techniques (ICEEOT), 2016, pp. 505-509.

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Developing And Implementing A Web-Based Recycling System For Protecting The Green Environment

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ABSTRACT

Our society suffers a lot from the things that are thrown uselessly; these things may be beneficial to our society. On the other hand, communities suffer a lot of waste especially plastic waste; this has led to environmental pollution and depletion of natural resources. Therefore, this research aims to achieve sustainable development and achieve part of the Saudi Arabia vision 2030. Hence we have distributed a questionnaire to 88 responders, and based on the results of this study, which shows the importance of recycling and its impact on the environment and the extent of community interest in this subject and their supporters, The Let's Recycle site, based on the results of the questionnaire, will improve waste and plastics disposal in an environmentally positive manner.The proposed system was developed using the Unified Modelling Language (UML) and Microsoft Visual Studio2010 programming language.

KEYWORDS

Recycling System, Green Environment, Technology, Software Engineering and Unified Modelling Language.

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REFERENCES

[1] C. M. Rochman, M. A. Browne, B. S. Halpern, B. T. Hentschel, E. Hoh, H. K. Karapanagioti, L. M. Rios-Mendoza, H. Takada, S. Teh, and R. C. Thompson, "Policy: Classify plastic waste as hazardous," Nature, vol. 494, p. 169, 2013.

[2] N. Saikia and J. De Brito, "Use of plastic waste as aggregate in cement mortar and concrete preparation: A review," Construction and Building Materials, vol. 34, pp. 385-401, 2012.

[3] M. A. Kamaruddin, M. S. Yusoff, N. Ibrahim, and M. H. Zawawi, "Resource recovery from municipal solid waste by mechanical heat treatment: An opportunity," Proceedings, 2017, p. 020031. in AIP Conference

[4] R. Silva, J. De Brito, and R. Dhir, "Properties and composition of recycled aggregates from construction and demolition waste suitable for concrete production," Construction and Building Materials, vol. 65, pp. 201-217, 2014.

[5] M. A. Kamaruddin, M. S. Yusoff, and A. H. Ahmad, "Waste to Wealth: Recovery of Recyclable Items and Biodegradable Wastes from Night Markets at Seberang Perai Selatan, Penang," in Applied Mechanics and Materials, 2015, pp. 543-548.

[6] GeneralAuthorityforStatistics, "Per capita daily waste generation in Saudi Arabia during the period 2010-2016," General Authority for Statistics, vol. https://www.stats.gov.sa/sites/default/files/waste_production_rate_per_individual_en.pdf, 2016.

[7] M. Kamaruddin, M. Abdullah, M. Zawawi, and M. Zainol, "Potential use of Plastic Waste as Construction Materials: Recent Progress and Future Prospect," in IOP Conference Series: Materials Science and Engineering, 2017, p. 012011.

[8] Tadweer, "https://tadweer.org.sa/," 2018.

[9] ArabRecyclingCompanyLTD, "http://arab-recycling.com/en/main," 2018.

[10] RecycleNow, "https://www.recyclenow.com/," 2018.

[11] LiveLoveRecycleApplication, "http://liveloverecycle.tilda.ws/," 2018.

[12] M. k. Alsmadi, K. B. Omar, S. A. Noah, and I. Almarashdah, "Performance Comparison of Multi- layer Perceptron (Back Propagation, Delta Rule and Perceptron) algorithms in Neural Networks," in 2009 IEEE International Advance Computing Conference, 2009, pp. 296-299.

[13] Z. Thalji and M. Alsmadi, "Iris Recognition using robust algorithm for eyelid, eyelash and shadow avoiding," World Applied Sciences Journal, vol. 25, pp. 858-865, 2013.

[14] M. Alsmadi, U. A. Badawi, and H. E. Reffat, "A High Performance Protocol for Fault Tolerant Distributed Shared Memory (FaTP)," Journal of Applied Sciences, vol. 13, pp. 790-799, 2013.

[15] F. HADDAD, J. ALFARO, and M. K. ALSMADI, "HOTELLING'S T² CHARTS USING WINSORIZED MODIFIED ONE STEP M-ESTIMATOR FOR INDIVIDUAL NON NORMAL DATA," Journal of Theoretical & Applied Information Technology, vol. 72, pp. 215-226, 2015.

[16] F. Haddad and M. K. Alsmadi, "Improvement of The Hotelling's T2 Charts Using Robust Location Winsorized One Step M-Estimator (WMOM)," Journal of Mathematics (ISSN 1016-2526), vol. 50, pp. 97-112, 2018.

[17] M. K. Alsmadi, U. A. Badawi, and H. M. Moharram, "SERVER FAILURES ENABLED JAVASPACES SERVICE," Journal of Computer Science, vol. 10, pp. 671-679, 2014.

[18] M. K. Alsmadi, "Apparatus and method for lesions segmentation," ed: US Patent App. 15/614,893, 2018.

[19] M. K. Alsmadi, "Facial expression recognition," ed: Google Patents, 2018.

[20] R. Aldaej, L. Alfowzan, R. Alhashem, M. K. Alsmadi, I. Al-Marashdeh, U. A. Badawi, M. Alshabanah, D. Alrajhi, and M. Tayfour, "Analyzing, Designing and Implementing a Web-Based Auction online System," International Journal of Applied Engineering Research, vol. 13, pp. 8005- 8013, 2018.

[21] H. Almaimoni, N. Altuwaijri, F. Asiry, S. Aldossary, M. Alsmadi, I. Al-Marashdeh, U. A. Badawi, M. Alshabanah, and D. Alrajhi, "Developing and Implementing WEB-based Online Destination Information Management System for Tourism," International Journal of Applied Engineering Research, vol. 13, pp. 7541-7550, 2018.

[22] I. A. Almrashdeh, N. Sahari, N. A. M. Zin, and M. Alsmadi, "Requirement analysis for distance learning management system students in Malaysian universities," Journal of Theoretical and Applied Information Technology, vol. 24, pp. 17-27, 2011.

[23] M. k. Alsmadi, K. B. Omar, and S. A. Noah, "Proposed method to decide the appropriate feature set for fish classification tasks using Artificial Neural Network and Decision Tree," IJCSNS vol. 9, pp. 297-301, 2009.

[24] N. Alsubaie, N. Althaqafi, E. Alradwan, F. Al-Hazza, M. Alsmadi, I. Al-Marashdeh, U. A. Badawi, M. Alshabanah, D. Alrajhi, S. Alsmadi, and M. Tayfour, "Analyzing and Implementing an Online Metro Reservation System," International Journal of Applied Engineering Research, vol. 13, pp. 9198-9206, 2018.

[25] D. A. Daniyah Alkhaldi, Hajer Aldossary, Mutasem k. Alsmadi, Ibrahim Al-Marashdeh, Usama A Badawi, Muneerah Alshabanah, Daniah Alrajhi, "Developing and Implementing Web-based Online University Facilities Reservation System," International Journal of Applied Engineering Research, vol. 13, pp. 6700-6708, 2018.

[26] i. Almarashdeh, M. K. Alsmadi, T. Farag, A. S. Albahussain, U. A. Badawi, N. Altuwaijri, H. Almaimoni, F. Asiry, S. Alowaid, M. Alshabanah, D. Alrajhi, A. A. Fraihet, and G. Jaradat, "Real- Time Elderly Healthcare Monitoring Expert System Using Wireless Sensor Network " International Journal of Applied Engineering Research, vol. 13, pp. 3517-3523, 2018.

[27] M. K. S. Al Smadi, "Fish Classification Using Perceptron Neural Network," Centre for Graduate Studies, Universiti Utara Malaysia, 2007.

[28] M. K. Alsmadi and U. A. Badawi, "Pattern matching in Rotated Images Using Genetic Algorithm," Journal of King Abdulaziz University Computing and Information vol. 5, pp. 53 - 59, 2017.

[29] S. Aldossary, A. Althawadi, M. Almotairy, M. k. Alsmadi, D. Alrajhi, M. Alshabanah, I. AlMarashdeh, M. Tayfour, and R. Aljamaeen, "ANALYZING, DESIGNING AND IMPLEMENTING A WEB-BASED COMMAND CENTER SYSTEM," International Research Journal of Engineering and Technology, vol. 6, pp. 1008-1019, 2019.

[30] R. A. Sheikh, R. Al-Assami, M. Albahr, M. A. Suhaibani, M. k. Alsmadi, M. Alshabanah, D. Alrajhi, I. Al-Marashdeh, H. Abouelmagd, and S. Alsmadi, "Developing and Implementing a Barcode Based Student Attendance System," International Research Journal of Engineering and Technology, vol. 6, pp. 497-506, 2019.

[31] S. A. S. Ali, K. E. H. I. Eldaw, M. K. Alsmadi, and I. Almarashdeh, "Determinants of deposit of commercial banks in Sudan: an empirical investigation (1970-2012)," International Journal of Electronic Finance, vol. 9, pp. 230-255, 2019.

[32] L. Eljawad, R. Aljamaeen, M. K. Alsmadi, I. Al-Marashdeh, H. Abouelmagd, S. Alsmadi, F. Haddad, R. A. Alkhasawneh, M. Alzughoul, and M. B. Alazzam, "Arabic Voice Recognition Using Fuzzy Logic and Neural Network," International Journal of Applied Engineering Research, vol. 14, pp. 651- 662, 2019.

[33] A. M. Al Smadi, M. K. Alsmadi, H. Al Bazar, S. Alrashed, and B. S. Al Smadi, "Accessing Social Network Sites Using Work Smartphone for Face Recognition and Authentication," Research Journal of Applied Sciences, Engineering and Technology, vol. 11, pp. 56-62, 2015.

[34] M. Alsmadi, "Facial recognition under expression variations," Int. Arab J. Inf. Technol., vol. 13, pp. 133-141, 2016.

[35] M. Alsmadi, K. Omar, and I. Almarashdeh, Fish Classification: Fish Classification Using Memetic Algorithms with Back Propagation Classifier: LAP LAMBERT Academic Publishing, 2012.

[36] M. Alsmadi, K. Omar, S. Noah, and I. Almarashdeh, "A hybrid memetic algorithm with back- propagation classifier for fish classification based on robust features extraction from PLGF and shape measurements," Information Technology Journal, vol. 10, pp. 944-954, 2011.

[37] M. Alsmadi, K. B. Omar, S. A. Noah, and I. Almarashdeh, "Fish Recognition Based on Robust Features Extraction from Size and Shape Measurements Using Neural Network " Journal of Computer Science, vol. 6, pp. 1088-1094, 2010.

[38] M. K. Alsmadi, "An efficient similarity measure for content based image retrieval using memetic algorithm," Egyptian Journal of Basic and Applied Sciences.

[39] M. K. Alsmadi, "Query-sensitive similarity measure for content-based image retrieval using meta- heuristic algorithm," Journal of King Saud University - Computer and Information Sciences.

[40] M. K. Alsmadi, A. Y. Hamed, U. A. Badawi, I. Almarashdeh, A. Salah, T. H. Farag, W. Hassan, G. Jaradat, Y. M. Alomari, and H. M. Alsmadi, "FACE IMAGE RECOGNITION BASED ON PARTIAL FACE MATCHING USING GENETIC ALGORITHM," SUST Journal of Engineering and Computer Sciences (JECS), vol. 18, pp. 51-61, 2017.

[41] M. K. Alsmadi, K. B. Omar, S. A. Noah, and I. Almarashdeh, "Fish recognition based on robust features extraction from color texture measurements using back-propagation classifier," Journal of Theoritical and Applied Information Technology, vol. 18, 2010.

[42] U. A. Badawi and M. K. Alsmadi, "A GENERAL FISH CLASSIFICATION METHODOLOGY USING

META-HEURISTIC ALGORITHM WITH BACK PROPAGATION CLASSIFIER," Journal of Theoretical & Applied Information Technology, vol. 66, pp. 803-812, 2014.

[43] M. Yousuf, Z. Mehmood, H. A. Habib, T. Mahmood, T. Saba, A. Rehman, and M. Rashid, "A Novel Technique Based on Visual Words Fusion Analysis of Sparse Features for Effective Content-Based Image Retrieval," Mathematical Problems in Engineering, vol. 2018, 2018.

[44] R. R. Saritha, V. Paul, and P. G. Kumar, "Content based image retrieval using deep learning process," Cluster Computing, pp. 1-14, 2018.

[45] M. K. Alsmadi, K. B. Omar, and S. A. Noah, "Fish recognition based on robust features extraction from size and shape measurements using back-propagation classifier," International Review on Computers and Software, vol. 5, pp. 489-494, 2010.

[46] M. K. Alsmadi, K. B. Omar, S. A. Noah, and I. Almarashdeh, "Fish recognition based on robust features extraction from size and shape measurements using neural network," Journal of Computer Science, vol. 6, p. 1088, 2010.

[47] M. K. S. Alsmadi, K. B. Omar, S. A. Noah, and I. Almarashdah, "Fish recognition based on the combination between robust feature selection, image segmentation and geometrical parameter techniques using Artificial Neural Network and Decision Tree," arXiv preprint arXiv:0912.0986, 2009.

[48] M. Alsmadi, K. B. Omar, and S. A. Noah, "Back propagation algorithm: the best algorithm among the multi-layer perceptron algorithm," International Journal of Computer Science and Network Security, vol. 9, pp. 378-383, 2009.

[49] M. Alsmadi, K. Omar, S. Noah, I. Almarashdeh, S. Al-Omari, P. Sumari, S. Al-Taweel, A. Husain, N. Al-Milli, and M. Alsmadi, "Fish recognition based on robust features extraction from size and shape measurements using neural network," Information Technology Journal, vol. 10, pp. 427-434, 2009.

[50] T. H. Farag, W. A. Hassan, H. A. Ayad, A. S. AlBahussain, U. A. Badawi, and M. K. Alsmadi, "Extended Absolute Fuzzy Connectedness Segmentation Algorithm Utilizing Region and Boundary- Based Information," Arabian Journal for Science and Engineering, pp. 1-11, 2017.

[51] M. K. Alsmadi, "A hybrid Fuzzy C-Means and Neutrosophic for jaw lesions segmentation," Ain Shams Engineering Journal.

[52] U. A. Badawi and M. K. S. Alsmadi, "A Hybrid Memetic Algorithm (Genetic Algorithm and Great Deluge Local Search) With Back-Propagation Classifier for Fish Recognition " International Journal of Computer Science Issues, vol. 10, pp. 348-356, 2013.

[53] A. M, O. K, and N. S, "Back Propagation Algorithm : The Best Algorithm Among the Multi-layer Perceptron Algorithm," International Journal of Computer Science and Network Security, vol. 9, pp. 378-383, 2009.

[54] M. Sharma, G. Purohit, and S. Mukherjee, "Information Retrieves from Brain MRI Images for Tumor Detection Using Hybrid Technique K-means and Artificial Neural Network (KMANN)," in Networking Communication and Data Knowledge Engineering, ed: Springer, 2018, pp. 145-157.

[55] Y. Gao, X. Li, M. Dong, and H.-p. Li, "An enhanced artificial bee colony optimizer and its application to multi-level threshold image segmentation," Journal of Central South University, vol. 25, pp. 107-120, 2018.

[56] M. K. Alsmadi, "A hybrid firefly algorithm with fuzzy-C mean algorithm for MRI brain segmentation," American Journal of Applied Sciences, vol. 11, pp. 1676-1691, 2014.

[57] M. K. Alsmadi, "MRI brain segmentation using a hybrid artificial bee colony algorithm with fuzzy-c mean algorithm," Journal of Applied Sciences, vol. 15, p. 100, 2015.

[58] M. K. Alsmadi, "A hybrid Fuzzy C-Means and Neutrosophic for jaw lesions segmentation," Ain Shams Engineering Journal, 2017.

[59] S. H. Park and K. Han, "Methodologic Guide for Evaluating Clinical Performance and Effect of Artificial Intelligence Technology for Medical Diagnosis and Prediction," Radiology, p. 171920, 2018.

[60] D. S. Kermany, M. Goldbaum, W. Cai, C. C. Valentim, H. Liang, S. L. Baxter, A. McKeown, G. Yang, X. Wu, and F. Yan, "Identifying Medical Diagnoses and Treatable Diseases by Image-Based Deep Learning," Cell, vol. 172, pp. 1122-1131. e9, 2018.

[61] I. Almarashdeh, "Sharing instructors experience of learning management system: A technology perspective of user satisfaction in distance learning course," Computers in Human Behavior, vol. 63, pp. 249-255, 2016.

[62] I. ALMARASHDEH, H. BOUZKRAOUI, A. AZOUAOUI, H. YOUSSEF, L. NIHARMINE, A. A. RAHMAN, S. S. S. YAHAYA, A. M. A. ATTA, D. A. EGBE, and B. M. MURIMO, "AN OVERVIEW OF TECHNOLOGY EVOLUTION: INVESTIGATING THE FACTORS INFLUENCING NON-BITCOINS USERS TO ADOPT BITCOINS AS ONLINE PAYMENT TRANSACTION METHOD," Journal of Theoretical and Applied Information Technology, vol. 96, 2018.

[63] I. Almarashdeh, "The important of service quality and the trust in technology on users perspectives to continues use of mobile services," Journal of Theoretical & Applied Information Technology, vol. 96, 2018.

[64] I. Almarashdeh and M. Alsmadi, "Investigating the acceptance of technology in distance learning program," in Information Science and Communications Technologies (ICISCT), International Conference on, Tashkent Uzbekistan 2016, pp. 1-5.

[65] I. Almarashdeh and M. Alsmadi, "Heuristic evaluation of mobile government portal services: An experts' review," in 11th International Conference for Internet Technology and Secured Transactions (ICITST), 2016, pp. 427-431.

[66] I. Almarashdeh and M. K. Alsmadi, "How to make them use it? Citizens acceptance of M- government," Applied Computing and Informatics, vol. 13, pp. 194-199, 2017/07/01/ 2017.

[67] I. Almarashdeh and M. K. Alsmadi, "Applied Computing and Informatics," 2017.

[68] I. Almarashdeh, A. Althunibat, and N. F. Elias, "Developing a Mobile Portal Prototype for E- government Services," Journal of Applied Sciences, vol. 14, pp. 791-797, 2014.

[69] I. Almarashdeh, A. Althunibat, N. Fazidah Elias, A. Adewumi, A. Al Thunibat, N. Zin, N. Ashaari,
A. Al Thunibat, N. Zin, and N. Sahari, "E-Government for mobile societies-stocktaking of current trends and initiatives," Journal of Applied Sciences, vol. 14, pp. 104-111, 2013.

[70] I. Almarashdeh, N. F. Elias, N. Sahari, and N. Zain, "Development of an interactive learning management system for malaysian distance learning institutions," Middle East Journal of Scientific Research, vol. 14, pp. 1471-1479, 2013.

[71] I. AlMarashdeh, G. M. Jaradat, M. Ayob, A. Abu-Al-Aish, and M. Alsmadi, "An Elite Pool-Based Big Bang-Big Crunch Metaheuristic for Data Clustering," Journal of Computer Science, 2018.

[72] I. Almarashdeh, N. Sahari, and N. Mat Zin, "Heuristic evaluation of distance learning management system interface," presented at the International Conference on Electrical Engineering and Informatics Bandung, Indonesia 2011.

[73] I. Almarashdeh, N. Sahari, N. M. Zin, and M. Alsmadi, "Instructors acceptance of Distance Learning Management System," in International Symposium on Information Technology 2010 (ITSim 2010), Kuala Lumpur, 2010, pp. 1-6.

[74] I. A. Almarashdeh, N. Sahari, N. A. H. M. Zin, and M. Alsmadi, "Distance learners acceptance of learning management system," in 2nd International Conference on Data Mining and Intelligent Information Technology Applications (ICMIA2010), Seoul, Korea, 2010, pp. 304-309.

[75] I. A. Almarashdeh, N. Sahari, N. A. H. M. Zin, and M. Alsmadi, "Distance Learning Management System requirements From Student's Perspective," The international Journal of Theoretical and Applied Information Technology, vol. 24, 2011.

[76] I. A. Almarashdeh, N. Sahari, and N. A. M. Zin, "Heuristic evaluation of distance learning management system interface," in Electrical Engineering and Informatics (ICEEI), 2011 International Conference on, 2011, pp. 1-6.

[77] I. A. Almarashdeh, N. Sahari, N. a. M. Zin, and M. Alsmad, "The Success of Learning Management System Among Distance Learners in Malaysian Universitie," Journal of Theoretical and Applied Information Technology, vol. 21 pp. 80-91, 2010.

[78] I. A. Almarashdeh, N. Sahari, N. A. M. Zin, and M. Alsmadi, "THE SUCCESS OF LEARNING MANAGEMENT SYSTEM AMONG DISTANCE LEARNERS IN MALAYSIAN UNIVERSITIES," Journal of Theoretical & Applied Information Technology, vol. 21, 2010.

[79] I. A. Almarashdeh, N. Sahari, N. A. M. Zin, and M. Alsmadi, "Acceptance of learning management system: A comparison between distance learners and instructors," Advances in Information Sciences and Service Sciences, vol. 3, pp. 1-9, 2011.

[80] I. A. E. Almarashdeh, "Study of the Usability of Learning Management System Tool (Learning Care) of Postgraduate Students in University Utara Malaysia (UUM)," Graduate School, Universiti Utara Malaysia, 2007.

[81] I. A. Almrashdah, N. Sahari, N. A. H. M. Zin, and M. Alsmadi, "Distance learners acceptance of learning management system," in Advanced Information Management and Service (IMS), 2010 6th International Conference on, 2010, pp. 304-309.

[82] I. A. Almrashdah, N. Sahari, N. A. H. M. Zin, and M. Alsmadi, "Instructors acceptance of distance learning management system," in Information Technology (ITSim), 2010 International Symposium in, 2010, pp. 1-6.

[83] I. A. ALMRASHDEH, N. SAHARI, N. A. M. ZIN, and M. ALSMADI, "DISTANCE LEARNING MANAGEMENT SYSTEM REQIUREMENTS FROM STUDENT'S PERSPECTIVE," Journal of Theoretical

& Applied Information Technology, vol. 24, 2011.

[84] I. A. Almrashdeh, N. Sahari, N. A. M. Zin, and M. Alsmadi, "Instructor's success measures of Learning Management System," in Electrical Engineering and Informatics (ICEEI), 2011 International Conference on, 2011, pp. 1-7.

[85] M. K. A. Ibrahim Almarashdeh, Ghaith Jaradat, Ahmad Althunibat, Sami Abdullah Albahussain, Yousef Qawqzeh, Usama A Badawi, Tamer Farag, "Looking Inside and Outside the System: Examining the Factors Influencing Distance Learners Satisfaction in Learning Management System," Journal of Computer Science, vol. 14, pp. 453-465, 2018.

[86] G. Jaradat, M. Ayob, and I. Almarashdeh, "The effect of elite pool in hybrid population-based meta- heuristics for solving combinatorial optimization problems," Applied Soft Computing, vol. 44, pp. 45- 56, 2016.

[87] G. M. Jaradat, A. Al-Badareen, M. Ayob, M. Al-Smadi, I. Al-Marashdeh, M. Ash-Shuqran, and E. Al-Odat, "Hybrid Elitist-Ant System for Nurse-Rostering Problem," Journal of King Saud University- Computer and Information Sciences, 2018.

[88] M. Rasmi, M. B. Alazzam, M. K. Alsmadi, I. A. Almarashdeh, R. A. Alkhasawneh, and S. Alsmadi, "Healthcare professionals' acceptance Electronic Health Records system: Critical literature review (Jordan case study)," International Journal of Healthcare Management, pp. 1-13, 2018.

[89] M. K. Alsmadi, "Forecasting River Flow in the USA Using a Hybrid Metaheuristic Algorithm with Back-Propagation Algorithm," Scientific Journal of King Faisal University (Basic and Applied Sciences), vol. 18, pp. 13-24, 2017.

[90] J. Adeyemo, O. Oyebode, and D. Stretch, "River Flow Forecasting Using an Improved Artificial Neural Network," in EVOLVE-A Bridge between Probability, Set Oriented Numerics, and Evolutionary Computation VI, ed: Springer, 2018, pp. 179-193.

[91] A. Ahani, M. Shourian, and P. R. Rad, "Performance Assessment of the Linear, Nonlinear and Nonparametric Data Driven Models in River Flow Forecasting," Water Resources Management, pp. 1-17, 2018.

[92] S. Maniknandan, "Artificial Intelligence: An Effective Tool for Environment Protection," Blogging Hub, vol. https://www.cleantechloops.com/artificial-intelligence-environment-protection/, 2018.

[93] S. Muraleedharan, "Role of Artificial Intelligence in Environmental Sustainability," The Promise of Bioremediation, vol. https://www.ecomena.org/artificial-intelligence-environmental-sustainability/, 2018.

[94] B. S. Cost, V. H. Zampa, and E. A. Soare, "Artificial Intelligence in Automated Sorting in Trash Recycling," XV Encontro Nacional de Inteligência Artificial e Computacional (ENIAC)At: IBM, São Paulo, vol. https://www.researchgate.net/publication/326994757_Artificial_Intelligence_in_Automated_Sorting_in_Trash_Recycling, 2018.

[95] I. Almarashdeh, K. E. Eldaw, M. AlSmadi, U. Badawi, F. Haddad, O. A. Abdelkader, G. Jaradat, A. Alkhaldi, and Y. Qawqzeh, "Search Convenience and Access Convenience: The Difference Between Website Shopping and Mobile Shopping," in International Conference on Soft Computing and Pattern Recognition, 2018, pp. 33-42.

[96] M. Fontoura, W. Pree, and B. Rumpe, "UML-F: A modeling language for object-oriented frameworks," in European Conference on Object-Oriented Programming, 2000, pp. 63-82.

[97] l. Teixeira, A. R. Xambre, J. Figueiredo, and H. Alvelos, "Analysis and design of a project management information system: practical case in a consulting company," in CENTERIS/ProjMAN/HCis, 2016, pp. 171-178.

[98] I. Almarashdeh, N. F. Elias, N. Sahari, and N. A. M. Zain, "Development of an interactive learning management system for malaysian distance learning institutions. ," Middle East Journal of Scientific Research, 14(11), . 10.5829/idosi.mejsr.2013.14.11.2339, vol. 14, pp. 1471-1479, 2013.

[99] D. Rajagopal and K. Thilakavalli, "A Study: UML for OOA and OOD," International Journal of Knowledge Content Development & Technology, vol. 7, pp. 5-20, 2017.

[100] M. Torchiano, G. Scanniello, F. Ricca, G. Reggio, and M. Leotta, "Do UML object diagrams affect design comprehensibility? Results from a family of four controlled experiments," Journal of Visual Languages & Computing, vol. 41, pp. 10-21, 2017/08/01/ 2017.

[101] S. I. Bello, R. O. Bello, A. O. Babatunde, M. Olugbebi, and B. O. Bello, "A University Examination Web Application Based on Linear-Sequential Life Cycle Model," 2017.

[102] I. Almarashde, A. Althunibat, and N. Fazidah El, "Developing a Mobile Portal Prototype for E- government Services," Journal of Applied Sciences, vol. 14, pp. 791-797, 2014.

[103] R. Ibrahim, "Formalization of the data flow diagram rules for consistency check," arXiv preprint arXiv:1011.0278, 2010.

[104] N. A. Nora Alsubaie, Eman Alradwan, Fatima Al-Hazza, Mutasem Alsmadi, Ibrahim Al-Marashdeh, Usama A Badawi, Muneerah Alshabanah, Daniah Alrajhi, Sanaa Alsmadi, Mohammed Tayfour., "Analyzing and Implementing an Online Metro Reservation System," International Journal of Applied Engineering Research, vol. 13, pp. 9198-9206, 2018.

Evaluation Of Models To Implement The Iso 9001 Process Approach

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ABSTRACT

The ISO 9001 standard is adopted worldwide by organizations from different sectors. The ISO 9001:2015 guidelines for implementing the process approach require not only the identification of the organization processes, but also the description of their interactions as a network system. Flow charts are a common tool adopted in quality management to show the sequence flow of a process. However, they do not show interrelations between different processes. The first aim of this study is to investigate the utilization of some software engineering models to satisfy the process approach requirement in the ISO 9001:2015 standard. The second aim is to show the implementation of the ISO 9001:2015 process approach and the "Plan-Do- Check-Act" (PDCA) cycle to manage academic programs processes as a case study and to present how the proposed models can be utilized to describe the interactions between processes. Finally, the study used a semi-structured interview methodology to evaluate the proposed models based on three criteria: understandability, modifiability and process improvement.

KEYWORDS

ISO 9001:2015; process approach; Software engineering models; Academic Program Management; semi-structured interview

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REFERENCES

[1]   ISO, (2017). ISO Survey. Retrieved from https://www.iso.org/the-iso-survey.html

[2]   ISO, (2008). ISO 9000 Introduction and Support Package: Guidance on the Concept and Use of the Process Approach for management systems. Retrieved from https://www.iso.org/files/live/sites/isoorg/files/archive/pdf/en/04_concept_and_use_of_the_process_a pproach_for_management_systems.pdf

[3]   ISO, (2015). International Organization for Standardization, THE PROCESS APPROACH IN ISO 9001:2015. Retrieved from http://www.iso.org/tc176/sc02/public

[4]   Pszenica, Y. (2001). Project Management and ISO 9001—An Integrative Approach Through Process Management. In Proceedings of the Project Management Institute Annual Seminars & Symposium, Nashville, Tenn., USA.

[5]   Marques, P. A., Requeijo, J. G. (2009). SIPOC: A Six Sigma Tool Helping on ISO 9000 Quality Management Systems. In 3rd International Conference on Industrial Engineering and Industrial Management XIII. Barcelona-Terrassa: Congreso de Ingeniería de Organización.

[6]   Moreland, N. & Clark M., (1998) Quality and ISO 9000 in educational organizations, Journal Total Quality Management, Vol 9, No. 2, pp311-320.

[7]   Thonhauser, T., & Passmore, D. (2006). ISO 9000 in education: A comparison between the United States and England. Research in Comparative and International Education, 1(2), 156-173

[8]   El Abbadi, L., Bouayad, A., Lamrini, M. (2013). ISO 9001 and the Field of Higher Education: Proposal for an Update of the IWA 2 Guidelines. Quality Approaches in Higher Education, 4 (2), 14- 19.

[9]   ISO, (2007). ISO/IWA 2: Quality management systems - Guidelines for the application of ISO 9001:2000 in education. Retrieved from https://www.iso.org/obp/ui/#iso:std:iso:iwa:2:ed-2:v1:en

[10] Ismail, K., & Gadar, K. (2008). A Beneficiary-Driven and Recipient-Focused Program Using ISO 9001:2000 in Teaching and Learning in Malaysian University. The Journal of International Management Studies, 3 (2), 133-140.

[11] Gamboa, A. J., Melão, N. F. (2012). The impacts and success factors of ISO 9001 in education: Experiences from Portuguese vocational schools. International Journal of Quality & Reliability Management, 29 (4), 384-401.

[12] Ariff, M., Zaidin, N., Sulong, N. (2007). Total Quality Management Implementation in Higher Education: Concerns and Challenges Faced by the Faculty. In Proceedings of the 12th International Conference on ISO 9000 and TQM, Taiwan: National Chin-Yi University of Technology.

[13] Levina, E. Y., Kamasheva, Y. L., Gazizova, F. S., Garayeva, A. K., Salpykova,I. M., Yusupova G., Kuzmin, N. (2015). A Process Approach to Management of an Educational Organization. Review of European Studies, 7 (4) 234-240.

[14] OMG, (2016). Object Management Group, Business Process Model & Notation™ (BPMN™): Resource Page. Retrieved from http://www.omg.org/bpmn

[15] Sommerville, I. (2016). Software Engineering, England: Pearson.

[16] J.A. Garcia-Garcia , J.G. Enriquez, F.J. Dominguez-Mayo (2019), Characterizing and evaluating the quality of software process modelling language: comparison of ten representative model-based languages, Computer Standards & Interfaces. Vol 63, 52-66.

Requirements Variability Specification For Data Intensive Software

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ABSTRACT

Nowadays, the use of feature modeling technique, in software requirements specification, increased the variation support in Data Intensive Software Product Lines (DISPLs) requirements modeling. It is considered the easiest and the most efficient way to express commonalities and variability among different products requirements. Several recent works, in DISPLs requirements, handled data variability by different models which are far from real world concepts. This,leaded to difficulties in analyzing, designing, implementing, and maintaining this variability. However, this work proposes a software requirements specification methodology based on concepts more close to the nature and which are inspired from genetics. This bio-inspiration has carried out important results in DISPLs requirements variability specification with feature modeling, which were not approached by the conventional approaches.The feature model was enriched with features and relations, facilitating the requirements variation management, not yet considered in the current relevant works.The use of genetics-based methodology seems to be promising in data intensive software requirements variability specification.

KEYWORDS

Requirements variability specification, Data intensive software product lines, Bio-inspired modeling, data versions, feature model.

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REFERNCES

[1]   F. Schwägerl and B. Westfechtel, (2017). Perspectives on combining model-driven engineering, software product line engineering, and version control, Proceedings of the Eleventh International Workshop on Variability Modelling of Software-intensive Systems, ACM, 76-83

[2]   J. Font, L. Arcega, Ø. Haugen, C. Cetina, (2017). Leveraging variability modeling to address meta- model revisions in Model-based Software Product Lines.Computer Languages, Systems & Structures 48: 20-38

[3]   N. Khedri and R.Khsoravi, (2013).Handling database schema variability in software product lines, 20th Asia-Pacific Software Engineering Conference (APSEC), IEEE Computer Society, Washington, pp. 331-338.

[4]   N. Khedri, R. Khosravi, (2016).Incremental variability management in conceptual data models of software product lines Proceedings - Asia-Pacific Software Engineering Conference, APSEC 2016, pp. 222-229

[5]   N. Khedri and R.Khsoravi, (2015). Towards Managing Data Variability in Multi Product Lines, 3rd International Conference on Model-Driven Engineering and Software Development, SCITEPRESS - Science and Technology Publications, Lda, Angers, pp. 1-8.

[6]   S. Bouarar, J.Stéphane , and S.Norbert, (2015). SPL Driven Approach for Variability in Database Design, Proceedings of the 5th International Conference on Model and Data Engineering, Springer International Publishing, New York, pp. 332-342.

[7]   M. La Rosa, W. van der Aalst, M.Dumas, F.Milani, (2016) Business process variability modeling : A survey. ACM Computing Surveys. (In Press)

[8]   E. M. Sanfilippo, S.Borgo, (2016).What are features? An ontology-based review of the literature.CAD Computer Aided Design 80, pp. 9-18

[9]   S. Ibraheem and S. Ghoul, (2017). Software Evolution: A Features Variability Modeling Approach, Journal of Software Engineering, vol. 10, no. 4, pp. 2-10.

[10]   W. J. Yu, H.Y. Zhao, , W. Zhang, , Z. Jin, (2016). A survey of the feature model based approaches to automated product derivation. Journal of Software 27(1), pp. 26-44

[11]   A. Rana, S.P.Singh, R.Soni, and A.Jolly , (2015). Incremental Software Version Release Planning For Adaptive Maintenance, International Journal of Software Engineering and Its Applications, vol. 9, no. 8, pp. 217-228.

[12]   X. Cheng, L. Peng, L. Jiang, L., J. Zhao, (2016). Mining revision histories to detect cross-language clones without intermediates ASE 2016 - Proceedings of the 31st IEEE/ACM International Conference on Automated Software Engineering. pp. 696-701

[13]   C. Hauptmann, M.Brocco, and W.Wörndl, (2015). Scalable semantic version control for linked data management, CEUR Workshop Proceedings.

[14]   C. Jomphrom andK.Porkaew, (2015). Version Management of Hierarchical Data in Relational Database, Recent Advances in Information and Communication Technology, Springer International Publishing, vol. no. 361, pp. 275-284. .

[15]   M. Frommhold, et al. (2016). Towards versioning of arbitrary RDF data ACM International Conference Proceeding Series 13-14-September-2016, pp. 33-40

[16]   Y. Zhang, et al. (2016). DataLab: A version data management and analytics system Proceedings - 2nd International Workshop on BIG Data Software Engineering, BIGDSE pp. 12-18

[17] E. Naffar and S.Ghoul, (2017).A Genetic Framework model for Self-Adaptive software.Journal of Software Engineering Volume 11, No. 2.

[18] S. Ghoul, (2016). A Road Map to Bio-inspired Software Engineering, Research Journal of Information Technology, vol. 8, no. 3, pp. 75-81.

[19] J. Son, A. Mishra. (2017). A survey of brain inspired technologies for engineering, (PRASA-RobMech), 2016, IEEE Xplore

[20] M. Akmal Khalid, U. Yusof, K. Ku Aman. (2016). A survey on bio-inspired multi-agent system for versatile manufacturing assembly line. ICIC Express Letters. 10(1), pp. 1-7

[21] K. Arun, R. Rejimoan. (2016). A survey on network path identification using bio inspired algorithms. Proceeding of IEEE - AEEICB 2016 , 7538314, pp. 387-389

[22] J. Yue, (2014). Transition from EBNF to Xtext.PSRC@MoDELs 2014: 75-80

[23] Dubielewicz, I., Hnatkowska, B., Huzar, Z., Tuzinkiewicz, L. (2017). Domain modeling based on requirements specification and ontology.Advances in Intelligent Systems and Computing, 504, pp. 31-45

[24] J.Angel and G.Duarte, (2015). Evolution, testing and configuration of variability intensive system, PhD thesis, University of Seville/University of Rennes 1.

[25] J. Bartholdt, R. Oberhauser, and A. Rytina, (2009). Addressing data model variability and data integration within software product lines, International Journal on Advances in Software, vol. 2, no. 1, pp. 84–100

[26] L.A.Zaid and O.D.Troyer, (2011). Towards modeling data variability in software product lines, Enterprise, Business-Process and Information Systems Modeling, Springer, Berlin, vol. no. 81, pp. 453–467.

[27] J. Simonin, J. Puentes.(2018). Automatized integration of a contextual model into a process with data variability. Computer Languages, Systems and Structures 54, pp. 156-182,

[28] M. Raatikainen, J, Tiihonen, T. Männistö, (2019). Software product lines and variability modeling: A tertiary study. Journal of Systems and Software, 149, pp. 485-510

[29] N.Khalfallah, S.iOuali, N.Kraïem. (2018). Case Tool Support for Variability Managing in Database Schemas. JSW 13(11): 600-612

[30] M.C.Tavares   et   al.   (2018).   A   Variability-Aware   Design   Approach   to   the   Data Analysis Modeling Process.BigData : 2818-2827

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