

2012. Retrieved from https://www.researchgate.net/profile/Girish_Sharma4/publication/259827907_IJETA_E_1212_84/links/02e7e52e0dc392211f000000.pdf
- [3] N. H. Z. Abai, J. H. Yahaya and A. Deraman, "User Requirement Analysis in Data Warehouse Design: A Review". *Procedia Technology*, 11, 801–806, 2013. <https://doi.org/10.1016/j.protcy.2013.12.261>
 - [4] M. El Mohajir and I. Jellouli, "Towards a Framework Incorporating Functional and Non Functional Requirements for Data Warehouse Conceptual Design". *IADIS International Journal on Computer Science and Information Systems*, 9(1), 43–54, 2014. Retrieved from <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.640.5590&rep=rep1&type=pdf>
 - [5] A. Nasiri, E. Zimányi and R. Wrembel, "Requirements Engineering for Data Warehouses". 49–64, 2015. Retrieved from <http://code.ulb.ac.be/dbfiles/NasZimWre2015inollection.pdf>
 - [6] F. Di Tria, E. Lefons and F. Tangorra, "GrHyMM: A Graph-Oriented Hybrid Multidimensional Model". *Lecture Notes in Computer Science (Including Subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*, 6999 LNCS, 86–97, 2011. https://doi.org/10.1007/978-3-642-24574-9_12
 - [7] M. Thenmozhi and K. Vivekanandan, "Data Warehouse Schema Evolution and Adaptation Framework Using Ontology". *International Journal on Computer Science and Engineering (IJCSE)*, 6(07), 232–246, 2014.
 - [8] R. Jindal and T. Shweta, Comparative Study of Data Warehouse Design Approaches : A Survey. *International Journal of Database Management Systems*, 4(1), 33–45, 2012. <https://doi.org/10.5121/ijdms.2012.4104>
 - [9] M. Golfarelli and S. Rizzi, "Designing the Data Warehouse: Key Steps and Crucial Issues". *Computer Science and Information Management*, 2(3), 88–100, 1999. Retrieved from <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.124.1900&rep=rep1&type=pdf>
 - [10] R. M. Bruckner, "Developing Requirements for Data Warehouses Systems With Use Cases". *Seventh Americas Conference on Information Systems*, 329–335, 2001.
 - [11] A. Adesina-Ojo, "Towards the Formalisation of Object-Oriented Methodologies". University of South Africa, 2011. <https://doi.org/10.1145/2072221.2072252>
 - [12] M. Singh, A. K. Sharma and R. Saxena, "An UML + Z Framework for Validating and Verifying the Static Aspect of Safety Critical System". *International Conference on Computational Modeling and Security*, 352–361, 2016. <https://doi.org/10.1016/j.procs.2016.05.243>
 - [13] N. A. Zafar, "Formal Specification and Verification of Few Combined Fragments of UML Sequence Diagram". *Springer - Arab J Sci Eng*, 41, 2975–2986, 2016. <https://doi.org/10.1007/s13369-015-1999-9>
 - [14] C. Dongmo and J. A. van der Poll, "Evaluating Software Specifications by Comparison". *SAICSIT '11, October 3-5, 2011, Cape Town, South Africa* <https://doi.org/10.1145/2072221.2072232>
 - [15] I. N. Mbala and J. A. van der Poll, "Towards Specification Formalisms for Data Warehousing Requirements Elicitation Techniques". *The 3rd International Conference on Computing Technology and Information Management (ICCTIM 2017)*, (1), 45–58, 2017.
 - [16] O. Nikiforova, K. Gusarova, L. Kozachenko, D. Ahilcenoka and D. Ungurs, "An Approach to Compare UML Class Diagrams Based on Semantical Features of Their Elements". *The Tenth International Conference on Software Engineering Advances*, (November 2015), 147–152. <https://doi.org/10.13140/RG.2.1.3104.4889>
 - [17] M. A. Al-khiaty and M. Ahmed, "UML Class Diagrams : Similarity Aspects and Matching". *Lecture Notes on Software Engineering*, 4(1), 41–47, 2016. <https://doi.org/10.7763/LNSE.2016.V4.221>
 - [18] J. Trujillo, J. Gomez and I. Song, "Designing Data Warehouses with OO Conceptual Models". pp. 66–75, 2001. University of Alicante <https://doi.org/10.1109/2.970579>
 - [19] S. Luján-Mora, J. Trujillo and P. Vassiliadis, "Advantages of UML for Multidimensional Modeling". *ICEIS 2004 - Proceedings of the Sixth International Conference on Enterprise Information Systems*, 298–305, 2004. <https://doi.org/10.5220/000263302980305>
 - [20] S. Luján-mora, "Data Warehouse Design with UML PhD Thesis". University of Alicante, 2005.
 - [21] B. P. Basaran, "A Comparison of Data Warehouse Design Models". MSc Dissertation, Atilim University, 2005.
 - [22] T. Oketunji and O. Omodara, "Design of Data Warehouse and Business Intelligence System". (Blekinge Institute of Technology), 2011. Retrieved from <http://www.diva-portal.org/smash/record.jsf?pid=diva2:831050>
 - [23] M. Golfarelli, "From User Requirements to Conceptual Design in Data Warehouse Design". *Data Warehousing Design and Advanced Engineering*, 15, 2010. <https://doi.org/10.4018/978-1-60566-756-0.ch001>
 - [24] S. Haag and M. Cummings, "Management information systems for the Information Age". 9th edition. McGraw-Hill Irwin, 2013.
 - [25] K. Moremedi and J. A. van der Poll, "Towards a Comparative Evaluation of Text-Based Specification Formalisms and Diagrammatic Notations". *International Journal of Data Mining, Modelling and Management (IJDDMM)*, 11(3), 259 – 283, 2019. Inderscience Enterprises Ltd. <https://doi.org/10.1504/IJDDMM.2019.100386>
 - [26] P. Moura, R. Borges and A. Mota, "Experimenting Formal Methods through UML". pp. 1–13, 2015.
 - [27] S. Kim. and D. Carrington, "Formalizing the UML Class Diagram Using Object-Z". *LNCS 1723, Springer-Verlag Berlin Heidelberg 1999*, 83–98, 1999. https://doi.org/10.1007/3-540-46852-8_7
 - [28] M. Shroff and R. B. France, "Towards a Formalization of UML Class Structures in Z". *Proceedings Twenty-First Annual International Computer Software and Applications Conference (COMPSAC'97)*, 646–651, 1997. <https://doi.org/10.1109/COMPSAC.1997.625087>
 - [29] Y. Mai, J. Li and H. L. Viktor, "Dimensional Modeling for Data Warehouse". *Management Information Systems*, 201–210, 2004.
 - [30] N. El-Gamal, "Data Warehouse Conceptual Modeling Approaches". *Proceedings of the 37th International Conference On*, (January 2007), 231–242. Retrieved from http://www.researchgate.net/publication/230854949_DATA_WAREHOUSE_USE_CONCEPTUAL_MODELING_APPROACHES/file/79e415056f8261c932.pdf
 - [31] J. N. Mazón and J. Trujillo, "A Hybrid Model Driven Development Framework for the Multidimensional Modeling of Data Warehouses". *ACM SIGMOD Record*, 38(2), 12–17, 2009. <https://doi.org/10.1145/1815918.1815920>



Isaac N. Mbala is an MSc Candidate in Computer Science with School of Computing, University of South Africa (UNISA), South Africa. He obtained his BSc Hons (Computer Science) from the University of Kinshasa (UNIKIN). He has worked for a Vodacom Congo company as Management Information System (MIS) Specialist from 2013 to 2015 in the DRC. He was in charge of Business Intelligence, Development and Reporting. He also worked for JB Capital Partners company as IT Specialist – Software

Engineer from 2019 to 2020. He was in charge of Coding, Testing and deployment of the software applications.

His current focus area is to determine the extent to which the use of formal methods for data warehouse systems may alleviate failures within the design process. He is looking forward to do his PhD in Computer science.



Prof John A. van der Poll obtained a BSc from the University of Stellenbosch, South Africa in 1980 and a Hons BSc (Computer Science) in 1982, also from Stellenbosch. He obtained an MSc (Computer Science) from Unisa (University of South Africa) in 1987 and a PhD in Computer Science from Unisa in 2001. He was employed in the Unisa School of Computing from 1988 to 2013. He became a full Professor in Computing in 2007 and moved to Unisa's Graduate School of Business Leadership (SBL) in Midrand in June 2013.

His research interests are in the construction of highly dependable software for Business ICTs, specifically the formal specification and subsequent reasoning of the properties of Business Intelligence applications, Data warehousing, the IoT, IT Governance, and aspects of the 4th Industrial Revolution. He is a Research Professor at the SBL, an NRF rated researcher, category C2 and supervised numerous Master's and Doctoral students to completion.