A Novel & Unified Semantic Interoperable Model for Data Interoperability in Logistic & Supply chain Management usingModel Driven Architecture

Ms. Navjot Kaur and Mr. Rimmy Yadav

Abstract- The paper emphasises the research on electronic or semantic interchangeability for information exchange in logistics and supply chain management in this special issue. The sharing of data is one of the most obvious shortcomings in the management of the supply chain and logistics. The authors first go through the significance of data interchangeability and interoperability in logistical and supply chain management before recommending a modelling technique. A model-driven architecture approach and UML modelling will help with the semantic interoperability issues that occur in supply chain management and logistics. Platform independent models (PIM) and platform specific models (PSM) can be used to create a multi-platform, autonomous, and integrated system or application for logistics and supply chain management. It is possible for data to be exchanged across the logistic and supply chain management systems functioning in various firms without there being any issues with database ambiguity.

Introduction: Organizations are eager to enhance digital interoperability through digital transformation processes in order to ride the tide ofdigitalization. The ability to share data and information quickly, seamlessly, securely, and dependably between businesses is known as digital interoperability. A cross-functional and cross- organizational collaboration on strategic planning and operational management emphasises the significance of data seamlessintegration, in logistic and supply chain management. Companies are still working to improve data interoperability at both a medium and large scale in order to achieve data interoperability [1]. The interconnection of a system made up of objects, characteristics, and other linked elements is the focus of current methodologies. For instance, the most advanced and extensively used technologies are ontology, the semantic web, and cyber-physical systems.

Data-driven solution design: Operations Management and Operations Research (OM and OR) areas have always supported and been the main source of informationfor the decision-making processes in LSCM. Additionally, solely data-driven approaches have demonstrated a significant potential to support the processes, such as leveraging real-time data for dynamic planning and historical data for forecasting. Some of the more conventional mathematical methods related to

OM and OR may be thought of as being reoriented in this way. Using real-time journey information for cargos, for instance, is recommended by [1] and [2] when planning synchro modal transportation. The findings indicate that real-time information may aid in modal choice optimisation by reducing overall transportation and late delivery expenses. Shi et al. (2020), who work in horizontal collaboration among shippers, examine the significance of real-time demand updating in joint distribution systems.

In order to gather and exchange synchronously and continuously data from clients, shippers, logistics platforms, etc., for the purpose of route optimization, they offer a framework of digital interconnectivity for the dynamic joint distribution system. More recently, the use of machine learning techniques in the logistics sector has profoundly changed the ways in which traditional methods were used, allowing for more effective and imaginative decision- making. Previous researchers mainly focused on the system's syntactical setting; they did not address its semantic interoperability.

Model Driven Architecture: The significance of model-based systems engineering (MBSE) was stressed by the International Council of Systems Engineering (INCOSE). An approach to software design, development, and implementation is model-driven engineering (MDE). It offers suggestions for organising model-based software specifications. MDA decouples platform technology from business and application logic. The MDA can be used to implement platform-independent models of an application's or integrated system's business functionality and behaviour that were created using UML and other related OMG modelling standards. These platforms include Web Services, .NET, CORBA R, J2EE, and others. The core of the application is protected from technology and its relentless churn cycle by these platform-independent models, which also enable interoperability both within and between platform boundaries. They document the business functionality and behaviour of an application separately from the software-specific code that implements it. The business and technical parts of an application or integrated system are no longer dependent on one another and can each develop at their own rate, with technology utilising new developments and business logic responding to business needs.

Conclusion: The core of the application is protected from technology and its relentless churn cycle by these platform-independent models, which also enable interoperability both within and between platform boundaries. They document the business functionality and behaviour of an application separately from the technology-specific code that implements it. The business and

technical parts of an application or integrated system are no longer dependent on one another and can each develop at their own rate, with technology utilising new developments and business logic responding to business needs.

REFERENCES:

[1] Leal, Gabriel da Silva Serapião, Wided Guédria, and Hervé Panetto. "Interoperability assessment: A systematic literature review." *Computers in Industry* 106 (2019): 111-132.

[2] Yee, Hannah, Joren Gijsbrechts, and Robert Boute. "Synchromodal transportation planning using travel time information." *Computers in Industry* 125 (2021): 103367.

[3] BOUMAHDI, Fatima, et al. "MDA4SOA+ d: a new Model Driven Architecture to Supporting Decision Making in SOA." *Journal of King Saud University-Computer and Information Sciences* (2023).

[4] Gavrila, Sorin Gavrila, and Antonio de Lucas Ancillo. "Spanish SMEs' digitalization enablers: E-Receipt applications to the offline retail market." *Technological Forecasting and Social Change* 162 (2021): 120381.

About Authors

Mr. Rimmy Yadav Assistant Professor, Department of Information Technology Pyramid College of Business & Technology, Mehtan, Phagwara, Punjab

Mr. Rimmy Yadav is working as an Assistant Professor in the department of computer at pyramid college of business and technology, Mehtan, Phagwara, Punjab. He also worked as Associate Dean (Student Welfare) at college of Engineering, Kapurthala, Punjab. He completed his M.Sc. in Computer Science from Panjab University, Chandigarh. He has also obtained M.Phil. in Computer Science from Lovely Professional University, Phagwara. His expertise lies in the field of bioinformatics, medical healthcare, Internet- of-Things (IoT) and cloud computing. He has published review papers, research articles and book chapters in databases of IEEE Xplore, ScienceDirect. In year 2022, he was given opportunity as member of board of governors at Dr. B. R Ambedkar National Institute of Technology (NIT)

Jalandhar by the state government. Currently, he is rendering his services to the Pyramid College of Business & Technology, and teaching undergraduate and post graduate students and helping them to make better carrier in field of computer applications.

About Author

Ms. Navjot Kaur Head of the Department, Department of Information Technology Pyramid College of Business & Technology,Mehtan, Phagwara, Punjab

Ms. Navjot Kaur have an extensive experience of 14 years in teaching field. Currently she is working as a Co-ordinator in Computer Applications department at Pyramid College of Business & Technology, Phagwara. She is also serving as a SPOC in international affairs in the same institute. She has worked as an Assistant Professor in DAV College, Jalandhar. Her area of interest is Data structures, Computer Networks, Cyber Laws etc. She has done MCA with distinction From Lovely Institute of Management. She has published various research papers in different national and international journals and magazines. She also presented the papers in various international and national conferences and seminars. She also got an opportunity to act as an Innovation Brand Ambassador in IIC of the Ministry of Education's Innovation Cell (MIC). The aim of her life is personal and organizational growth by contributing her best among students to make their careers.