**Method used**: Extractive Summarization, manual summary, Abstractive Summarization with AI (Chatgpt), Google understanding terms.

**Write a brief description explaining how you applied your summarisation technique**

Started by reading through the PDFs, highlighting the important sentences / points . from the highlighted sentences, copy and pasted the important sentences from the PDFs into my document. Then I used abstractive summarization with AI to make what I extracted using an extractive(manual) summary shorter. Abstractive summarization was not applied to all parts of the texts. Good was used to understand unfamiliar terms.

**PDF 1**

- The transition to digitalization is causing significant disruptions in companies and economies, with the potential of the Internet and related technologies driving the creation of digital platforms. These platforms are evolving rapidly, with ecosystems of intelligent systems and services based on service-dominant logic. Digitalization is leading to the development of globally available and diverse IT systems, such as the Internet of Things and mobile systems, which are influencing the architecture of intelligent digital systems and services. Data, information, and knowledge are fundamental to this transformation, with new services and intelligent systems extending physical components by providing additional information and connectivity services. Intelligent digital systems use artificial intelligence to support and interact with people, and advances in AI have led to a growing number of such systems and services. The paper focuses on the research question of what key drivers and conceptual models are needed for an advanced digital enterprise architecture that supports intelligent digital systems and services. The paper outlines the architectural context for digitalization and transformation, basic mechanisms of AI, insights into a platform for intelligent digital systems, and a multi-perspective digital enterprise architecture. It also discusses the architectural evolution path for intelligent digital systems and concludes with research results and future work.

- Digitization was initially seen as a technical term, but it has evolved to encompass a range of technologies like cloud computing, big data, and social software. New technologies like deep learning are crucial for digitalization, enabling computers to perform tasks previously done by humans. Intelligent digitalization is now a key research area, with digital products and services being software-intensive and adaptable. We're at a turning point with the integration of artificial intelligence (AI) into digital systems, which has the potential to improve various aspects of work and society. Digitalization involves moving from analog to fully digital processes, with digital substitution, augmentation, and redefinition being key stages. It's not just about using digital technologies but also about creating new value propositions and business processes. Intelligent digital business requires careful consideration of human, ethical, and social principles.

- The combination of hardware and software components with intelligent cloud services allows for new ways of interacting with customers, as seen with Amazon Alexa. Artificial intelligence (AI) is a key technology in this, often used alongside other digital technologies like cloud computing and the Internet of Things. AI enables automation and decision support in various business areas, leading to a growing number of intelligent services and applications. Symbolic AI, which uses expert-based rules, was popular until the 1990s, while machine learning, which uses data analysis, has become more prominent. Digital technologies are

changing communication and collaboration, and the digital transformation has accelerated the development of intelligent digital products and services.

- The text discusses the importance of a targeted digital business architecture within an enterprise architecture, emphasising the integration of stakeholders, business and technical processes, and technology to implement digital strategies and create value-producing digital products and services. It highlights the dynamic nature of digital business design and the need for a comprehensive approach that includes digital strategy modelling, business operating models, and digital services and product compositions. The text also introduces the Digital Enterprise Architecture Reference Cube (DEA) as a holistic architectural reference model for integrating microgranular architectural services. It emphasises the importance of an effective and agile architecture management approach for digital enterprises, supported by a service platform that promotes value co-creation through the exchange of services. The text discusses the digital services backbone, which includes digital components, platform as a service, data repositories, and analytics, and emphasises the importance of network effects and community in the design of digital platforms.

- Intelligent or smart service systems bring together people, technology, organisation, and information. These systems are instrumented by sensors and actors, store data in the cloud, and are accessible from multiple devices. They can learn, adapt dynamically, and make decisions. The design of intelligent service systems requires a clear understanding of human interaction with technology and a human-centric design. Decision analytics offers increasingly complex support, especially in the development and evolution of sustainable digital architectures. Software evolution can be proactive, anticipating changes by the original software developer, or managed during the maintenance phase using specific tools and methods. A formal understanding of the nature of services and their model-based relationships is crucial for building and analysing solid digital service systems and enterprise architectures. There is a shift from traditional closed-world software engineering approaches to open service systems with autonomous parts. The main challenges of service computing for the next ten years lead to a redefinition of service computing, as postulated by the Service Computing Manifesto. This manifesto recommends focusing on four main research directions: Service Design, Service Composition, Crowdsourcing Based Reputation, and the Internet of Things.

**PDF 2**

- Industry 4.0 technologies should be considered as tools for complex transformation of business, information systems, and technological infrastructure.

- Digital transformation involves changing the business structure, business development strategy, corporate culture, sales system, team and process management in general.

- The technologies associated with digital transformation are a feature of the concept of Industry 4.0 and are designed to ensure the interaction of people and technologies and increase consumer involvement in production.

- The Industry 4.0 paradigm is related to the IoT, cyber physical systems, information and communication technology, EA, and corporate integration. It aims to increase

value, manage knowledge, achieve a higher level of operational efficiency and productivity, and a higher level of automation. It also includes the use of technical devices.

- Nine technologies of Industry 4.0 are, autonomous robots, simulation, horizontal and vertical system integration, industrial Internet of things, the cloud, additive manufacturing, Big Data and analytics, cybersecurity, augmented reality.

- Technology helps to increase the competitive advantage of a company.

- Digital tech creates new value chains that benefit the customers.

- To Succeed in digital transformation have to include technology into the enterprise architecture.

- Service Oriented Architecture is very important for IoT Systems.

- The five-layer architecture for IoT includes perception, transportation, processing, applications, and a business level. The transport layer handles sensor data transmission using networks like wireless, 3G etc. The processing layer stores, analyses, and processes data from the transport layer using technologies like databases. The business layer oversees the entire IoT system, including applications, business models, and user privacy.

- Generation of large amounts of data from various sources due to technological trends like IoT, Cloud Computing, and smart devices. Use of Big Data in complex systems and the potential of blockchain technology for Internet interaction systems, smart contracts, and security services. Cloud Computing is seen as promising for connecting people and devices, heavy data usage, and self-learning systems, with a focus on distributed architectures and service offerings like IaaS, PaaS, and SaaS. The potential of Cloud Computing for machine learning and the development of Cognitive Computing models in the next generation clouds.

- The Digital Twin is a powerful tool in the Industrial Internet of Things, enhancing cloud-based analytical services. It compares real sensor data with virtual sensor readings to detect anomalies and their causes. This technology evaluates, predicts, and analyses product or process performance throughout its life cycle, reducing investment errors and the need for physical prototypes. Digital Twins leverage multiphysics modelling, data analytics, and machine learning to demonstrate the impact of design changes and environmental conditions, improving development time and quality.

- Using AI in decision-making, focusing on the strengths and weaknesses of different AI methods like Artificial Neural Networks, fuzzy expert systems, and evolutionary algorithms. Combining these technologies can create hybrid intelligent systems that can consider common sense, extract knowledge from data, use human.like reasoning, handle uncertainty and inaccuracy, and adapt to changing environments.

- Enterprise architecture as an integrated approach to the integration of heterogeneous elements into an effective business system.

- Service-oriented approach as a means of aligning the requirements and capabilities of business and IT elements of a single system. Some functions of a service-oriented architecture is the creation of a broad architectural model that defines the goals of applications and approaches that will help achieve these goals.

- Enterprise architecture is designed to improve the management and functioning of complex enterprises and their information systems. Its set of heterogeneous elements in the interaction that make up the internal structure of business management - from strategy, goals, business model, to business and technological processes, organisational structure, information systems, production equipment and IT infrastructure.

- Traditionally, the following layers of enterprise architecture are: the business layer, the application layer and the technology layer . Service-oriented enterprise architecture allows the implementation of high-quality and efficient company work through a service approach to enterprise business processes. The enterprise architecture must be stable, it must be flexible and adaptive to changing business environment conditions, the emergence of new technologies and tasks.

- Digital transformation involves the use of new digital technologies and requires the optimal organisation of the enterprise structure and business processes. The architectural approach can become the basis of business management and its automation. When building enterprise architecture as an integrated enterprise management model, interconnected and interdependent layers are distinguished.

- Big Data is a type of data that is too large, fast, or complex to handle using traditional methods. It can be structured or unstructured, with structured data being numeric and organised, and unstructured data coming from various sources like social media. Big Data can benefit all departments in a company, including Sales and R&D.

- The main principles of Big Data usage in an industrial company involve adjustments to IT architecture and infrastructure. This includes adding a Big Data application with modules like Data Lake software, ETL, Data Mart, and analytical software. Data Lake compiles data from existing systems like ERP and MES, while Data Mart forwards processed data to a BI-system for analysis. Additional servers and databases are needed for these applications. The process involves collecting data from various sources, clearing it with ETL, processing it in the Data Warehouse, and analysing it in the Analytical Database. This allows for better decision-making, improved customer service, and increased productivity.

- Cloud Computing is a service that provides computing resources like data storage and computing power. Companies can rent these services instead of having their own IT infrastructure. However, integrating Cloud Computing into a company's architecture requires adjustments. The IT architecture will expand to include Cloud Computing applications, which will work closely with ERP and BI systems. The IT infrastructure will also change, with the creation of a virtual data centre including virtual web and database servers. These servers will access physical servers in the Cloud Computing vendor's datacenter. Cloud Computing services will allow the company to access data from any device with the required access. It will also help lower costs and avoid difficulties in maintaining IT infrastructure. Cloud Computing services will protect the company's data from unauthorised access.

- The Internet of Things (IoT) refers to physical devices worldwide that connect to the internet to collect and share data. Any object capable of internet connectivity and remote control can be transformed into an IoT device. Implementing IoT, such as a Smart Facility, requires significant changes in a company's technological architecture and IT infrastructure. Data from smart equipment flows through a REST API to a Data Acquisition Gateway, which collects data from all IoT devices. The IT architecture requires minimal expansion, mainly adding an IoT platform to exchange data with ERP, MES, BI for analysis, and the automated process control

system. IoT enables the company to access more data about its products and internal systems, empowering management to implement performance-enhancing changes.

- Blockchain technology is a distributed database that stores transaction information in a continuous chain of blocks. Each block contains a set of records and duplicates all information from previous blocks. The main principles of blockchain are transaction anonymity, security, and availability. It ensures data integrity and prevents retroactive changes to transactions. Blockchain is mainly used for cryptocurrency but has wider potential. It is integrated with existing systems, particularly ERP, to benefit from its use. This integration allows for distributed control of assets and liabilities.

- Digital Twin technology is a digital representation of a physical object or device that simulates its internal processes, technical characteristics, and behaviour in various environmental conditions. It uses data from sensors installed on physical objects to record real-time performance, operating conditions, and changes over time. This data is used to constantly update and improve the digital twin throughout the product's life cycle. The interaction cycle involves industrial sensors recording real object performance, transmitting data to Digital Twin software, storing data in a database, generating a digital model, and accessing it through an application. The application allows for diagnosis, analysis, modification, and forecasting. Integration with ERP and MES systems enables online processing of operational data, quick response to changes, and predictive maintenance. This technology can significantly increase productivity and reliability while reducing operating costs.

- Artificial intelligence (AI) is a system designed to mimic human intelligence, with applications in various fields, including enterprises. It processes data quickly and efficiently, making it useful for tasks like statistical process control, failure analysis, and inventory management. AI is supported by software components and integrates closely with MES and ERP systems, using their data for training and decision-making. AI can enhance production processes by managing critical operations, traditionally overseen by humans.

- The company's architecture integrates various technologies, including ERP, MES, IoT, Digital Twins, Big Data, Cloud Computing, Blockchain, and AI. These technologies are interconnected and enhance each other's efficiency. IoT and Digital Twins generate vast amounts of data, necessitating Big Data tools for processing. Cloud Computing accelerates data processing. Blockchain ensures data security and transparency. AI improves blockchain, Big Data, and IoT processes. The combined use of these technologies creates a powerful synergistic effect, maximising enterprise benefits.