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QUANTUM COMMUNICATION INTELLIGENCE CHAIN: A CARDINAL COADJUVANT MODEL

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ABSTRACT
This conceptual research proposes a quantum communication intelligence chain (QCIC) cardinal symbiotic model composed of "Integrant Technologies" that are unsung heroes integrating quantum computing, 5G wireless communication, artificial intelligence, and blockchain transforming industries from all business sectors creating the impact to spur market growth and the global economy in the 21st century.A comprehensive analysis of integrant technological developmental endeavors in the field of quantum computing, 5G (fifth generation) mobile communication, artificial intelligence, and blockchain are offered to ensure the futuristic synergetic systems thinking that are going to provide evolutionary and revolutionary applications in the years to come. The author applies exhaustive literature review, system thinking methodology, and a case study (Inditex Group) of the fashion industrythat focus on delivering the best possible evidence-based research and perspective on QCIC design applications. The contribution of this research provides the essential principles of systems thinking design with the QCIC innovation as "holistic and interdisciplinary" approach forthe transformation of value chain to overcome competition to attain design transcendence and stakeholder satisfaction creating sustainable value co-creation.This study provides precept to various industry practitioners, non-government organizations (NGOs), academia, entrepreneurs, investors, and policymakers to assuage economic benefit setting the stage for exciting new devices and services in the years ahead. Future researchers can build on QCIC systems thinking to examine the limitations of this model by using empirical researches.

Keywords
Quantum Computing**,** 5G Wireless, Artificial Intelligence, Blockchain, Fashion, Systems Thinking

INTRODUCTION

The future will be elucidated by advances in quantum computing, quantum machine learning, cloud computing, blockchain, artificial intelligence, autonomous IoT (AIoT), big data analytics, and augmented/virtual reality supported by 5G enhanced broadband, low-latency, secure wireless connectivity. When one experience 5G wireless communication, the operating speed will be at the speed of light.

Data shows that the emerging eight technology areas are attracted by the investors: quantum computing (QC), 5G mobile, artificial intelligence (AI), blockchain (BC), advanced materials, biotech, drones/ robotics, photonics and electronics. These technologies are novel and will have a immense impact, and power to create their own markets disrupting existing industries. But it will take a long time to reach market-ready maturity.

The four technology trends (QC, 5G, AI, BC) are expected to have a deep impact around the world in the years ahead creating dramatic opportunities. Since 5G, quantum computing (QC), artificial intelligence (AI) and Blockchain (BC) heralding new data age, the author has coined the term "Integrant Technologies" as unsung heroes setting the stage for exciting new devices and services in the years ahead.

Quantum computing [1] is an exciting new computing paradigm and is the ultimate in parallel computing, with the potential to tackle problems conventional computers can't handle. A quantum computer, completely different from a binary digital electronic computer, performs quantum computing using quantum-mechanical phenomena and would theoretically be able to solve certain problems much more quickly than any digital computer. Where current digital computers would require tens of billions of years to solve some of the world's most challenging problems, a quantum computer would be able to find a solution in only minutes, hours, or days enabling researchers to develop new catalysts and materials, new smart fashion wearables, improve medicines, accelerate advances in artificial intelligence, and even answering questions about the origins of the universe. In

a quantum world, it would take minutes, if not seconds, to run through all the possible permutations. The result has the potential to bring the same tremendous improvements in speed and security to interconnecting computational systems.

In 2019, IBM announced the world's first commercially available quantum computer called IBM Q "System One" harnessing the power of the 20-qubit machine over the cloud and has made quantum computing as a cloud service available to the world for the first time. In 2017, Intel announced the delivery of a 17-qubit superconducting test chip for quantum computing to research partner Qu Tech in the Netherlands. (https://newsroom.intel.com/newsroom/wp-content/uploads/sites/11/2017/10/17-qubit-fact-sheet.pdf, https://www.ibm.com/blogs/nordic-msp/ibm-unveils-groundbreaking-quantum-computing-system/)

5G [2] mobile communication (the fifth-generation technology) is the latest version of mobile network technology that provides enhanced coverage, speed, and response time that will transform industries from all business sectors creating the impact to spur market growth and the global economy. The wireless communication has the vital action of the information exchange system in the world and with the help of 5G wireless communication, the download and upload of data speed are vastly efficient and improved. Mobile internet connectivity is one of the most dynamic technologies and its use on smartphones has become an essential part of daily life. 5G is waiting to happen ubiquitously and is not only about a speedy internet connection but also aims to give developing countries the chance to connect to the Internet and enjoy everything the world wide web has to offer. Based on author's 3 decades of experience in tele/data communication and information technology business, the 5G wireless network technology will be part of the mass worldwide surveillance/mind control grid combining quantum computing with AI and the internet of things.

Blockchain [3] is a shared, immutable ledger that facilitates the process of recording transactions and tracking assets in a business network. An asset can be tangible (a house, a car, cash, land) or intangible (intellectual property, patents, copyrights, branding). Virtually anything of value can be tracked and traded on a blockchain network, reducing risk and cutting costs for all involved. The blockchain is essentially a new filing system for digital information, which stores data in an encrypted, distributed ledger format. The integration of Artificial Intelligence [4] and Blockchain (BC) is still an undiscovered discipline. The safest approach to create superintelligence is AI to be decentralized, designed and controlled by a network through open-source programming.

The combination of the two technologies (AI & BC) has the potential to use data in ways never thought before. Data is a vital ingredient for the development and enhancement of AI algorithms. Blockchain secures this data and allows to audit. AI takes to draw conclusions from the data and allows individuals to monetize. AI is incredibly revolutionary. It must be designed with the utmost precautions. Blockchain can greatly assist in the design endeavor. The author contends that the interplay between the two technologies has the potential for true disruption. The following ways in which AI and blockchain are made for each other: (i) Artificial Intelligence (AI) and encryption work very well together (ii) Blockchain can help to track, understand and explain decisions made by Artificial Intelligence. (iii) Artificial Intelligence (AI) can manage blockchains more efficiently than humans, (iv) better security, (v) open market for data.

Understanding the position and flow of products within a supply chain is vital. Nowadays customers demand transparency and regulators globally require information about supply chains. Supply chains depend on trust and transparency to operate correctly. Historically, distrust between stakeholders of companies has discouraged sharing data. Blockchain [4] can remedy such distrust with a shared record of ownership. Artificial Intelligence (AI), simply put, the theory and practice of building machines capable of performing tasks that require intelligence.

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PURPOSE OF THE STUDY

The aim is to propose a cardinal symbiotic model composed of "integrant technologies" that integrates quantum cloud computing, artificial intelligence, 5G wireless communications, and blockchaintransforming industries from all business sectors creating the impact to spur market growth and the global economy in the 21st century.

JUSTIFICATION OF THE STUDY

The integration of "Integrant Technologies" (quantum computing, 5G wireless communication, artificial intelligence, and blockchain) is still a largely undiscovered area. The convergence of these four technologies has not received its fair share of scholarly attention yet. Projects in practice devoted to this groundbreaking integration are still scarce. Thisstudy identifies the symbiotic nature of the four "Integrant Technologies" and its enormous benefits for industries to spur business growth. Hence, the author has endeavored to propose a synergetic model integrating the four "Integrant Technologies" together to show the academia and practitioners that the potential opportunity is immense.

RESEARCH BRACKGROUND

"IntegrantTechnology" era - Leadership in quantum science, 5G wireless, artificial intelligence, and blockchain will serve to benefit the people around the world. The innovation ecosystem of the above ingredient technologies will be the envy of the world for generations to come. Imagine a world, when an interactive 3D video can be downloaded in a few seconds, smart watches offering a myriad of health-related data on the fingertip, weather-related data in Nanoseconds, a smart building anticipates one's need, and an autonomous vehicle reaches the destination safely. This is the world of 5G wireless technology handles data very efficiently. The era of 5G is ready to usher in with improved connectivity, cloud-based storage, and an array of connected devices and services with the virtual system architecture of mobile internet of things (IoT).

Evolution of Mobile Networks is as shown in figure 1: (i) 1G- First Generation, (ii)2G-Second Generation (iii) 3G-Third Generation, (iv) 4G-Fourth Generation, (v)5G-Fifth Generation, (vi) 6G- Sixth Generation, and (vii) 7G-Seventh Generation.

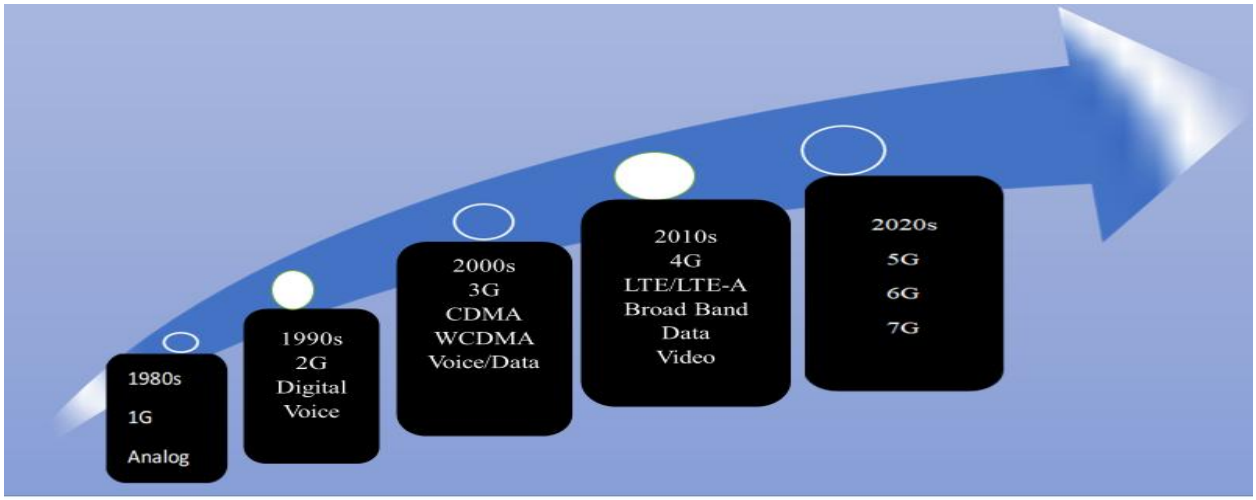

Fig1. Evolution of Mobile Networks

Unlike previous generations (1G to 4G) of mobile networks, the fifth generation (5G) technology will transform the role that telecommunications technology plays in contemporary society. It should be noted that 5G will aim to provide 20 times the peak data rate (speed), 10 times lower latency (responsiveness) and 3 times more spectral efficiency than 4G long term evolution (LTE). The development and deployment of 5G will spur innovation, enable cutting - edge technological advancements bringing the benefits of connectivity globally.

5G network is expected, by 2020, to support 50 billion connected devices and 212 billion connected sensors ranging from smartphones and tablets to smartwatches, cars, machinery, appliances, and remote monitoring devices generating a massive amount of "useful data" that can be analyzed. Researchers estimate that the 5G connected ecosystem will utilize a higher percentage of digital data (35%) than before (5%). The 5G wireless

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communication services will transform the way people live, work, travel, and play and will dramatically reduce costs per gigabit per second of service. 5G will unleash new ideas and applications in areas like mobile virtual reality, supercharging the Internet of Things.
The following are five mobile industry goals in the 5G era, as shown in figure 2:
• Boundless connectivity
• Innovation networks with optimal economics
• The digital transformation of industry verticals
• Transform the mobile broadband experience

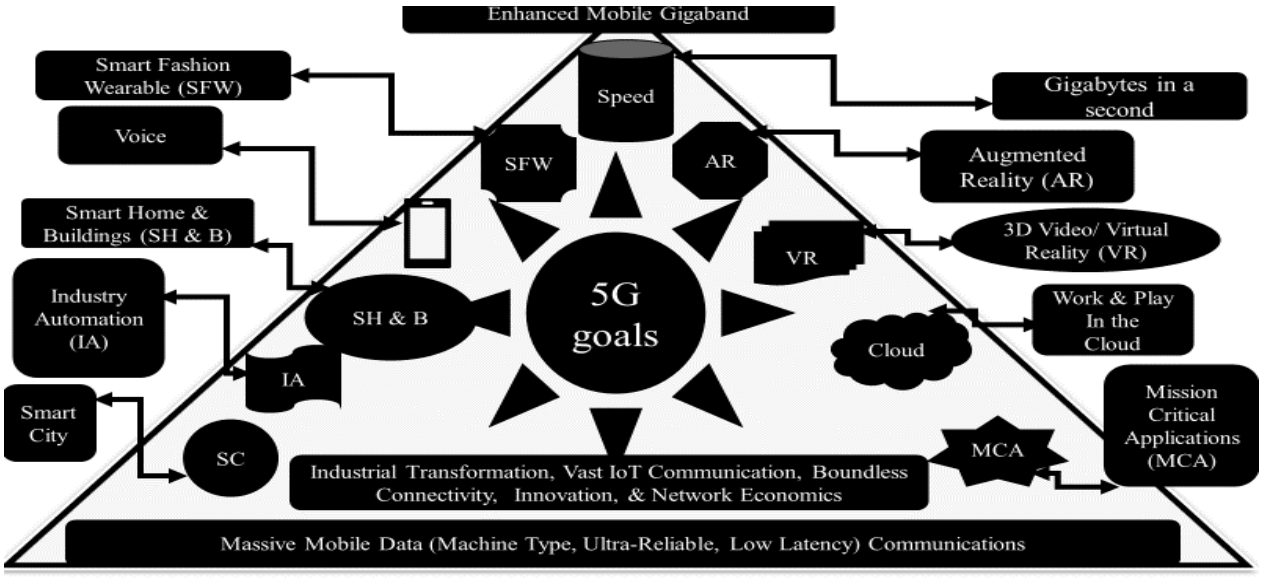

Fig.2 Five goals of 5G Era

The 5G technology primary components are the following, as shown in figure 3:
(i) New spectrum - The very high data rates of up to 20 Gbps require bandwidth up to 1-2 GHz.
(ii) Control channels beamforming can increase the spectral efficiency and network coverage substantially.
(iii) Network slicing - The physical and protocol layers in 5G need a flexible design to support the different use cases, vertical segments, and different frequency bands and to maximize energy and spectral efficiency. Network slicing will create virtual network segments for the different use cases within the same 5G network.

Fig 3. 5G Primary components

(iv) Multi-connectivity - 5G can be deployed as a standalone system and the 5G device can be connected simultaneously to both 5G and LTE, offering a higher user data rate and a more reliable connection.

(v) In-built support for cloud implementation and edge computing. The current architecture in LTE networks is fully distributed in the radio and fully centralized in the core network. The demand for low latency in5G requires the content to be brought closer to the radio, which necessitates local break out and Multi-Access Edge Computing (MEC). Massive MIMO is part of 5G from the beginning.

There is no doubt that 5G communication technology is an important factor affecting the socio-economic development of worldwide in the future.5G Communication technology development is the key part of China's 2025 plan which has made the country a leader in a range of industries. China is leading the way ahead of the U.S. in the global 5G competition and has built 350,000 new cell sites to support 5G communications. The society of 2025 will be a connected society with intelligent and integrated sensor systems that will change the way people lead their lives. "Smart living" people will require constant and ubiquitous mobile connectivity to the network to upload their activity data and Internet of Things control commands.

The following few pros and cons of 5G technology:

Pros

- Increased bandwidth
- Enhanced speed for data connectivity
- Reduced latency

Cons

- Costly
- More bandwidth means less coverage
- Possible occurrence of radio frequency problems

Pillars of 5G, as shown in figure 4:

(i) Evolution of Radio Access Technologies (RATs): 5G RAT= Enhanced LTE RAT + New RAT. New RATs considered for IoT, mm WAVE, Massive MIMO and for Better Broadband Access? New RAT is also to exploit higher frequency band for 5G. 5G will hardly be a specific RAT, rather it is likely that it will be a collection of RATs including the evolution of the existing ones complemented with novel revolutionary designs. As such, the first and the most economical solution to address the 1000x capacity crunch is the improvement of the existing RATs in terms of SE, EE and latency, as well as supporting flexible RAN sharing among multiple vendor

(ii) Hyperdense small- cell deployment is another promising solution to meet the 1000x capacity crunch, while bringing additional EE to the system as well.

(iii) Self- Organizing Network (SON) capability is another key component of 5G. As the population of the small cells increases and SON capability to intelligently adapt themselves to the neighboring small cells to minimize inter- cell interference.

(iv) Machine Type Communication (MTC) apart from people, connecting mobile machines is another fundamental aspect of 5G. The machine type communication (MTC) is an emerging application where either one or both end users of the communication session involve machines.

(v) mm-WAVE - The sub- 3 GHz spectrum is increasingly congested. The RATs are approaching Shannon's capacity limit. Hence mm-Wave bands for mobile communications has already started and the results look promising. A vast amount of spectrum is available in the mm-Wave band.

(vi) Backhaul links are the next critical issue of 5G. In parallel to improving the RAN, backhaul links also need to be re-engineered to carry the tremendous amount of user traffic generated in the cells.

(vii) Energy Efficiency (EE) will remain an important design issue of 5G development. To reduce the carbon emissions, it is necessary to pursue energy- efficient design approaches from RAN and backhaul links to the UEs.

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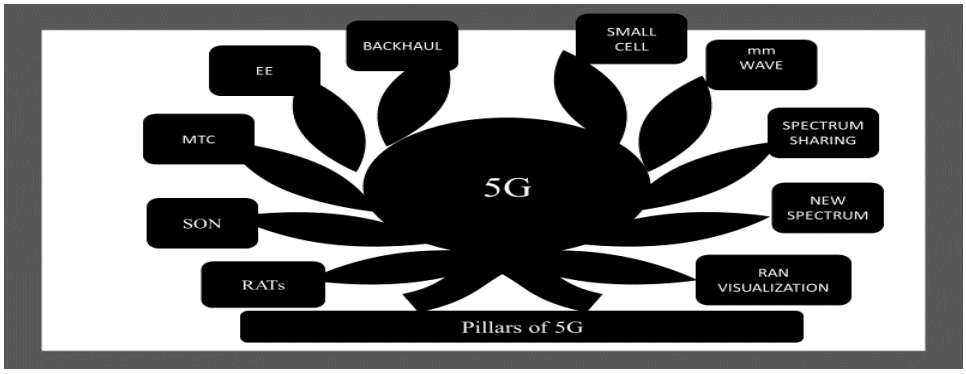

Fig. 4 Pillars of 5G

(viii)New Spectrum allocation for 5G is a critical issue of 5G is the allocation of new spectrum to fuel wireless communications in the next decade. Besides technology innovations, 10 times more spectrum is needed to meet the demand.

(ix) Spectrum Sharing Regulatory process for new spectrum allocation is often very time-consuming. Innovative spectrum allocation models should be adopted to overcome the existing regulatory limitations.

(x) RAN Virtualization is a critical enabler of 5G allowing sharing of wireless infrastructure among multiple operators.

China, EU, Japan, Korea, and the USA are accelerating the introduction of 5G technology in their respective markets. It is expected that by 2025, China will be covering 40 percent of global 5G networks. Huawei (China) is the only non-Five Eyes company that has gained significant market share in 5G chipset, operating system, and network protocol area, and is poised to be a peer competitor to the United States in leading the 5G revolution.

https://www.cisco.com/c/en/us/solutions/collateral/service-provider/visual-networking-index-vni/white-paper-c11-738429.html,

https://www.itproportal.com/2015/03/23/uk-government-already-investing-6g-networks-5g-exists/

5G technology benefits & applications

(i) High Speed, High Capacity with almost no limitations.
(ii) 5G technology providing large broadcasting of data in Gbps.
(iii) Multi-media newspapers watch T.V programs with clarity as to that of an HD Quality.
(iv) Faster data transmission that of the previous generations.
(v) Large Phone Memory, Dialing Speed,
(vi) Clarity in Audio/Video. Support interactive multimedia, voice,
(vii) Streaming video, Internet and other 5G is More Effective and More Attractive
(viii) Able to charge your mobile using your own heartbeat.
(ix) Provides to perceive your grandmother sugar level with your mobile.
(x) Know the exact time of your childbirth that too In Nanoseconds.
(xi) Mobile rings according to your mood.
(xii) Highly supportable to WWWW (Wireless World Wide Web)

5G- the internet of things – connecting everything, as shown in figure 5

A new model for modern Internet usage builds on the latest "Future-Internet" architecture research New networking paradigm:

•Mobility – eliminate the need for special mobility overlays
•Security – guarantee the integrity of every data object
•Storage – dynamic placement of information anywhere in the network.

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Companies like OPPO (China) will deliver an integrated supply chain and take advantage of their expertise in order to strengthen technical capacity and benefit from the application of artificial intelligence with the aim of developing a range of smart devices such as smart watches to explore and to meet the growing requirements of consumers in the era of the Internet of Things (IoT), as shown in figure 5. In the future, the quest is to become a company that manufactures smart fashion wearables (smart watches) and smartphones that match with the 5G wireless networks to provide applications to innovate in the 5G era that ultimately determines the value of the networks with the best experiences of the revolutionary quality and growth of the business.

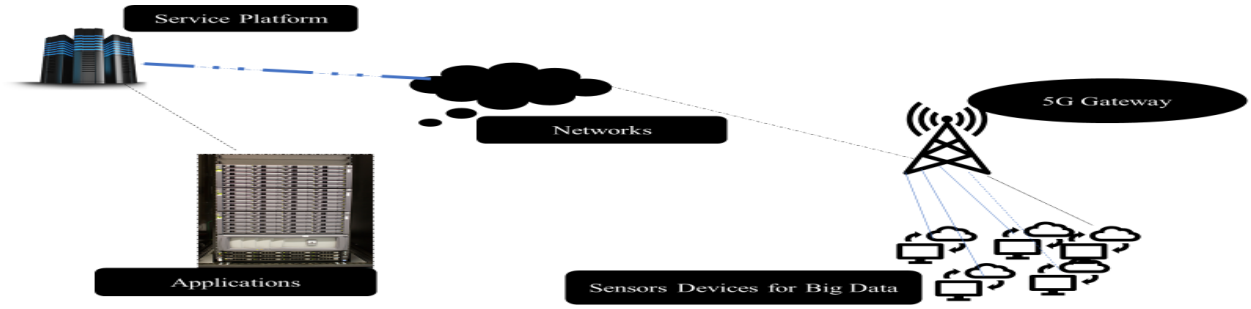

Fig 5. the Role of 5G wireless communications in the development of IoT

New Data Age: Integration of Artificial Intelligence, and 5G Wireless Communication
5G wireless communication boasts fiber-like data speeds, low latency and the ability to support unlimited data plans that shall fuel new services and technologies such as the Internet of Things (IoT), augmented reality, smart fashion wearables, autonomous vehicles, smart cities and mission critical applications. With 4G wireless networks (100 megabits per second) consumers download a two-hour movie in 6 minutes. 5G wireless will download the 2hour movie in 3.6 seconds delivering at speeds of 10 gigabits per second.

China, EU, Japan, Korea and USA are accelerating the introduction of 5G technology in their respective markets. It is expected that by 2025, China will be covering 40 percent of global 5G networks. Huawei (China) is the only non-Five Eyes company that has gained significant market share in 5G chipset, operating system and network protocol area, and is poised to be a peer competitor to the United States in leading the 5G revolution.The 5G network The 5G network transmits data from car sensors, roadside sensors, and video cameras installed above the road to a local data center, which analyzes the information and sends it back to the vehicles to help them navigate.
https://www.cisco.com/c/en/us/solutions/collateral/service-provider/visual-networking-index-vni/white-paper-c11-738429.html, https://www.itproportal.com/2015/03/23/uk-government-already-investing-6g-networks-5g-exists/

Key concepts of 5G communications are:
A. Dynamic ad-hoc Wireless Network (DAWN), essentially identical to Mobile ad-hoc network (MANET), Wireless mesh network (WMN) or Wireless grids, combined with smart antennas and flexible modulation.
B. Internet Protocol Version6 (IPv6), where a visiting Care of mobile IP address is assigned according to location and connected network.
C. High altitude stratospheric platform station (HAPS) systems.
D. A real wireless world with no more limitation with access and zone issues.
E. User-centric network concept instead of operator-centric (as in 3G) or service-centric (as in 4G) Worldwide wireless web (WWWW), i.e. comprehensive wireless-based web applications that include full multimedia capability beyond 4G speeds.

5G - ultra-reliable wireless has the potential to profoundly change systems and devices essential:

- short packet transmission
- communication-theoretic attention to the control information

- every step in the protocol needs a careful reliability design
- careful use of diversity
- many steps in real protocols impair reliability and latency
- lean protocol design

Table 1. Basic Features of 5G

Wireless Communication/ Mobile Network Technology	5G
Generation	Fifth
World Wide Web (WWW) Support	Wireless WWW (WWWW)
Architecture	Open Wireless Architecture (OWA)
Speed	Up to 1Giga bits per second (Gbps)
Connectivity Speed	25Mbps
Useable Format	Mobile Internet Packet (IP)
Multiple Mobile and Network Access	Yes
Smart Antenna	Yes
Applications	Futuristic – 3D Internet, Network Virtual Reality
Remote Management & Diagnostics	Yes
Encryption	Yes (Flexible and Anti Virus)
Memory Capacity	Large
Clarity/Quality (Audio & Video)	Yes

Promise of 5G: Data Analytics and Artificial Intelligence

Trusted data analytics offer advantages for almost every business and industry. The opportunity to mine data will grow as digital infrastructure becomes more powerful and will help to get the information needed to make informed decisions. To assess data in real time will enable quick learning on various applications and the use of this information will uncover "actionable insights," in real time. Machine learning (ML) is a valuable aspect of the emerging landscape. Artificial intelligence helps make sense of complex databases. Example: Medical records combine structured data such as heart rates, blood pressure readings, and vital signs with unstructured text that needs to be analyzed via natural language processing (NLP) and machine learning (ML) can"analyze unstructured data and keep the context" and provide "far-reaching implications for health care. Wearable devices are helpful in treatment and heart attack victims can receive assistance with smartphones or wearable devices such as smart watches.

There is an enormous opportunity for data analytics in almost every industry. Example: Health information is complex and varied. With big data analytics endowed by 5G wireless communication technology researchers will be able to garner more insight as to the drugs taken by patients. With the 5G system, we will see systems that are closer to the edge and an opportunity to have more intelligence to determine what information to send back and when to send it. In a world of connected devices, a 5G system will allow us to move from algorithms based on static information to those that can be optimized in real-time using data from the user.

Mobile edge quantum computing or networks are essential to deliver on the 5G promises to provide the potential benefits of data analytics to support data collection and distributed processing.The author contends "big data" as a broad topic is something of an understatement.

Telephone companies tend to look at data analytics (improving service offers), network data (improving network operations) and the vast amounts of sensor-based and IoT data likely to operate over their networks. From various industry perspective, myriad data sources are collected and analyzed in support of myriad benefits. Prior to starting data analytics in 5G, for example, it's essential to frame the following conversation with a description of analytics:

(i) Enhanced Mobile Broadband rather than just delivering giga bandwidth, it is all about delivering enhanced experiences. Data analytics plays the role of identifying

the bandwidth required to deliver that experience, based on application or customer profiles.

(ii) Vast Internet of Things (IoTs) - a key difference between IoT and machine-to-machine (M2M) usage is the role of data. M2M is all about connecting and transactions between things. IoT is all about connectivity in the name of control and/or capturing data to analyze things. 5G wireless communication support massive connectivity across diverse devices to gain insights from data in real-time.

(iii) Critical Communications use cases to generate data requirements on when and where the analysis takes place constrained by bandwidth. Mobile edge computing is based on local analytics or the latency improvements promised by 5G interface, making possible the real-time and automated intelligence that can seamlessly propagate from the cloud to a plethora of end points.

China Mobile has been paying attention to artificial intelligence(AI) making effort to build an open and collaborative 5G+AI ecosystem of big data and machine learning technologies to enhance the intelligence of 5G network, reduce the complexity, and explore the new capabilities of network to help customers unlock the potential within their 5G networks using open interfaces and toolkits. The use of AI and machine learning will enable myriad new services opportunities and leverage the capabilities of our 5G architecture to support China Mobile's AI research to optimize future networks and the delivery of many innovative new services.

5G standard that is already defined promises to revolutionize wireless communications remotely. Companies like *Intel, Samsung, Nokia, and Qualcomm*, recently moving through the integration of two of the technologies (5G and AI) that come treading morestrongly. Taking advantage of its experience in the telecommunications sector, Nokia has presented its next generation of connectivity chips "Reef Shark" a clear competitive advantage with combination of power, intelligence, and efficiency make it ideal to be at the heart of 5G networks not only promise to meet the 5G standards but also offer smaller size, lower manufacturing cost and, therefore, sale and also reduced consumption during its operations. "Reef Sharks", the new radio frequency chips from Nokia also improve the performance of the radio to cover longer territories.Apple and Huawei, Qualcomm, Samsung and Nokia already implementing artificial intelligence in the mobile processors, semiconductors.The AI of the Reef Shark will be put to work in tasks of monitoring and optimization of the radio in real time to operate in the different layers of the 5G network to monitor and optimize the network to offer service to the different actors connected to their networks, from cars connected to smartphones or IoT devices.
https://www.gismotrends.com/nokia/2018/01/30/nokia-artificial-intelligence-5g-reefshark/

As artificial intelligence (AI) adds intelligence to products and adapts through progressive learning it will become the most important technological phenomena of the future—second, only to the Blockchain. Machine learning (ML), the promising subset of AI, aims to teach computers to learn from examples (or "Data") and perform a task without being explicitly programmed to do so. Some AI, such as Microsoft, Apple, Google's face recognition software, can make decisions like recognizing a face. From 3D avatars to wardrobe advisers, AI is shaping the way one gets dressed. The author contends that there will be an algorithm for fashion style and develop the meta-cognition that associate with consciousness. Artificial intelligence (AI), cognitive computing, and other technologies affecting day to day life, so too will opportunities to improve efficiency, performance, and productivity. The use of machine learning (ML) and natural language processing (NLP) techniques drive the automation of a complex web of cognitive processes benefit various aspects of internationalization process of a fashion brand to penetrate international markets to achieve the global vision.

AI applications as shown in figure 6

a. **Cognitive Science**: (a) fuzzy logic, (b) genetic algorithms, (c)neural networks, (d) intelligent agents, (e)expert systems, (f) learning systems
b. **Robotics:** (a) visual perception, (b) Tactility, (c) Dexterity, (d) locomotion, (e) Navigation

c. **Natural Interface**: (a) natural languages, (b) speech recognition, (c) multisensory interfaces, (d) virtual reality, (e) augmented reality.

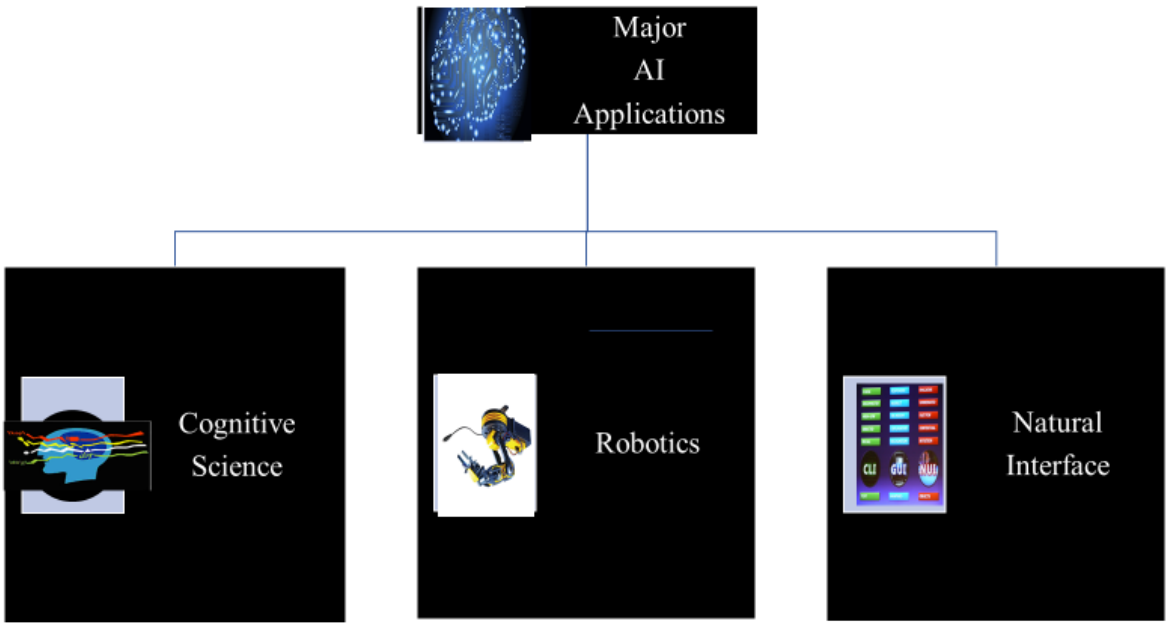

Fig. 6 Major AI Applications

Some examples of specific AI applications: (a) creating art, (b) autonomous vehicles (such as drones and self-driving cars), (c) smart fashion wearables, (d) medical diagnosis, (e) playing games such as chess. (f) providing mathematical theorems, (g) machine vision equipment for the textile industry, (h) search engines (such as Google), (i) online assistants (such as Siri), (j) image recognition in photography, (k) telecommunications maintenance such as 5G wireless network, (l) spam filtering, (m) targeting online advertisements and social networks, (n) online and telephone customer service and much more.

Blockchain

The blockchain considered one of the most important financial services innovations of the twenty-first century. Blockchains don't necessarily have to only track financial transactions; they could also be used to securely distribute other information let's call it complex metadata, might be stored. Blockchains are essentially just indexes of standardized information. In a very simple sense, blockchains are community-generated maps. What this technology can enable in the fashion business is uniform real-time access to updated product information supplied by brands, a universal pathway for retailers to immediately report back to suppliers on things like stock levels and customer feedback, and then who knows what else might come along once something like this new basic building block structure is in play.

One technology is not employed by fashion companies yet is the blockchain and could be used by every brand accessible to any retailer, editor or consumer, feeding new digital tools that would massively democratize the curation of fashion. In a connected supply chain, there is information available across the entire value chain. RFID tag inventory provides opportunities for instant traceability, improved inventory management, and automated recycling. A connected supply chain creates digital information, where analytics can be used to establish circular insights. Automated sorting of clothing enables more efficient recycling and reduces waste. Improved logistics, inventory management, and planning of collections contributing to less waste, and greenhouse gas emissions. Also enables transparency and instant tracking of material sources.

Blockchain, ICT, and IoT create opportunities for an end-to-end connected and transparent fashion supply chain. With distributed database protocols, blockchain enables a complete audit trail throughout the entire fashion

value chain. IoT enables connected clothes across the very same value chain. Until now, manual intervention is required to recycle apparel.

Blockchain could have widespread ramifications across the insurance value chain, increasing market reach and customer personalization while also cutting costs in these ways:
Insurance products, pricing, and distribution may be wildly altered as blockchain proliferation and its associated smart contracts spawn new products, like parametric insurance and insurance implanted in transactional purchases, and realize efficiencies in the insurance process, thereby lowering prices and allowing for broader reach into emerging markets.

The blockchain may end up being considered one of the most important financial services innovations of the twenty-first century. But what exactly is a blockchain and why does this technology seem to have such extraordinary capabilities —lending it to seemingly limitless opportunities? This paper aims to illuminate just that by explaining the blockchain's significance and implications for the insurance industry, as well as outlining the rich and fascinating history behind it.

The blockchain is significant in that it combines a distributed database and decentralized ledger, completely removing the need for verification by a central authority. For example, through its underlying blockchain technology, bitcoin solved the double-spending problem, which stymied digital currencies before it. It also reinvented the concept of monetary networks by providing a true peer-to-peer payment system and eliminating the need for intermediary banks, including central banks.

Many companies already dabbling in blockchain technology, the author outlines the following real-world applications across a wide variety of industries: (i) Banking, (ii) Fashion, (iii) Smart Contracts, (iv) Connected Car, (v) Healthcare, (vi) Internet of Things, , (vii) Identity, (viii) Marriage and Divorce Certificates, (ix) Insurance, (x) Wills, (xi) Food Safety

The list below highlights just the far-reaching blockchain applications for various industries:
(a) The American Institute of CPAs, Deloitte, Ernst & Young, KPMG, and PwC consortia triple-entry accounting on the blockchain.
(b) Automobile sales Visa and DocuSign Blockchain to build a proof of concept for car leasing
(c) Banking R3 (a consortium of more than 70 major banks) synchronizes financial agreements among members using BC
(d) Cybersecurity companies using blockchains to fight cyber-attacks.
(e) Sony Global Education recording students' results on the blockchain.
(f) Energy LO3 energy trade using blockchain. \
(g) Finance—stocks Nasdaq Opening blockchain services to global exchange partners.
(h) Japanese government sends blockchain start-ups abroad as part of an innovation program.
(i) Mass media entertainment Disney develops its own blockchain
(k) Money transfers SWIFT testing blockchain technology.
(l) Social media companies use blockchain to create new social media network that pays for content.
(m) Microsoft Azure develops first sports blockchain.
(n) Walmart tests supply chain management using blockchain.

Quantum Computing
Scientists at the MIT (USA) created a suitable pathway for the large-scale production of quantum logic gates for quantum computing architectures required for quantum computers. Researchers devised a fabrication technique that produced well-spaced ensembles of several nitrogen vacancies (NVs). The research team utilized the stencils to attain a regime by the basic process of implanted nitrogen scattering in the diamond lattice and opened the door to scalable creation of isolated spin ensembles for next-generation quantum computing. Diamond nanophotonic technology is a contender for next-generation optical computers. The potential of quantum computers is immense and could bring vast opportunities in computational power and ultimately replace digital computers. Software (Qiskit) for experiments on IBM Q quantum computers, Qiskit is a comprehensive software platform that challenges a community of researchers, scientists, and developers

contributing valuable expertise to achieve the goal – the software stack should be easy to use quantum computers. There is a long way to go to making a commercial universal fault-tolerant quantum computer. Quantum hardware continues to mature, software plays a vital role in the success of quantum computers.

Applications:
(i) Supply chain & logistics – Provides best solutions for ultra-efficient logistics and global supply chain.
(ii) Financial Services – New ways to model financial data to isolate global risks to make better investments.
(iii) Enables facets of AI such as machine learning much more powerful dealing big data.
(iv) Materials – untangling complex molecular interactions leading to the discovery of new materials.
(v) Cryptography
(vi) Computational Chemistry
(vii) Drug design
(viii) Cyber Security
(ix) Smart Fashion Wearables
(x) Codebreaking
(xi) Circuit, Software and System Fault Simulation

METHODOLOGY

In this study, the research methodology includes the following:
1. Exhaustive literature review.
2. Systems thinking perspective and modeling methodology on software development for the four "Integrant Technologies" – 5G, AI, BC & QC.
3. A case study on Inditex group to provide analysis and a perspective on the application of four "Integrant Technologies" on sustainable value co-creation using QCIC model.

Segment 1: The literature review explores various terms broadly and the search keywords include explanation sections mentioned above: (a)introduction, (b)research background that includes analysis and explanation on the four "Integrant Technologies" - 5G, AI, BC & QC.

Segment 2: Systems thinking perspective and modeling methodology on the development of the four "Integrant Technologies" – 5G, AI, BC & QC.

5G wireless system perspective:
- Enhanced Mobile Broadband requires hundreds of megahertz (MHz) of channel bandwidth using new frequencies for mobile wireless - 3.5GHz for 5G, to tens of gigahertz and beyond into the millimeter wave (mm-Wave) spectrum.
- Ultra-efficient for streaming data, and massive multiple inputs/multiple outputs (MIMO)
- Fixed wireless offering more options to get 20 gigabits per second (Gbps) connections.
- Wireless infrastructure ideally suited to adaptive-array steerable antennas
- Low latency for real-time connections enabling augmented reality/virtual reality (AR/VR)
- IoT connecting more than a trillion devices to the Internet in the next ten years with extremely low data rates, battery life greater than ten years, and the longest possible communication range.

Artificial Intelligence (AI) perspective
AI ventures are working closely with the fashion industry to identify trends, automation for repetitive task whilst making the integrated platform truly intuitive. Artificial intelligence (AI) is not only enabling the fashion industry to cut down costs and overheads but also making an integrated platform smart, superior, and intuitive. The brands like Inditex and other aspiring companies in the fashion domain would have to welcome the "Integrant Technologies" such as AI, to maintain their edge and attain long-lasting business success. Fashion companies are leveraging the power of big data to predict customers behavior. The learnings from the same can be further utilized to improve the service, product positioning, pricing and more. AI can help to extract important information from the raw data faster and analyzing data through AI holds greater significance in times to come.

VR, "AR" and "AI" are technologies that are being used in the development of many state-of-the-art products. Most of us know these terms but don't know their real meaning. These three technologies have brought some tremendous changes in the world of technology. Virtual Reality (VR) fabric headset–When one thinks about virtual reality (VR)fashion is not something that immediately comes to mind. VR is used by the fashion industry in the following ways:(i) 3D avatars (virtual humans) to help with clothes design, (ii) Fashion show - a 3D image was projected into a real-world setting, i.e. a catwalk as part of the show, and (iii) 3D fashion portfolio. AI is a kind of technology where human intelligence is simulated on machines. AR is the use of computer technology to enrich the real environment and provide real-time interaction with surroundings Unlike VR, it takes us to whole new environment and augments surroundings by adding sounds, videos, text, graphics, etc. Example - Snapchat filters can make changes to a normal environment by adding graphics, texts, sounds, etc. Simply put, AI is described as computer systems that can behave like humans, think, learn, and understand and is based on the concept of Machine Learning. Combination of AR and AI is the future to provide mind-boggling results.

The digital and technological landscape is continually changing. Automating tasks makes businesses more efficient and productive. Business and developers can solve complex processes using intelligent automation. The Future Is a balanced mix between AI, AR, and VR. AI technologies to reduce human error rates through AR and VR simulations of tasks. Advances in AI, VR, AR mean fresh design opportunities for designers. The technology power of AR and VR applications are exponentially growing at an extraordinary rate. New applications are emerging in an unprecedented manner in almost every industry. Both VR and AR, combined with AI will significantly disrupt humans making lives "auto-magical." And the implications will touch every aspect of human lives. (https://vr.google.com/).

"Integrant Technologies" are enriching a new wave of highly immersive games and online communities. Minecraft is over eight times the size of the earth and kids would rather build in Minecraft than any other activity exploring and creating new worlds experiences and be challenged. While the Integrant technological methods are new, this concept has been alive for generations. As the nature of childhood, kids get lost in the world of Harry Potter, or watching television, or playing in imaginary worlds with characters. A virtual character in AR and VR geared with AI capabilities can participate in a fictional storyline and interact directly with humans in virtual and digital environments. Even Star Wars to provide a novel social media experience. Characters like Pokémon brought into the real world with Pokémon Go, populating with holograms and tasks. AR has the power to turn physical environments into a digital gaming platform and home into a narrative environment. AR and VR are on the cusp of revolutionizing the way humans create worlds, play, tell stories, c and interact with both fictional characters and each other.

The interaction and convergence of Internet of Things (IoT) and artificial intelligence (AI) at work in several business areas. The combo leverage of machine learning with big data unlock the potential of new opportunities in IoT. Moreover, the author contends that IoT and connected systems drive the adoption of AI as intelligent automation to make sense of the big data generated from sensors. Looking deeply at IoT and AI, it is relatively easier to understand commonality between them particularly when data turned into information - intelligence - decisions for meaningful purposes. AI is changing other technologies and levels in the big picture IoT and Industrial IoT.Integrant Technologies enriching and enabling digital transformation, VR, AR, cloud, big data, robotics, etc. working side by side with IoT and AI. The evolutions of IoT platforms taking place in the increasing role of AI engines and cognitive capabilities, and support for AR/VR.

AI and IoT: a compelling combination perspective

The combination of IoT and AI have been used for decades in making sense of data, locating data and putting data at work, with a focus on the rise of unstructured data. Acting as the to AI's brain, IoT facilitates inputs (data) and outputs (actions) for computing and data analytics function of a centralized AI system.
The following reasons are why the combination of AI and IoT is 'novel':

- IoT and AI are still relatively new.
- Both are used for the *purposes of proactive and predictive maintenance.*

- In the scope of maintenance, predictive analytics and operations in various sectors of industries where AI and IoT led enterprises to reap the benefits.

AI and the essence of IoT

IoT essentially is the network of connected sensors, actuators and communication technologies like 5G with specific hardware, software and architectural approaches to get data from myriad devices for many users, purposes, innovations, and enrichments**.** The essence of IoT is about getting data from connected devices and leveraging that data for a valuable reason which includes enabling people and connected devices to take an action based upon the analyzed and visualized data. Without these elements there is little sense in connecting things of course. And with big data analytics and visualization we are already de facto getting in artificial intelligence in more complex environments and applications. The convergence of AI, IoT and big data is driving new, and next gen applications.

AI and IoT in manufacturing and beyond

AI and IoT are already converged or converging. AI and IoT: the brain and the body. AI and IoT work together and offer various applications in practice such as augmented intelligence or autonomous intelligence in many industries. AI and IoT are obvious companions and AI also in a way needs IoT.

Blockchain (BC) & AI systems integration perspectives

Humans create the artificial neural networks and teach the computer algorithms with the help of machine-learning algorithms. Yet, the developers of artificial intelligence are not able to predict its actions. The AI-systems are sort of black boxes for human intelligence. The machine's memory contains more information than the brains of the most intelligent people in the world. It must differentiate which of the information is important. Algorithms are created to teach the computer to do this. If all the decisions of the AI system are recorded in the blockchain, the extensive database is received and able to check the decisions taken by AI to explain their logic. Also, it will ensure the security of the data since the information stored in blockchain cannot be falsified.

AI can increase the efficiency of blockchain

Blockchain transactions are validated by the data miners. The AI trained by machine learning algorithms able to guess the code in an intelligent way enabling to speed up and cheapen the process of validation.The data-storing methods of blockchain can also be optimized with the help of machine-learning algorithms.

The benefits of integration (BC & AI)

The work of decentralized artificial intelligence is based on a parallel computing system. The distributed nature of the system can analyze huge data sets quickly. The dataset will be split into smaller units and can be united into an integral database. This vast information (world database) can be available to every member of the network and possible to use this vast data for training the advanced AI-algorithms.The platform for design of NLP-oriented applications is quick and convenient and is possible to test and improve the application to increase its precision and simplify the following aspects of data analysis:The following businesses are dealing with big data analysis:

- financial sector
- fashion industry
- telecommunication and media
- consulting, customer service, tourism, medicine etc.
- filtering out the irrelevant information
- knowledge extraction

https://sloboda-studio.com/blog/how-blockchain-and-ai-integration-is-changing-business/

Quantum Computing (QC) & Blockchain perspective

Quantum computing uses factorials and exponentials in algorithms and is based on the use of qubits instead of bits. Quantum computing is emerging as a hot topic, scientists and developers have started to work to safeguard

the future of blockchain and internet in general. BlockDAG uses the tangle protocol that offers “quantum resistance.”. Another option is to use private blockchains where access permissions are strictly controlled to be validated by the network creator.Both quantum computing and AI may have a negative impact on blockchain protocols and solutions, but the author contends that both are undeveloped, and it will take ample time to become a real risk. The quantum computing security risk is manageable

Experts are suggesting quantum computing may render blockchain obsolete. This type of computing can hack the cryptography hash that universally secures the blockchain and in general the internet. Therefore, quantum computers may complete fraudulent transactions and steal coins. Given the exponential power, quantum computers threaten blockchain’s future security.

Blockchain are synced throughout a peer-to-peer network and consists of encrypted nodes connected on a chain, therefore it is impossible to hack. The order of entries adheres to the blockchain protocol, which makes it counterfeit-resistant.
https://hackernoon.com/quantum-computing-is-it-the-end-of-blockchain-9ce4a9664720

Systems Thinking & Software Development [5] from a systems perspective of “Integrant Technologies”
QCIC as a complexsystem can’t be individual parts. One need a broader perspective to see the big picture. Complex systems can’t be individual parts. One need a broader perspective to see the big picture. The systems thinking enable to visualize a complex system as a framework with the interrelationships between internal and external elements that influence the system. Completion of a systems diagram allows better understanding how it works, the delays in the system how to improve the system based on the concluded data.Systems thinking has evolved as an alternative to the old paradigms. Many methodologies are derived from the systems thinking. With systems thinking, designers learn how their organization interact. Systems Thinking was originally proposed as an analytical paradigm to different scientific disciplines like biology, psychology, the social sciences, etc. Nowadays systems thinking has become an established perspective on the management process. One goal of systems thinking in management is conceptual understanding of the structure and behavior of complex organizations and the benefits of systems thinking can be explained using Brooks' Law [6]. As shown in figure 7, a common systems perspective on design and development process consists of three subsystems, namely sensors/controller system, software development system, and customer System.

Software development environment requires often change during the design and development life-cycle to meet business needs, minimizing headaches for development teams. The software development system has requirements and resources as inputs, and software asoutput. The inputs and outputs are flow of information. Ex: the customer system has software(e.g. information about the software's actual functionality) as one input, and it produces requirements (e.g. information about the software's desired functionality) as one output. The outputs of such a system are not only dependent on the inputs, but they also depend on the system's state.This create dynamics that result in time delays between input changes and corresponding output changes of a system. Delays can cause two effects:(i)the system needsmore time to respond to changes, (ii) delayed flows ofinformation result in outdated information. Both undesirable effects of delays can be explained referring to Brooks' Law and Figure 9.In this study, the author has identified two sources of delays insoftware development processes, that are generally addressed by agile methods.The first source of delays is the separation of processdefinition and process execution, that is a frequent practicein software development management. Contrary to this,agile software development methods propose an integrativeapproach toward process definition and process execution.The second source of delays are buffering strategies, thatare widely used in software development management.

Based on authors extensive experience, there are many ways, randomly one could explore better configurations in a software development project. Injecting randomness, as shown in the above figure 7, into a software development project, the objective is not to create chaos, but to create new avenues for the information to flow within the project team and a novel way to derive the outcome. Using such practices increase project's chances for success. The chance of success increases for the project by exploring new organizations and structures

through a process of small (safe-to-fail) changes that can lead to ultimately superior performance.

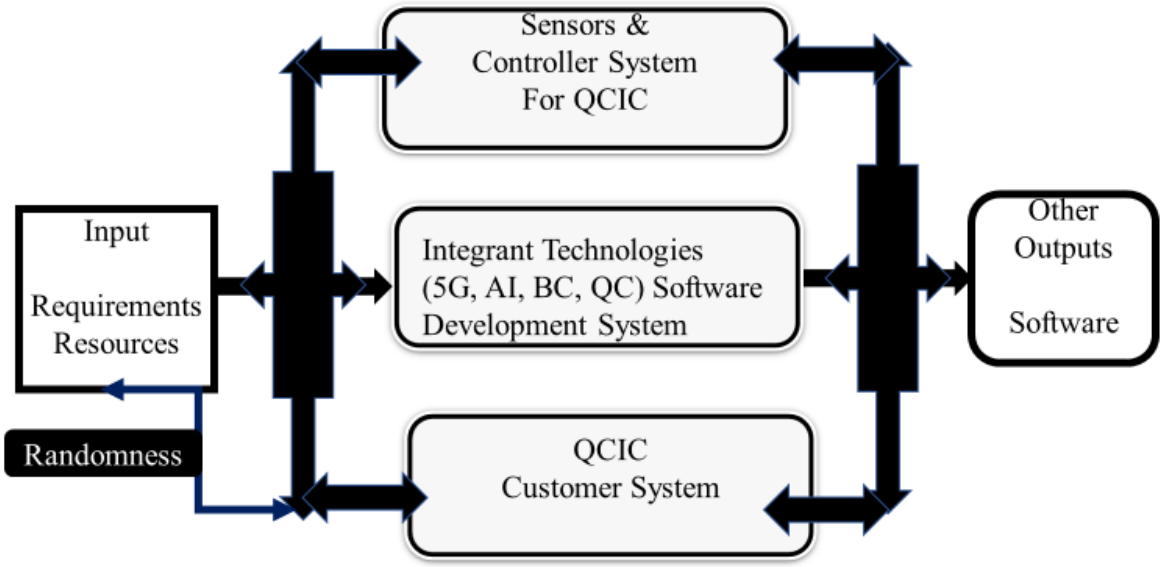

Fig.7 A systems perspective of"Integrant Technologies" software development

The author introduces the systems thinking and modeling methodology as a conceptual and analytical method relevant to the design and development of "Integrant Technologies" from the view point of fashion. The development of systems thinking, and modeling methodology involves the following five distinct phases and can be used separately or individually, for value added purpose as shown in figure 8:

(i) Problem structuring involves scope and boundaries consisting of (a) problem areas concerning to stakeholders, (b) collection of information and data, (c) conducting group sessions for creative problem structuring.

(ii) Causal loop modeling – conceptual models of the problem is created through (a) key variables identification, (b) behavior for the key variables, (c)developing influence among the key variables, (d) discussing dynamics of the behavior, (e)identification of system archetypes, (f) identification of leverage points, (vii) developing strategies to intervene.

(iii) Dynamic modeling involves the following phases: (a) development of a high-level systems map of a potential simulation model, (b)defining variable types , (c)collecting detailed and relevant information and data , (d)construction of a computer simulation model, (v)producing graphical and output of the model, (e) verifying model equations and validate the model's behavior, (f) performing sensitivity tests , (g) testand design policies/procedures with the model to address management concerns, (h)developing test strategies.

(iv) Scenario planning and modeling includes strategies and policies for all stakeholders: (a) developing general scope, and timeframe, (b) identification of key drivers that could have a significant impact on the decisions, (c) constructing pro/con scenarios, (d) simulating the scenarios with the model, (e) evaluation of the performance of the strategies with the model for each scenario.

(v) Implementation and organizational learning, most beneficial and enduring outcomes of systems thinking and modeling, includes (a) preparing a report for all the stakeholders, (b)communicate outcomes and

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insights to all stakeholders, (c)developing a detail picture for the simulation model, (iv)develop and use the learning lab process to facilitate learning for stakeholders.

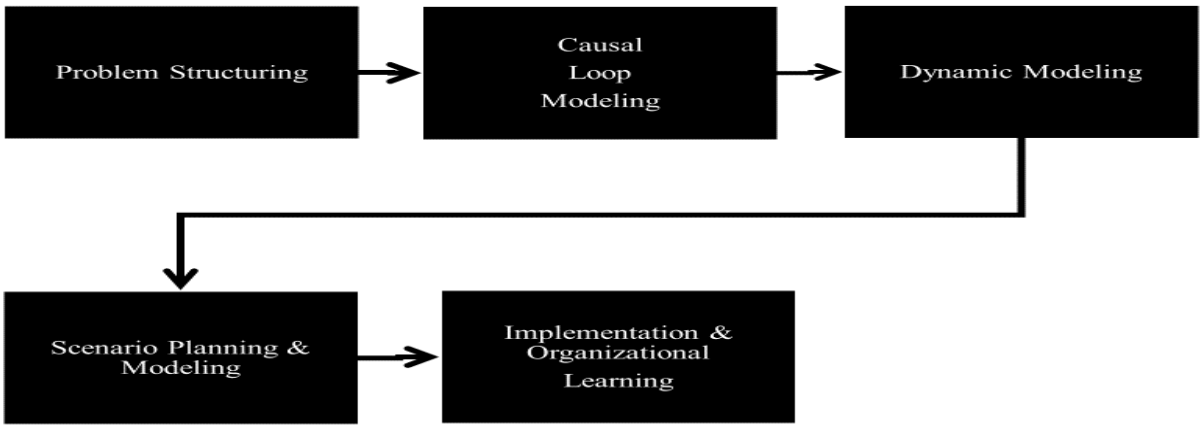

Fig. 8 Systems thinking & modeling methodology

TOWARDS A CARDINAL COADJUVANT QCIC MODEL

Still, to date, the most top leadership team of a firm consider sustainable development as a one-dimensional opportunity. Such a one-dimensional approach provides firms shortcomings to deal with the challenges in a strategic way. The global challenges have ramifications for every aspect of a company's business model and strategy. Hence, value co-creation requires a multi-dimensional approach by firms to achieve optimum performance.

In this study, the development of a QCIC model is focused on the co-creation value framework that involves the synergetic relationship of four integrant technologies, brands stakeholders and the relevant value chain in a multidimensional opportunity. The building blocks and practices of the sustainable value co-creation (SVCC) framework, as shown in figure 9, are: (i) application of four integrant technologies (5G wireless communication, Blockchain-BC, Artificial Intelligence-AI, Quantum Computing-QC, (ii) cooperation between the stakeholders of a brand, (ii) stakeholders' participation in the entire value chain, (iii) products, process and services interactive actions with the application of four integrant technologies

Using a case study on Inditex brand the author examines the application of four integrant technologies on the concept of sustainable value co-creation. Such a proposition enables brands to achieve benefits increasing performance, substantial cost savings or to integrate sustainability into their supply chain. For each of the stakeholder, there is a different focus. For example, brand integrators together with suppliers focus on the system integration, synchronization, and convergence of their products, process, and services. Customers and end users add their inputs to receive the functional, emotional and social satisfaction through dialogue with brand providers. All these activities will inevitably be linked to the surrounding society that empowers communities and promotes joint efforts to achieve both economic growth and sustainability.

Based on the discussion above, a SVCC conceptual framework is constructed, as shown in figure9, for the brands to use four integrant technologies (such as Quantum Computing, 5G, Blockchain, Artificial Intelligence), and the framework embraces the brand stakeholders in which it operates. At the core of the framework stands the stakeholders' interactive work 'value co-creation' that is connected and enabled by the integrant technologies. A QCIC model is presented that connects the global sustainability challenges to the creation of stakeholder value by the brands such as Inditex group as a case study mentioned below. This QCIC model can be used as an educational framework and guide for all stakeholders including suppliers, providers, customers, decision makers and other industries who are seeking for value co-creation for sustainable development.

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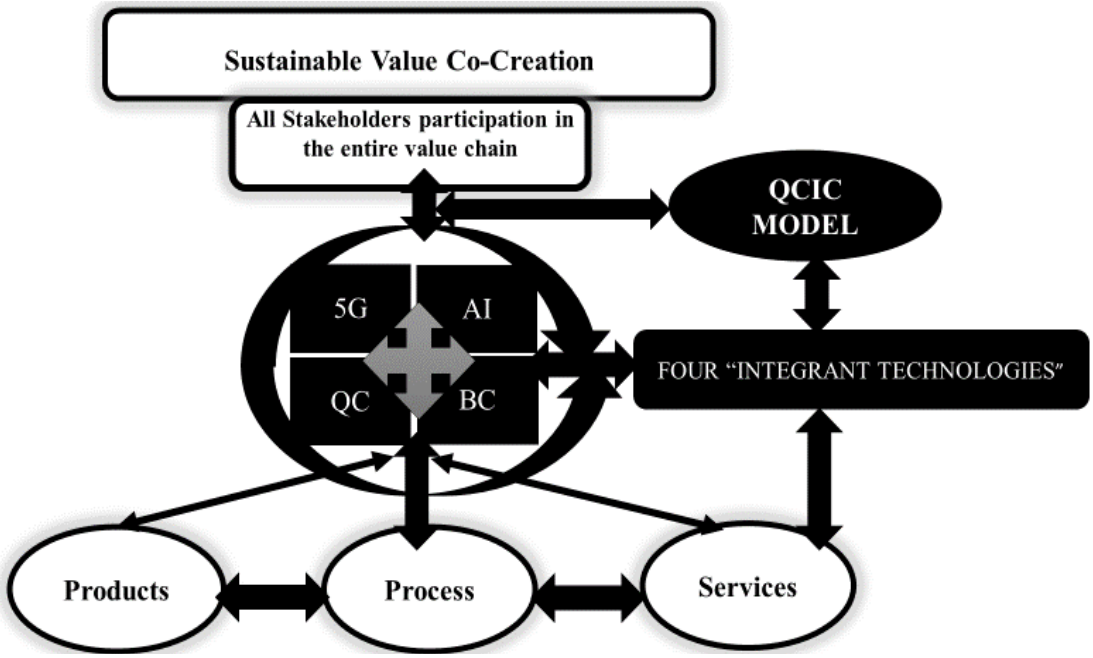

Fig.9 Symbiotic QCIC Model creating Sustainable Value Co-Creation

Inditex Case Study

Amancio Ortega, the founder of Inditex, started in the clothing industry in 1960s in A Coruna, Spain. He and his wife, Rosalia Mera started making clothes from their home. Then Co-founded the company GOA Confections (Spain) in 1972 dedicated to the manufacture of clothing and the first Zara store was opened in 1975. During 1975-85, the next ten years, the company expands rapidly to create Inditex (Industrias de Diseño Textil SA). Inditex started as a small family business in a workshop making women's clothing. Since the inception the fundamental idea has been consistent – the customer is at the epicenter of everything. The company brings customers closer than ever to the products at affordable prices. In the following years, the company expands abroad opening stores in Porto (Portugal, 1988), New York (USA,1989) and Paris (France,1990). Since May 2001, Inditex became a public enterprise and has been listed on the stock market. Today,as shown in the exhibits 1a and 1b, it has nine fashion brands (Zara, Kiddy's Class, Pull and Bear, Bershka, Massimo Dutti, Stradivarius, Oysho, Zara Home and Uterque) over 7000 stores & online,171839 employees (97 nationalities) in 96 markets globally.

The success of Inditex group has an integrated model of online and retail stores. People are at the heart of everything at Inditex and employees have a shared vision building on sustainability, of growing with suppliers and building a positive future for the communities. Inditex has a solid growth model with sustained growth over the years, coupled with the following consisted creation of economic, social and environmental value: (i) People in the center – commitment to stable and secure work, (ii) a continually expanding integrated platform - new stores and online platforms designed to enhance the customer experience, (iii) Customer-oriented technology investment - value-added customer services, (iv) centralized and cutting-edge logistics model - ongoing investment in innovation and automation - RFID Integrated stock management, (v) fashion value proposition articulated constant growth in all brands, (vi) Sustainability, a strategic cornerstone and collective calling - development of the circular fashion mode applying the circular economic model. Inditex, historically, has faced challenges of reputation that could have severely affected its sales. However, because of the quick reaction and pro-active actions of the company, the innovation, and flexibility in its business, it has allowed growing exponentially.

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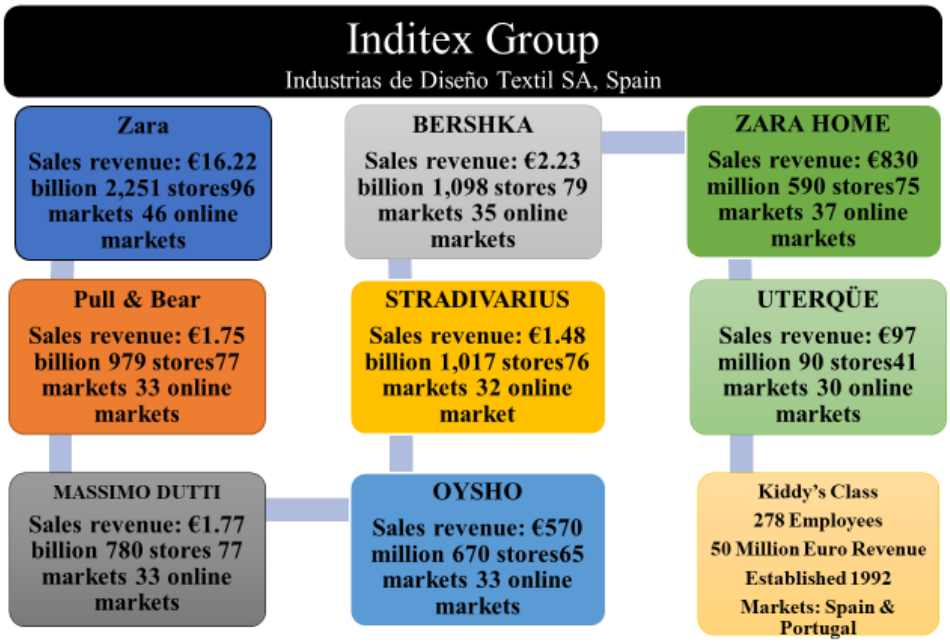

Exhibit 1a. Inditex Group (Nine Subsidiaries) with an integrated platform

Company (Subsidiaries)	No. of stores	Founding Year	Market
Zara Home	563	2003	Home goods and decoration objects
Zara	2,232	1975	Fashion for men, women and children
Uterqüe	82	2008	High-quality fashion accessories at attractive prices
Stradivarius	1,015	1999 (acquired)	Casual and feminine clothes for young women
Pull and Bear	982	1991	Casual laid-back clothing and accessories for the young
Oysho	646	2001	Lingerie, casual outerwear, loungewear, gymwear & swimwear and original accessories
Massimo Dutti	769	1991 (acquired)	Clothing and accessories for cosmopolitan men and women
Bershka	1,096	1998	Blends urban styles and modern fashion for young women and men
Kiddy's Class	278	1992	Children Clothes through online stores

Exhibit 1b. Inditex Group (Nine Subsidiaries)Market Segments & Positioning

Sales Revenue: 23.34 Million Euro (2017) with a 59% growth in sales over the last 5 years (2012 to 2017). Online sales have grown 41% with sales revenue growth (online) 12% in one year (2016 to 2017). The integrated platform has produced earnings growth of 7% from 2012 to 2017. The total number of suppliers: 7500 with 22 billion Euro invoiced. Technology and logistics RFID in all chain's expansion of logistics capacity enhanced and more integrated stock management.

Inditex has been successful based on the following design, operational strategy and customer related technology innovation: (a) Flexibility and precision with the customer in mind, (b) Constant creation of new designs through 700 designers, (c) Proximity production: 57%, (d) Continual innovation in supply chain management (e)Traceability in information management, monitoring and continuous training, (f) flawless execution through

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12 clusters, 7500 suppliers, 7,210 factories, (g) A cutting edge logistic model - Continuous investment in innovation and modernization: RFID, (h) Innovation in Online services (same day and next day delivery services, (i) Automatic order pick up points, (j) Self-Check Outs, (k) Integrated Inventory /Stock Management, (l) Logistics hub in Lelystad (Netherlands), (m) First hanging garment multi-shuttle, (n) Sustainability, a strategic cornerstone and collective calling social dimension. https://www.inditex.com/documents/10279/561548/2018+Annual+General+Meeting+Presentation.pdf/34a23938-93a6-4cef-9bb6-d24115daf078

Application of QCIC model to the Inditex integrated (customer focused and logistic) technology platform, as shown in figure 10:

Inditex's 2018 total technology related investment in the integrated platform: 1.5 billion Euro (invested in recent years customer focused technology and logistics technology).https://www.inditex.com/documents/10279/561548/2018+Annual+General+Meeting+Presentation.pdf/34a23938-93a6-4cef-9bb6-d24115daf078

Inditex's cost savings applying the QCIC model: minimum 25% (375 Million Euro). The following specific benefits, productivity performance and sustainable co-creation value through the integrated technology platform with the application of QCIC model that includes the four "Integrant Technologies:

1. 5G- internet of things connecting everything Inditex can provide a networking paradigm with the following benefits: (a) Mobility – eliminate need for special mobility overlays: (b) Security – guarantee the integrity of every data object (c) Storage – dynamic placement of information anywhere in the network (d) Trusted data analytics.

2. Artificial Intelligence (AI) face recognition software can make decisions like recognizing a face, from 3D avatars to wardrobe advisers and shaping the way one gets dressed affecting day to day life and improve efficiency, performance, and productivity. The use of machine learning (ML) and natural language processing (NLP) techniques drive the automation of a complex web of cognitive processes benefit various aspects of internationalization process of a fashion brand like Inditex to penetrate international markets to achieve the global vision.

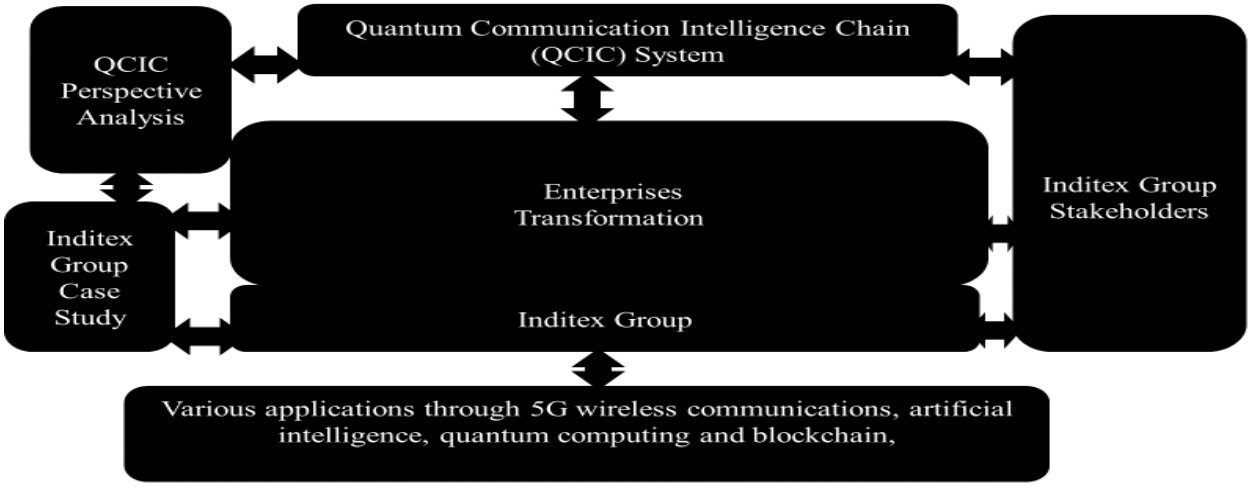

Fig. 10 The Applications of QCIC model to Inditex Integrated Technology Platform

3. Inditex through blockchain, a distributed ledger technology (DLT), can maintain continually growing list of transactions or records called blocks containing a timestamp linking each blockto provide transactions in a fraction of second to attain better financial services innovations streamlining the process to enhance transparency and security.

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4. Quantum computing:Where current digital computers would require tens of billions of years to solve some of the world's most challenging problems, a quantum computer would be able to find a solution in only minutes, hours, or days enabling designers to develop new catalysts and materials, new smart fashion wearables for Inditex group offering substantial cost savings, competitive edge to stay ahead of the curve in the market.https://www.inditex.com/documents/10279/561548/2018+Annual+General+Meeting+Presentation.pdf/34a23938-93a6-4cef-9bb6-d24115daf078

CONTRIBUTION

This research makes several contributions to "Integrant Technologies" management, supply chain, value co-creation literature. A comprehensive perspective of recent integrant technological developmental endeavors in the field of 5G (fifth generation) mobile communication, quantum computing, artificial intelligence, and blockchain are offered to ensure the futuristic synergetic systems thinkingthat are going to provide evolutionary and revolutionary applications in the years to come.Integrant Technologiesare emerging perspective in the academic research. This research contributes worthwhile insight on "Integrant Technologies" application on various industries.A case study on Inditex group provides analysis and a perspective on the application of four "Integrant Technologies" on sustainable value co-creation using QCIC model. The author provides the essential principles of systems thinking designwith the QCIC innovation as "holistic and interdisciplinary" approach forthe transformation of value chain to overcome competition to attain design transcendence and stakeholder satisfaction. The relevant insights described in this paper are useful lessons to entrepreneurs, marketers, technologists, and academia.

CONCLUSION

The objective of this conceptual paper has been to analyze the literature to-date, to establish a cardinal Coadjuvantmodel to understand the applications and benefits of "Integrant Technologies". So far,the current literature does not provide any comprehensive model on the integration perspective of QC, 5G, AI, BC. This research deals with an integration environment between four technologies (QC, 5G, AI, BC). This new model requires a mix of technical, entrepreneurial, international managerial experience, value co-creation business model, and knowledge to transform an embryonic cutting-edge technology venture or an established enterprise to continually execute innovation to match the market need to attain success.

There are tremendous opportunities through 5G across a variety of sectors to connect the world in creative ways. The use of mobile devices, sensors, and remote monitoring equipment is going to grow and there will be a dramatic advancement in patients receiving imaging, diagnosis, or treatment through digital technology. To ensure all of this becomes a reality to facilitate an end-to-end system. Devices must connect to networks and the cloud in ways that are interoperable and secure.

Technologies are not a universal panacea for sustainability or value co-creation. Their impact needs to be assessed on a comprehensive level to ensure net positive gains of value co-creation. Sustainable production need to "do more with less" and profits need to be anchored to social benefits for people and the planet. To be truly useful, usable and desirable for consumers, it is vitally important to see the future improvements in user-centric applications.

In the traditional market concept of product- process - service oriented economy, value is created inside the firm and consumers outside the firm. However, technical advancements make value creation a synchronic and interactive process. Suppliers and customers are no longer on opposite sides but interact with each other for new business opportunities.The stakeholders of an industry need to understand the importance of the SVCC concept. Empowerment of stakeholders and rise of "Integrant Technologies" need the acceptance of stakeholders in the brands like Inditex's value-creating process. This research demonstrates "Integrant technologies"; such as QC, 5G, AI &BC can inexorably facilitate the sustainable value co-creation in the "Integrant Technology" era enabling the sustainability for the various industries. In the future, the industry

stakeholders need to think the seamless integration of QC, 5G, AI &BC that will give immense benefits with regards to productivity, performance and cost savings with sustainable value creation.

REFERENCES

[1] Preskill, J (2018). Quantum Computing in the NISQ era and beyond, Quantum – The open Journal for quantum science, Vol2, p.79, doi.org/10.22331/q-2018-08-06-79
[2] Agiwal ,M; Roy, A ; Saxena, N.(2016).Next Generation 5G Wireless Networks: A Comprehensive Survey, IEEE Communication Survey, Volume: 18 Issue: 3, **doi:** 10.1109/comst.2016.2532458
[3] Padhi, P.K (2018).Fashion Design, Digital Technology, Aesthetics, and Contemporary Society –A Critical Review Vol-5, Issue-6,International Journal for Research in Applied Sciences and Biotechnology, Vol-5, Issue-6, p. 9-20, doi.org/10.31033/ijrasb.5.6.
[4] Gunning, D (2017). Explainable Artificial Intelligence (XAI), DARPA/I2O, https://www.darpa.mil/attachments/XAIProgramUpdate.pdf
[5] Padhi, P.K (2019). Systems Thinking Augment Aestheticology Apotheosis, IJETRM Journal, Vol 1, Issue 2, p.26-40, www.ijetrm.com/issues/files/Feb-2019-22-1550813886-6.PDF
[6]Sterman, J.D. (1992). System dynamics modeling for project management, Unpublished manuscript, Cambridge**,** MA**,** web.mit.edu/jsterman/www/SDG/project.pdf**.**

BIOGRAPHY

Prafulla Kumar Padhi, a serial entrepreneur, has over 42 years of global business experience and held the

Founder, CEO and Chairman of the Board positions for more than 25years and managed up to US$1.2 Billion revenue operations. His education qualification includes a Master of Science degree from the prestigious Massachusetts Institute of Technology (MIT), Cambridge, USA and a graduate of the Ivy League Wharton School of Business, University of Pennsylvania (USA) and holds seven diplomas from the Ivy League Columbia University (USA), the Ivy League Dartmouth College (USA), and Kellogg School of Management (USA). For more than 40 years, as a pioneer, Mr. Padhi has been involved in entrepreneurial venture endeavors in disruptive technologies and smart fashion wearable ventures globally. So far, he has done business in 46 countries and travelled to 142 countries. He is an author, independent researcher, teacher, innovator, pioneer, product marketing architect (patent/copyright holder) in the creation, design, marketing disruptive technologies and products.