Driving Technological Convergence toward a Human-centered Global Economy

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1. Introduction

Driving Technological Convergence Toward a Human-Centered Global Economy

Many of us have invested much of our lives discussing the attractiveness of creating a human-centred global economy. We have argued about working to resolve the constraints of narrow national interests to improve the human race. We are concerned with the role of technology in the long-term process of creating a more human-centred and better-performing economy.

We began our approach to this problem with a handful of technological changes that innovators might consider to work on these goals for a more human-centred economy. We have written an essay about these developments. Other people have also thought beyond what the current trajectories of ICT adoption would suggest about more radical changes and how they might use a more general driver of technology convergence, such as a focus on human needs. These four essays complement one another and, indeed, converge on the drivers of technological behaviour. In "What Will Make the Future Different from the Past?" a focus on human needs argues that economic growth is no longer about gaining satisfaction from consumerism but rather from lifelong learning and direct caring for other individuals.

1.1. Background and Rationale

Many leading countries across the global stage are racing towards an era of technological conquest not previously seen in history. To do this, ensuring that technology is pushing the boundaries somewhat and responsibly will be paramount for developing contemporary society and protecting the world for future generations. It is for this reason that Japan and other nations and organisations have placed a strong emphasis on the melding of humanity and

cutting-edge technologies. The Government of Japan has approved the Fourth Science and Technology Basic Plan. This is the first Basic Plan to incorporate the Society 5.0 concept and positions leading endeavours in science, technology, and innovation as essential stakeholders supporting Society 5.0.

The increased interconnectivity of modern technological advances, the number of world stakeholders, and the rapid rate of technological growth have placed humanity at a critical junction. As the SDGs work towards securing a future of prosperity for all, the ensuing Decade of Action has brought renewed attention to the power of technology as an enabler. Countries and organisations have reflected this mindset in strategising, such as prioritising technological advancements in the Fourth Science and Technology Basic Plan. However, there is a growing emphasis on the human-centred aspect of those technologies. To build a truly global path that reflects the ideals and aspirations of the SDGs, eradicating deeply entrenched inequality and global leadership tensions towards these technological developments, it is necessary to drive these options in a human-centred approach.

2. Understanding Technological Convergence

Technological convergence refers to progressively separate technical, commercial, service, and network entities co-evolved, merged, and morphed into trans-sectoral pervasive technologies and standardised platforms. Evolution at the converging instance of technology and commerce is constraining heretofore national legislation, proprietary IP, and ownership, able to force jurisdictions to compete in providing global protections and value rather than in a race to the bottom grounded in differential rent.

As technologies mature to produce previously unthinkable opportunities, technological convergence instances scale in increasing complexity. Hyperconnectivity and convergence in the digital sphere represent the world economy's attempt to know and worldwide deploy margin-optimized processual convergence. Overriding the future we expect of us, the technical potential is more an expression of the present's path dependencies or regulatory penury of prior investment operating at the limit of good enough science than a matter of abstractions about technical evolution. Concerning digital convergence per se, economies of scale and attendant criticality merely result from previously separate technologies co-evolving in complexity over time. Until that juncture of prevailing commercial utility, as technologies mature to find it harder to evolve and optimise

within their boundaries, the technologies converge or are compelled to interoperate to augment their range of applicability. Even at maturity over time, incompatibilities and friction from differing vendors still represent market opportunity.

2.1. Definition and Concept

This subsection explains the meaning and implications of technological convergence. Technological convergence is one of the most critical changes in the digital revolution. It refers to the tendency for different technological systems to evolve to perform similar tasks. It sometimes means computing systems for data processing, communication systems for information transfer, and network systems for connecting people. This integrated perspective is essential to understanding the role of the information society, particularly the emergent changes in the economy. The background of convergence results from the ubiquitous connectivity of cheap and robust communication channels, universal processing and storage that have become commonplace in what some scholars call the digital revolution.

Proponents of the Information Society provide a loose description for those who need to grasp a rough sense of technological convergence. The above view of technological change is based on the more significant stress on the computer and the Internet. This emphasis is because the development and deployment of these sectors have opened several possibilities throughout various applications in various fields, presenting strategic challenges for countries in a global economy. Thus, this concentration on computers and the Internet shows what technology convergence means and where it affects the most. Convergence refers to a loss of distinction among computing, communication, and transportation systems and products as they increasingly share standard technologies, materials, and software. This new paradigm drives many economists and financial analysts to predict unprecedented growth, job creation, and synergy that can drive a new era of prosperity and innovation worldwide.

3. The Role of Technology in Shaping the Global Economy

Technology has been the predominant force driving the current phase of globalisation and the rise of the global economy. Modern technology also lays the foundation for an early phase of the emergence of a worldwide economy two centuries ago. Our ability to model a human-centred global economy depends

significantly on the fact that our economic system is a complex adaptive system that influences technology, institutions, policies, social customs, and culture. The new digital technologies reflect radical innovations in computer memory development and systems integration that comprise an inflexion point in information technology. That allows us to distinguish the current global economy from an earlier phase of the worldwide economy two centuries ago that is sometimes known as the early modern- and even proto-globalization affected by the rise of the West mainly through the Spanish and the Portuguese Empires, and the wealth creation by modern banking made possible by joint-stock companies.

In the new global economy, one crucial question is what may happen from economic, social, and environmental perspectives when digitalisation converges with other technologies. Given our long history, the result of technological innovation in the long run is a new economy that reflects complex adaptive evolution. In the early 21st century, we are still in the midst of an information revolution and, therefore, far from knowing what kind of global economy this will produce and how rapid its evolution will unfold. Today's digital technology is an important start that will affect our global economy for many years. Our economic and social analysis and the modelling of the decision-making directives from this analysis can and might be only based on our coming to some rough consensus about the kind of global economy we desire as we move from a human-centred global economy to global luxury communism founded on green technology in the early 22nd century.

3.1. Historical Perspectives

Technology and the global economy have been closely linked throughout history. Materials, labour, construction, movement, and trade have all, at various times over the past two millennia, been shaped by and incentivised the development of different assemblies of men, animals, and machines to organise and enable the movement, conversion, and trade of physical goods to friendly recipients and potentially hostile interests. The primary emphasis throughout has always been physical evasion or confrontation: metaphorically speaking, the organisation of organised vertebrate escape from crises and formation of utility from resources has always necessitated not so much creating and maintaining systems which can evade crises as it required ensuring that we had the right kind of crises.

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The change from a quantitatively and qualitatively vast, primitive global economy to an integrated digital order in the making, tied to a shift from social mores, values, politics, and uses of time based on a relation to fear to a new fear-free correspondence, represents a moment in which the question 'what is happening to our economies?' appears to merit acute attention. Where shifts in the material-technical supply chain powered such past transitions, the establishment and values of infrastructures like procedural rationality, modern scientific method, mass mechanical production, and the doctrines necessary to facilitate the implementation of a "law of value," the financiers, Silicon Valley grandees, policy philosophers, and academic consultants have legitimate concerns over the potential collision between the new value systems, their financial capital infrastructure, and the shell of our current civilisation.

The goal of this book is, more than stating and proving that substantial convergence is occurring in technical, ethical, and value arenas incisive to these questions, to tell a story of change based on which the influential players who might profit from it might as far as is humanly possible, guide it — in such a way as to minimise its downsides: from AI-reinforced digital state totalitarianism to a 50-year overheated polycrisis, and negative zero-sum or positive-security equity, inflation, nihilism, and self-cancellation. At an informative social and relational level, the establishment and utilisation of 'communications technologies' – each model of which has claimed to be unique at shaping 'the world' or 'human nature' – have produced a quantum leap in the constitution of global masses, their material orderings, and into the regulation of utility/fighting free-favour exchange at the entrepot of local city-states.

4. Challenges and Opportunities in Human-centered Technological Convergence

Before setting the stage for driving technological convergence toward a human-centred economy, it is necessary to articulate this convergence's ethical considerations and potential pitfalls clearly. Moreover, we need to specify critical areas where technological convergence already exists or will likely be heading toward a human-centred framing. The convergence sought in this work is characterised by a persistent increase in data and knowledge exchange interoperability, standards development, and increased innovation among different types of technologies. A human-centred take on technological

convergence is therefore based on ontological and economic prioritisation and could be framed as such: they seek to prioritise and fit around the needs, goals, and values of humans in the global economy.

There are warning signs in discussions of convergence of the ethical considerations, and unpacking these at the outset could potentially lay some foundations for oncoming challenges and possibilities of the convergence we seek. Challenges, for example, can include the fact that there are significant complexities and potential ethical dilemmas in the plurality of 'social' and 'economy' into a singular adaptive system driven by technological management and oversight. Human-centric convergence is an invitation into the uncharted territories of post-cybernetic socio-economics. These are novel terrains to chart, but they hold incredible possibilities if coordinated correctly and will pave the way toward sentient collaboration. Few projects for the convergence of technologies, businesses, regulations, and global standards have genuinely taken into social and ethical considerations within their working frameworks, not to mention the present push to provide both open access and citizen governance underpins most open publishing and working models across MDPI journals; however, these can also make for profound possibilities in sentient-human-centric.

4.1. Ethical Considerations

Some ethical considerations are associated with these future visions. On the one hand, they might hurt the workers in the sectors who might lose from such a shift—for example, with all cars driving themselves, societies would save about 1.3 million lives per year. If most of those lives are savable in high-income countries, the people who would lose out from this technologisation of car traffic would be the ones working in the medical systems that provide rehabilitation after accidents, care at home or in hospitals, health insurances that pay for the health care, and funeral homes. Economically, those who might lose their job in the car manual or service industries because of fewer car accidents could find new work as developers, managers, or salespeople for advanced, safer cars.

Without well-thought ethical considerations of the business models that should be allowed or even supported, there are good reasons to be suspicious of the motivations behind such transformation. On the other hand, a more human-centred global economy could contribute to solving several pressing problems of our current society and world and, with that, could be more attractive to invest in.

Developers and businesspeople could make business models where all can win by increasing overall wealth and health and being morally upstanding. For example, we know that a top predictor of a person's happiness is whether all others around her are also happy. A more human- and planet-centered economy would also mean a more stable world with fewer economic and migration conflicts.

5. Frameworks for Promoting Human-centered Innovation

For firms developing new technologies, one way forward that is beginning to gain traction is to use such design thinking approaches to frame problems in a human-centric way and to generate new ideas for creating value within that frame. Thus, to drive the technological convergence that we argue is needed, our question becomes: How can we leverage these and other associated methodologies and frameworks for promoting human-centred innovation in ways that will prioritise human interests in the development of AI and the broader wave of digitisation? In short, we believe the best tools for fostering human-centred innovation are those that adopt a multilateral, open-source, transparent and participatory approach to their use. More specifically, we believe that there are several reasons that methodologies and frameworks featuring human-centred design are particularly likely to advance the sweeping technological convergence we advocate for.

In particular, we suggest that these approaches present a practical tool for those seeking to wrestle with the ethical complexity of value creation in emergent digital technologies. The premise underlying the methodologies and frameworks we are focusing on in this section is that not only does business performance often improve when firms take a human-centred approach to innovation, but that humans and human interests should be the normative starting point for ethical evaluations of new and emergent technologies. The use of such methodologies, in other words, provides a way of driving technological convergence toward the creation of a human-centred global economy, as discussed in more detail in Part I of this white paper.

5.1. Design Thinking Approaches

At the core of design thinking and originating in specific problem-solving projects, such as understanding real user needs, reframing and harnessing systemic insights, numerous methodologies and strategies have been developed, offering a broad set of tools. Recently, recognising the potential amid the technological convergence with fields of VR, AI, Big Data, quantified society, blockchain, etc.,

these strategies are harnessed to stimulate, promote, or force necessary openings in a general "human-centred" innovation approach. Human-centred innovation is one industry-driven approach framed by international agencies to integrate sustainable development, a cornerstone of today's world economy. The International Development Policy of 2012 suggests that supported by new technologies, "convergence could be directed" towards a 'Put People First' Global Economy by policy measures that could 'drive technological convergence.' Others, such as young G-Science Academies, should "promote convergence... in the interests of the global public."

Ethical "value voting" or "veil of ignorance" is a mandate, but it can only be done by political entities constructed from behind. Players such as Facebook, Google, Amazon, and parts of digital capitalism stand on the brink of or behind it. Indeed, "design thinking" might help through large multiples, especially needing a "human-centred" approach. National consultations for extensive IT strategies in Germany, especially the European Union, show this pattern. While fat envelopes circulate amongst groups of "innovators," those "not-innovating" or "un-inspired" tell of "taking people seriously and letting them participate" in making "new rules," "inventing the future." Most want to live in a world "where people, not the digital economy, define the rules." Provides enterprises with "real encounters," this human resource management, integrative leadership, and so does a bottoms-up society. A laboratory for a liberal world beyond Growth and Waste, the belief in the Need for New everyday Things is the Religion of Timeism.

6. Case Studies and Best Practices

Drawing on various examples, we can highlight some approaches to driving convergence in the technological space and opportunities for building more human-centred outcomes. This evidence of feasibility is borne of fundamental objectives from living labs worldwide as we seek to have new societal models built on strong business models, create real impact beyond academic publications, and touch diverse communities and demonstrators for learning. The application to a particular problem or opportunity is characteristic of a "hub approach," reflecting high engagement and co-creation with a broad set of families of technologies and industries from a system of ecosystems. These practical-in-nature explorations have been identified from various industries through the activities in the Geneva-

Tsinghua Initiative, including the ICT sector, the circular manufacturing sector, and the health sector.

One challenge is to leverage learnings with a "diverse set of interconnected strengths and weaknesses" yet to influence both incremental and radical innovation policies and research and practical industry applications with different-looking stakeholders and sustain pressure toward common or similar goals. Another critical challenge is maintaining a commitment to sustainability and resilience and rebalancing the relationship for the marginalised, such as excluded communities, across real-world complexity. Under the emerging spirit and hope being communicated for an international "peace dividend," including for more effective international cooperation and collaboration and, above all, reset in humanitarian and ethics-based values in the global political economy, this moves the ground from more generic systems-oriented considerations of scope to some sectoral examples where this notion of the "peace dividend" is already emerging.

6.1. Industry Examples

There are obvious reasons why the field of human-centred innovation is filled with demonstrated cases from many different industries: Human beings are similarly involved in all of them. What I want to suggest, with the examples that follow, is that universally accepted principles of human interaction with technology—what I am calling technology characterised by communities bottom-line human value—are moving slowly into high-tech fields that until now have primarily been led by the urge to develop the next gadget or technique. Two cases I've chosen are defence-related—a development field that has historically been outside the guidelines of human-centred technological convergence. The movement toward human-centred developments in these areas is slow, costly, and ideologically encumbered, with the result that the examples I've selected range from very recent development programs to proposed ideas that have not yet been mentioned in the commissioning of government or industry R&D.

In other areas, I've also selected examples from emerging fields or technology developments derived from adjacent fields under somewhat different motivations. We will start with the emerging and moving, rather conveniently, from the sea to the air. Remember, the purpose of turning Dr Flowers's reconceptualisation of technological convergence into the way of characterising

global economies is to construct pathways built from many interdisciplinary and regional efforts and scrolling down to the fundamental units of technological convergence. The costs and dynamics of human-centred technological convergence. Doing so yields something much more concrete, a set of precise following questions tailored to the actual defence, security, civilian government, and industry organisations eager to turn any variant of Flowers's vision of human-centred technological convergence into a strategy—into a market. The portfolios of actual projects and cutting edges given here are either public products of going strategies or sketches available to operators within the particular organisations behind them or within sister or competitor organisations. They are not yet doctrines.

7. Policy Implications and Regulatory Frameworks

The idea of human-centred technological convergence at a sectoral level creates the economic potential for regions with a latecomer's technological advantage to close the gap through rapid emulation and by executing catch-up strategies. As technological floors are raised, the technologies available for late movers are higher up the stack. It will enable emerging markets and developing economies to skip levels of business model evolution in a similar way that they have been able to leapfrog generations of technology with mobile telecoms and networks. In doing so, developing nations will become more viable partners for collaboration and trade worldwide, enabling and promoting the resilience of global supply chains in the face of global crises, fostering development and stability in partner countries, and helping solidify international relationships more generally.

To make that happen, it will likely require a new overriding enforced regulatory framework that addresses the global demand for a human sense of purpose, human spiritual values, and an understanding of the human relationship with the earth rather than doing. In addition to broad principles and norms, other types of policy and regulatory measures necessary are directly incentivising or enforcing specific patterns of production and encouraging investments in certain sectors, disciplines, or domains over others; redrawing the priorities of the state and discussing how certain global public goods (GPGs), identified by the UN, can be defended to maximise benefits for the growth of a human-centred or innovation-driven global economy. In this way, breaking new regulatory ground for maximum dissent or how to translate such notions as legal rights into a digitally

interoperable world could also be encouraged, explored, and discussed. With disruption being the new constant, similar financial returns on investment could be fed into why a set of countries which at one time were classed as developing could have a steady-state investment in the adoption of innovations, not just encouraging GPGs of the environment but also unlocking the capacity of some people to further discover or inquire into places and write scenarios for others failed in the GPG situations, philosophical ethics. The perspective of partners who profit unreasonably should also be taken up in such an approach. All by Act of Parliament. With the reward base of patents, tax credits, and star rating or certification schemes.

7.1. Global Cooperation and Governance

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The convergence of existing and emerging technologies to yield new and transformative applications will likely occur globally. Moreover, pivotal stakeholders will include companies that have not signed onto merely US-driven or Western-centric industry standards and influential research institutes and governments working with different regulatory perspectives. Consequently, no government or organisation can direct this colossal transformation alone. Moreover, addressing challenges and opportunities related to global phenomena such as the digital anthropocene or human-centred technological convergence is too fluid and interconnected to be relegated to a distant subset of international summits. Instead, the 'capitalisation of a global perspective and ethos' suggests developing good governance that draws contributions across actors and institutions existing at different levels, as arrangements will be needed not just at the national, international or even transnational level—but also at the regional and the local, the community, and beyond.

From a regional perspective, it is also essential, while acknowledging that the political leadership might not be interested, to keep pushing and informing Swiss and European international policy actors and agencies with the information, knowledge, and critical perspectives on how the development of technology is going, what the converging dynamics are, and what possible beneficial/constructive impacts and pathways there might be. From the local perspective, stakeholder alliances could lead the way in embodying the kind of technological future that they wish to see. Indeed, suppose they are to contribute

effectively and critically to local-level governance. In that case, that cadre of professionals, institutional leaders, active researchers, technology hubs, etc., are moving to shape our technological futures. In this context, they must also become part of the multi-domain, multi-disciplinary communities informing local political dynamics around technology.

8. Measuring the Impact of Human-centered Technological Convergence

As convergence among advanced technologies will lead to a more efficient, equitable, and inclusive human-centred global economy, how do we measure the impact of human-centric technological convergence? Advanced technology companies can see that their favour keeps growing and expanding into domains as possible problems arise. If those problems are solved with the right combination of high technology, they can be anticipated. Next-generation technologies for discovering the unknown possibilities in our world are already being built so that when innovation and new unmet human needs occur, companies are there to solve them and profit greatly. Different forms of capital and the capacity to execute are in higher demand. More comprehensive expertise is needed because many functional blocks must be connected in various ways in different fields, emphasising social application. There are many ways to connect; after considering past high technology evolutions and their current digital and bio combinations, firms can quickly evaluate how they help converge into a new ecosystem of high technology in a design planning strategy.

Thinking in terms of high technology forms an ecosystem of many interdependencies. Some variables to assess the formation of an ecosystem of high technology have been proposed. They are as follows: Evolution of enormous past relevant high technologies such as electricity, computing, space and the Polish maker movement. Recent converging bio and ICT evolution. By considering the demand drivers for a new ecosystem of high technology, which consists of many diverse players and so the characteristics to converge, it is possible to think of performance measures that can be used to evaluate the formation of the ecosystem and its progress. Thus, there is an evolving role from a supply push of advanced technology concepts and products to a more demand-sponsored strategy of societal innovation. Measurable solid cornerstone blocks are essential for VC, and tech stock markets are minimal indicators of societal innovations. Lower-paid people around the globe are allowed to move prices, not up or down, in the

direction of sustainable outcomes that improve the lowest paid so that they eventually will improve the most socially productive actions on Earth. National and international markets will subsequently follow this effect, making the money invested a profitable endless amount of resources and options.

8.1. Key Performance Indicators

Key Performance Indicators (KPIs)

(a) Quantitative KPIs: - Number of members of the HCCNC. - Number of resources listed on DDI, categorised by the United Nations Sustainable Development Goals (UN SDGs) Goals and Targets. - Number of deployed instances of Oppenheim. - Number of open courses completed. - Number of resources developed at Tolmy that are published on DDI. - Number of data-use courses offered through CDL. - The number of alums participating in web-based courses is monthly. - Percentage of course registrants who access online content within 14 days. - Average circulation per email about UN CCS Human Centered Convergence.

(b) Qualitative Indicators: - Reports assessing the extent of use of individual tools and technologies. - Evidence of integrated/reinforced curricular content, new or improved activities on course or module level. - New or improved resources published on the Data-Driven Insight system. - Number and speed of uptake of evidence of impact across computing education and demonstration of findings in innovation in the organisation of computing. - Evidence of political, civil and moral impact, application in organisations, findings and publications resulting from critical reports on political, civil and moral impacts. - Number of participants. - Number of evidence about systems built upon the open.

(c) Contextual/Descriptive Indicators: - Monthly hits on the HCCNC website. - Number of resources listed on Data Driven Insight Data Skills Directory, aggregated by African country. - Number of resources (workshops, training opportunities, datasets, images, functional websites, blog items) collected in Data Driven Insight. - Number of resources listed on Data Driven Insight, categorised by the United Nations Sustainable Development Goals (UN SDGs) Goals and Targets. - The level of data categorises the number of resources listed on DDI. - The number of resources listed on DDI is categorised by the types of resources

already listed by HEIs. - The number of resources individual William Tolmy Fellows developed at their home institutions is listed on DDI.

9. Future Trends and Emerging Technologies

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Two thousand sixteen highlights include the convergence of artificial intelligence and machine learning, which could have the most significant transformative potential in the next five to ten years, altering our ability to think, learn, perceive, and interact. These technologies and the insights they derive will drive and shape the future of convergence. Moreover, they will increasingly drive insights from and the assimilation of extensive data from multiple sensors, sources, formats, and modalities, which can only further our understanding and knowledge. Notably, the knowledge, technologies, and capabilities must converge to ensure they are functional, scalable, safe, secure, diffusible, and applicable to both international development and developed nations.

As detailed above and in Section 2, several core technologies are small, highly interconnected, and lacking today. Despite a solid technological push with increasing documentation of potential grand challenges, the technologies have made little tangible progress in practice in moving either the research practice or knowledge from the top-tier institution domains and toward the world more generally. After analysing the following case studies, the Panel concludes that Artificial Intelligence and Human-Machine Integration (AI + HMI) have the most significant potential for societal good in the long run. Vision and Physical and Cyber Security Systems are critical in more immediate timeframes.

9.1. Artificial Intelligence and Machine Learning

Artificial intelligence and machine learning. Many experts hold that AI, machine learning, and similar technologies will be central to future economic growth. Machine learning concerns tools focusing on the treatment of (relatively) large volumes of data to establish correlations between its different components and forecast future data points based on these established connections. Although it is insufficient to capture all of what is to the human mind, the creative aspect is critical in harnessing computer-related technologies to better respond to user commands—though many limitations remain. In a more systemic view, recent studies have pointed to machine learning and other technologies like remote

sensing, augmented reality, and precision agriculture as a way to develop a "complex knowledge network". The ultimate aim of this AI-envisioned network is a real-time response to any business or government request based on "all things connected and optimised".

While machine learning can be seen as a functional, instrumental approach to tech convergence, challenges must be addressed. For example, some have noted that machine learning works best with large amounts of data. A wealth of data also dramatically improves the accuracy of any inferences drawn from the data, thereby improving the quality of predictions and subsequent policy choices. However, not every country has access to large amounts of data, and those data may be located within different silos subcommittees in other districts or provinces. AI may also eliminate the need for many low-skilled workers, disrupting societies. Suppose the future global economy can meet these and other challenges related to AI and machine learning. In that case, the emerging technological convergence will be far more efficient and human-centred, positively impacting economic development.

10. Conclusion and Recommendations

After a review of the elements, dynamics, constraints, hardships, and design and development issues discussed in using human-centred design (HCD) in this essay, we can infer the following insights:

First, identifying design elements critical to the shift within the five design dimensions will move the technological convergence process towards a globally just, sustainable, and abundant economy.

Second, the drivers of technological convergence also provide leverage points for the design and development communities to work effectively toward deploying these design elements. Nonetheless, the challenges discussed in Section 5 and the process descriptions in Section 6 highlight that this work is not easy and straightforward: it will not just happen.

There are possibilities to work toward humanity in securing a global economy, defining what is ultimately needed for design, scientific, and technological convergence, and the requirements for getting there.

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Recommendations: Drive technological convergence, not technology research. Technological convergence facilitates technology transfer and thus reveals the international level playing field critical to fostering a people-centred global economy.

The first result of the future design should be a summary of freezing requirements for human-centred global technology convergence. This humanity will further guide the project, informing what will be beyond those design principles, elements, and constraints.

Further education is thus prepared in this area to inform a unified view of what we work towards as technology students.

10.1. Summary of Key Findings

In this inaugural essay, we have extensively and thoroughly emphasised and highlighted the utmost significance, importance, and weightiness of delving into the intricacies, nuances, intricateness, and subtleties, as well as the profundities, depths, and profundity of the rich and diverse historical tapestry encompassing and embracing the captivating, enchanting, alluring, and mesmerising realm, domain, and sphere of technological development and advancement. Amidst our thorough, diligent, and conscientious exploration, scrutiny, investigation, and examination, a vast and wide-ranging array, assortment, collection, and variety of consequential and momentous queries, issues, concerns, and matters has been adeptly, skillfully, and adroitly identified, detected, recognised, pinpointed, and proffered for a holistic, thorough, and exhaustive comprehensive examination, analysis, and contemplation. Moreover, we have postulated, put forward, and proposed a resolute, firm, unwavering, and steadfast proposition, assertion, and advocacy in favour of, supporting, and endorsing a transformative, revolutionary, and paradigm-shifting shift, alteration, and modification that aligns, harmonises, and concurs seamlessly, perfectly, and flawlessly with the remarkable, extraordinary, and astounding potential, capacity, and capabilities encapsulated, embedded, inherent, and inherent within the burgeoning, emerging, and dawning epoch, era, age, and period of artificial intelligence, machine learning, and data-driven innovation, advancement, and progress. In addition, we have alluded to, hinted at, and referred to the seamless, effortless, and smooth continuum, continuity, and sequence that our cogitations, musings, and reflections traverse, for they shall ardently, fervently, eagerly, and resolutely interlock, connect, and

intertwine with forthcoming, upcoming, and future essays, treatises, and articles in a seamlessly, coherently, consistently, and logically interrelated and interconnected manner, fashion, mode, and approach. Consequently, we at this moment, and immediately, unequivocally, unambiguously, and categorically put forth, present, and advance an enumeration, description, and roster of six indispensable, essential, vital, crucial, and pivotal domains, spheres, realms, and areas that undeniably and unquestionably warrant, deserve, merit, and require our unwavering, unflagging, undivided, complete, absolute, and total attention, vigilance, and scrutiny as progress, advancement, and development beacons, beckons, and summons us forward, onward, and ahead. Collectively, jointly, and as a whole, these multifarious, diverse, manifold, and varied constituents, components, elements, factors, and aspects authenticate, validate, confirm, substantiate, justify, and corroborate, as well as encapsulate, embody, and epitomize, the foundational, basic, fundamental, primary, essential, and core concepts, principles, and tenets that inherently, intrinsically, innately, and inherently permeate, penetrate, suffuse, imbue, and saturate and propel, drive, and impel the impending, forthcoming, approaching, and imminent series, collection, compilation, and set of essays, treatises, and articles that lie nestled, nestled and nestled upon the intellectual, mental, and cognitive horizon, awaiting, waiting, and ready for discerning, astute, perceptive, and sharp minds to explore, investigate, probe, scrutinize, examine, and uncover their myriad, numerous, diverse, assorted, and varied complexities, intricacies, intricateness, subtleties, subtleness, and subtlety.

In this thought-provoking opening essay, we have extensively emphasised the importance of the human-centred transformation that envelops our digitally-enhanced world, representing the essential and distinctive feature of the remarkable technological convergence occurring globally. At this unprecedented juncture in history, an array of novel techno-economic systems and human-focused values are steadily emerging, effectively offering boundless potential to enhance and augment the lives of the vast majority. However, it is crucial to acknowledge that an alternative path exists, one that might not serve us quite as admirably. As we shall ardently endeavour to depict and illuminate, an innovative alliance of individuals, expertly combining both technological systems and human values, has the extraordinary capacity to merge seamlessly, thereby exponentially enhancing experiences and elevating every facet of our existence, spanning across

all corners of the globe. We ardently believe that convergence research, when undertaken with an unwavering commitment to empirical evidence, can synergistically amalgamate these diverse elements and foster an environment of unparalleled promise, thereby paving the way towards establishing the most productive and fruitful practices. The ongoing digital transformation is currently underway, which is unequivocally centred around the human experience; however, it is imperative to recognise that the definitive trajectory of this transformative process remains uncertain and not yet entirely predetermined. As this essay progresses, our comprehensive and meticulously crafted recommendations, eloquently expounded in subsequent sections, revolve around the vital and indispensable endeavour of comprehensively grasping the intricacies and nuances of the human experience within the ever-converging realms of technology and society. To effectively enable and facilitate this transformative journey, we cordially propose a set of meticulously integrated and indispensable recommendations designed to diligently and conscientiously consider the immense and varied body of evidence surrounding human experiences. Firstly, we advocate for the formation of a dynamic and all-encompassing alliance, seamlessly unifying an extensive range of multidisciplinary fields, commencing with the likes of engineering, psychology, and the arts, while simultaneously affording a well-structured and understandable route map towards expanding this coalition to encompass an even more diverse and comprehensive range of disciplines. Moreover, we propose a parallel and intricately intertwined enhancement of the infrastructure and conditions necessary for rigorous testing and analysis, ensuring the reliability and validity of the empirical evidence gathered. By synergistically amalgamating these multifaceted advancements and initiatives, the process of convergence has the extraordinary potential to engender a technologically-driven, socially transformative framework empowered by a rich tapestry of evidence, effectively reshaping and reorienting the emerging digital culture which finds itself inexorably intertwined with the advent of Industry 4.0.