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BECOMING A CO-CREATIVE LIVING ENTERPRISE IN THE X-VERSE

Applying the PIE X lens to organizational transformation

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In the first report[1] in the "**Digital India Innovation and the Experience-verse Revolution**" series, we explored the contours of digital India innovations. We undertook a brief historical tour of India's computing journey, and examined the role of research and educational institutions, the IT industry and startups, and the government, in pushing the boundaries of computing.

We then undertook a brief historical tour of enterprise value creation – looking at the four eras of Industrial Revolution, the accelerating pace of digital transformation of private, public, and plural sector enterprises in a tech-intensive modern world, and touched upon some important management frameworks of value creation (such as value chain, platform business, ecosystem innovation, and co-creation).

Next, we proposed a new framework of interactional value creation in a post-digital, post-pandemic world – the "**eXperience-verse (X-verse)** Revolution". Unlike the previous four Industrial revolutions driven by technology, this new era requires an "experience-first" frame of reference of interactional value creation by every enterprise.[2]

We then presented the **PIE X (Platforms, Impacts, Engagements, eXperiences) lens**, that helps visualize opportunities and challenges for risk-managed experience-centric innovation and multi-stakeholder value creation in relational **interactive X-verse ecosystems**

In the second report in the series,[3] we visualised the **education X-verse** and applied the PIE X lens to various learning and skill development experiences at organizations like Microsoft, Coursera, NPTEL, DIKSHA, Infosys and ShikshaLokam. We also introduced three sets of PIE X Ecosystem transformation levers, associated with Platforms, Engagements, and Impacts in the context of a detailed illustration in the education X-verse.

In the third report,[4] we explored the **healthcare X-verse** and applied the PIE X lens to various digitalized health and insurance experiences in organizations like Ayushman Bharat Digital Mission, Apollo Hospitals, Oracle Cloud for Healthcare, Swasth Alliance, Discovery, Swiss Re and Gro Health, EBC Coalition, C-CAMP and Apple. We introduced two more sets of levers of PIE X Ecosystem transformation, this time associated with focal eXperience ecosystems of enterprises and growing the pie of interactional value creation across all stakeholders-as-eXperiencers.

In the fourth report,[5] we looked at the **retail and agri X-verse**, and applied the PIE X lens to digitalized supply chain and omnichannel commerce at Amazon, Walmart, Alibaba, and India's Open Network for Digital Commerce (ONDC); to purpose-driven reimagining of brand experiences at NIKE, Starbucks, Naandi – Araku; and smart-connected farm and farmer experiences at John Deere, Land O'Lakes, and Amul. We introduced two more sets of levers of PIE X Ecosystem transformation, this time associated with expansive design and co-innovation of X-verse ecosystems, together with all stakeholders-as-experiencers-creators. Using a comprehensive example of ITC illustrating all the levers in action, we motivated how every enterprise must become a co-creative 'living' enterprise in the next generation of X-verse innovation and value co-creation.

In this final report, we examine in more detail how conventional enterprises can go beyond traditional innovation and value creation to become next generation co-creative living enterprises in the X-verse of the future.

2. Becoming a Co-creative Living Enterprise in the X-verse

BECOMING A CO-CREATIVE LIVING ENTERPRISE IN THE X-VERSE

Applying the PIE X lens to organizational transformation

PIEX lens to visualise the X-verse

We are at the cusp of a new revolution of enterprise value creation in the **eXperience verse (X-verse)**. (See Figure 1.) The universe of eXperience environments and new experiences, that emerge from moments of engagements of eXperiencers in digitalized interactive ecosystems, constitutes the X-verse. In it, value creation is getting de-centered and democratized. Technology leverage becomes eXperiencer-centric, even as its innovation becomes ecosystem-centric.[6]

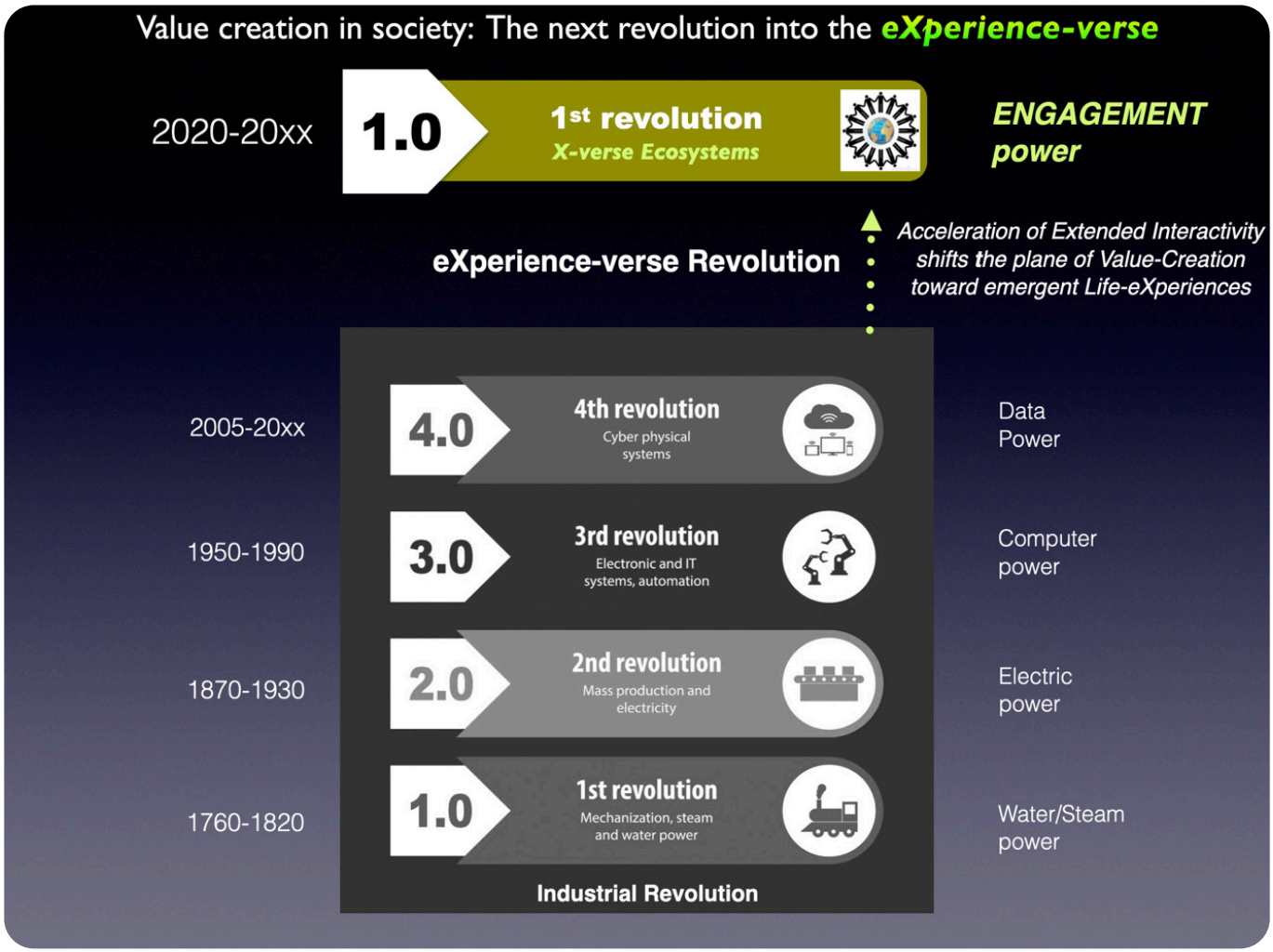

Figure 1: eXperience-verse Revolution (Source: Venkat Ramaswamy Picture adapted from Brittanica)

As the digitalized transformation of businesses has accelerated rapidly, in the X-verse, enterprises deliver customer outcomes across multiple fulfilment channels, engage employees with remote ways of working, manage suppliers' operational discontinuities, collaborate with partners in business networks and rapidly develop digitalized offerings of smart connected products and processes in interactive ecosystems, all the while co-creating experiences of value with individuals.[7]

The **PIE X (Platforms, Impacts, Engagements, eXperiences) lens** helps visualize opportunities and challenges for risk-managed experience-centric innovation and multi-stakeholder value creation in interactive ecosystems of the X-verse. (See Figure 2).

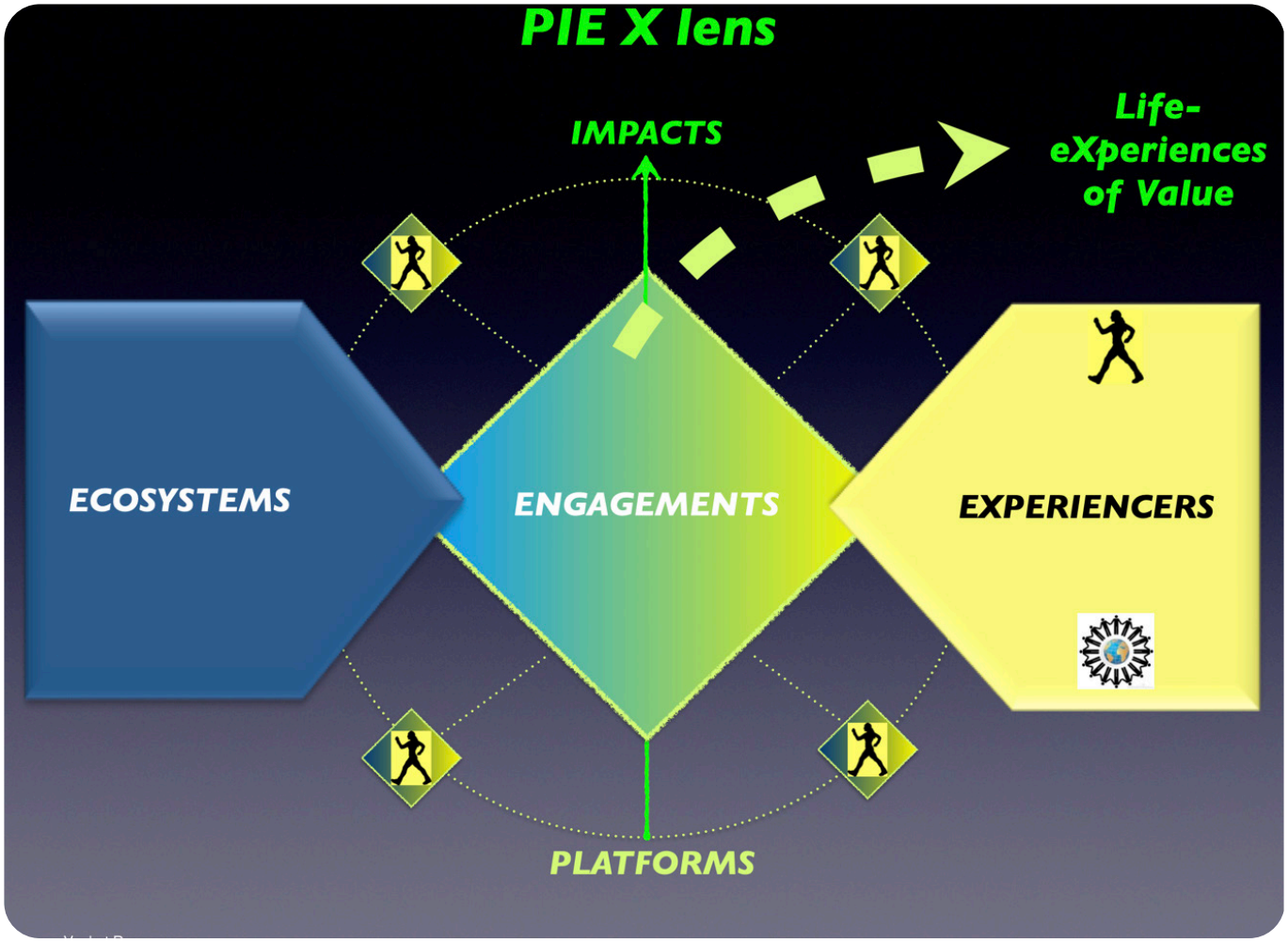

Figure 2: ***PIE X lens*** *(Source: Venkat Ramaswamy)*

X-verse and PIE X offer a new language to describe and understand digital transformation in enterprises. Others too, have similarly provided their own framework / language. For instance, in order to become digitally resilient and embrace innovation, Deloitte suggests that enterprises should be focused around experiences (creating interactions for all stakeholders), insights (data and analysis), platforms (information management), connectivity (information flow and networking), and integrity (driving purpose, security and trust).[8]

Let us now deep-dive into the language of X-verse and PIE X.

Transformational shifts in the X-verse

The major transformational shifts taking place in the X-verse can be viewed along five different loci of value creation: locus of interaction, locus of innovation, locus of value, locus of strategy, and locus of performance. (See Figure 3.)[9].

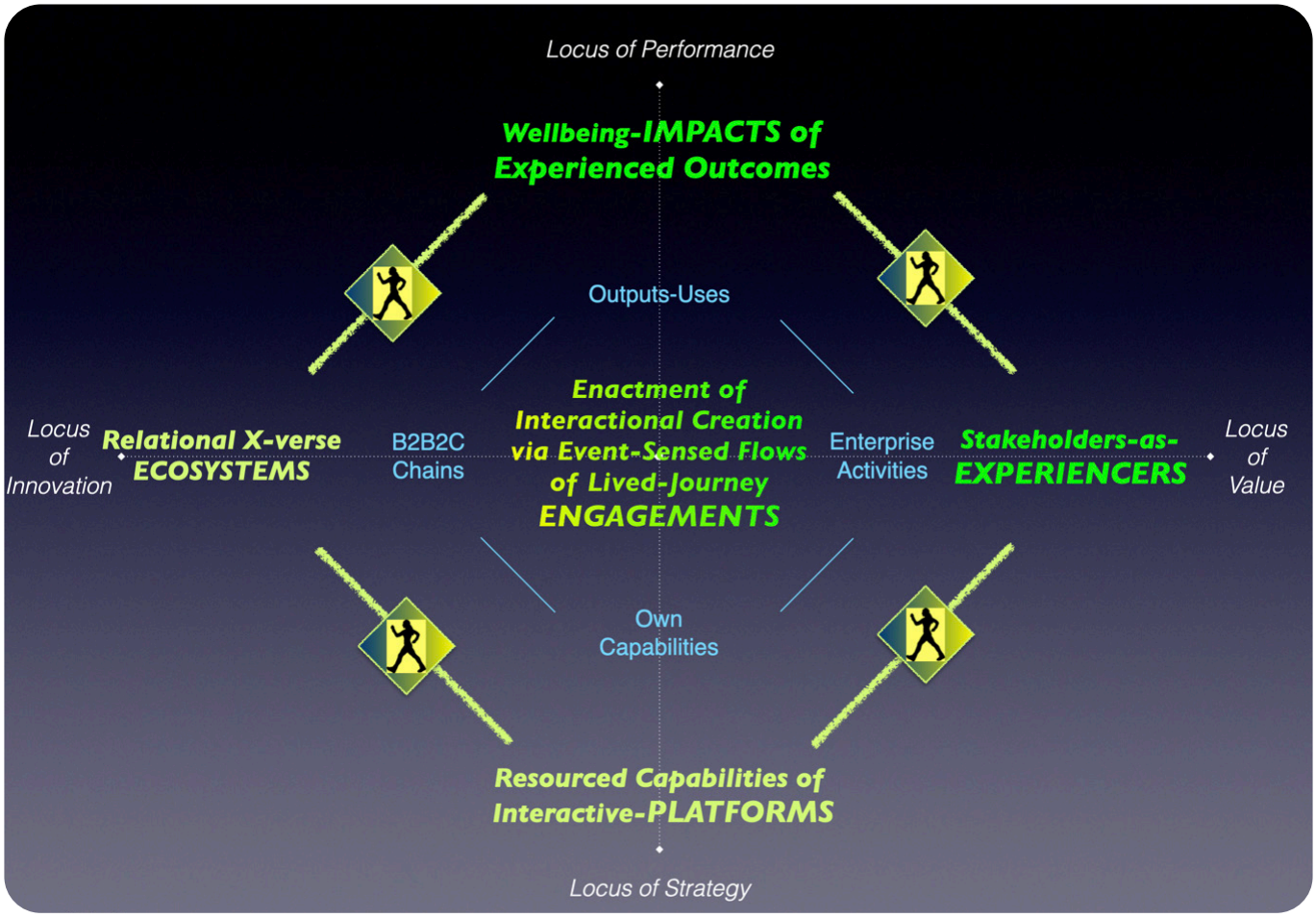

Figure 3: Strategic shifts in value creation in the X-verse (Source: Venkat Ramaswamy)

Let us consider how enterprises in the education and healthcare X-verse may experience these transformational shifts.

Transformational shifts in the education X-verse [10]

1. The locus of interaction shifts beyond 'industry boundaries of goods and services' to 'event-sensed flows of lived-journey engagements' of individuals-as-eXperiencers. The experiences happen at moments of engagements between the enterprise (say the educational institution) and the eXperiencer (say the students or the faculty).
    - Earlier the locus of interaction was centred on the university, and predominantly from the university to the student. For instance, the university had a defined set of courses and course-work, and the students had to pick from the given set of choices.
    - In the X-verse, the focus of interaction is on the student, who may be learning about the given subject from a number of different sources – online, from personal tutors, virtual worlds, etc. How does the university help the student personalize a learning plan given this context? Such a personalization falls under interactional creation via event-sensed flows of engaged learning.

2. The locus of innovation shifts beyond 'B2B2C chains' of goods and services to 'relational X-verse ecosystems'.
    - Earlier a student had to attend a university to learn. The emphasis was on the university – both the physical campuses and the dedicated virtual spaces. Value got created through the courses and programs that the university offered.
    - Now, the emphasis shifts to interactive ecosystems of digitalized learning experiences. An individual anywhere in the world can plug into a MOOC network and virtual learning and skill development experiences, in which this university is a partner. This also means that the experience-centric value creation is not just happening within a single enterprise, but across an enhanced learning and skill development network of multiple enterprises – in terms of educational content (from across multiple universities); innovative offerings (such as leveraging an education cloud solution for student engagement); and in terms of networked partner ecosystems (say for student outreach in new geographies).
3. The locus of value shifts beyond 'activities of enterprises' to 'interactivity of all stakeholders-as-experiencers', i.e., the interactive experiences of stakeholders as creators of value in their own lived-journeys of engagements.
    - In education we talk about flipped-classrooms, where it starts with the engaged learning experience of the student, and value is a function of student interactivity and exercising agency in their own personal development, rather than just the process of classroom teaching and lectures delivered by professors.
    - This shift applies to *all stakeholders-as-experiencers*, not just the students. In the case of faculty, the locus of value creation shifts beyond the process of hiring of resources by the university administration to the onboarding and lived-journey experience of the faculty members, as well as the learning partners in the interactive experience ecosystem.
    - An important aspect is to consider the lived-journeys of stakeholders-as-experiencers in their own creator ecosystems. For instance, one lived-journey is that of a student. While taking university courses, the student may also be running a startup. Does the university know this about that student? And does it provide interaction opportunities in the lived-journey of the person as an entrepreneur? Lived-journeys of employees, partners and other collaborators may also be considered. Such a perspective helps expand the "pie of value" for the enterprise.
4. The next shift is on the locus of strategy – beyond 'own capabilities' to 'resourced capabilities of platforms'.
    - This manifests in multiple ways – from a university providing education in one specific space, the university campus, to locations where the students are present – a shift from the physical to the virtual world.
    - It also manifests as a shift beyond a system of records (like an ERP system in a university) to a system of engagements (like a communication platform for students where they can collaborate, exchange ideas etc.) and how this edge system now integrates with the backend.
5. Finally, the locus of performance goes beyond just 'outputs-uses' to 'sustainable impacts'.

- For a university, the performance metrics shift beyond number of students taught, revenues (and other wealth measures), to increasing Gross Enrolment Ratios of a nation, or alignment to UN SDG Goal 4 on education, or ESGs in higher education.
- There is now emphasis on the wellbeing of the students and teachers, especially in the context of completely online learning, and amplifying positive developmental impacts at speed, scale, and scope, sustainably, while managing the risks effectively and efficiently.

Transformational shifts in the healthcare X-verse [11]

1. The locus of interaction shifts beyond 'industry boundaries of goods and services' to 'event-sensed flows of lived-journey engagements' of individuals-as-eXperiencers. The experiences happen at moments of engagements between the enterprise (say the healthcare provider) and the experiencer (say the patient or the nursing staff).
    - Earlier the locus of interaction was centred on the hospital, and predominantly from the hospital to the patient. For instance, the hospital had a set of doctors and medical equipment, and the patients had to go to the hospital for medical consultation.
    - In the X-verse, the focus of interaction is on the patient, who may be collecting information about her health from multiple sources and updating her "digital-patient model", an idea similar to a "digital twin" from the manufacturing industry. The measurements from her fitness trackers, health-sensors, previous medical examination and tests are available through a secure cloud when she meets her doctors next, and this provides data required for offering a personalized treatment plan. Such a personalization falls under interactional creation via event-sensed flows of engaged health-monitoring.
2. The locus of innovation shifts beyond 'B2B2C chains / goods-services' to 'relational X-verse ecosystems'.
    - Earlier a patient had to go to a hospital for healthcare services. The emphasis was on the hospital – typically the physical space where the healthcare provider was situated. Value got created through the healthcare services that the hospital offered.
    - In the X-verse, the emphasis shifts to relational ecosystems of digitalized interactive experiences. We are seeing the emergence of digital-first healthcare models. A patient can plug into a healthcare network, in which this hospital is a member. This also means that the experience-centric value creation is not just happening within a single enterprise, but across an enhanced network of multiple healthcare enterprises – hospitals, diagnostic laboratories, payers, home-care service providers and others.
3. The locus of value shifts beyond 'activities of enterprises' to 'interactivity of all stakeholders-as-experiencers', i.e., the interactive experiences of stakeholders as creators of value in their own lived-journeys of engagements.
    - Just like flipped classrooms, we have flipped clinics / hospitals – activities, like collecting samples and running tests, that have typically taken place in clinical settings, are being done in new locations and by leveraging new technologies. The pandemic has catalysed the adoption

of telehealth among both patients and healthcare providers. Home-based care models are gaining popularity.

- This shift applies to **all stakeholders**-*as-experiencers*, not just the patients. In the case of hospital, the locus of value creation shifts beyond the process of hiring of resources by the hospital administration to the onboarding and lived-journey experience of the doctors and nursing staff, as well as the healthcare partners in the interactive experience ecosystem.
- An important aspect is to consider the lived-journeys of stakeholders-as-experiencers, and as creators of wellbeing impacts in the interactive X-verse ecosystems in which they participate. Take the example of connecting with the 'patient-as-eXperiencer' environments of interactions through a smart-connected product like a cardiac pacemaker.[12] There are various experience scenarios if we consider the lived-journeys of patients – such as experiencing a crisis while out of town, or feeling uneasy and wanting to remotely consult the patient's primary doctor. (See Figure 4.)[13]

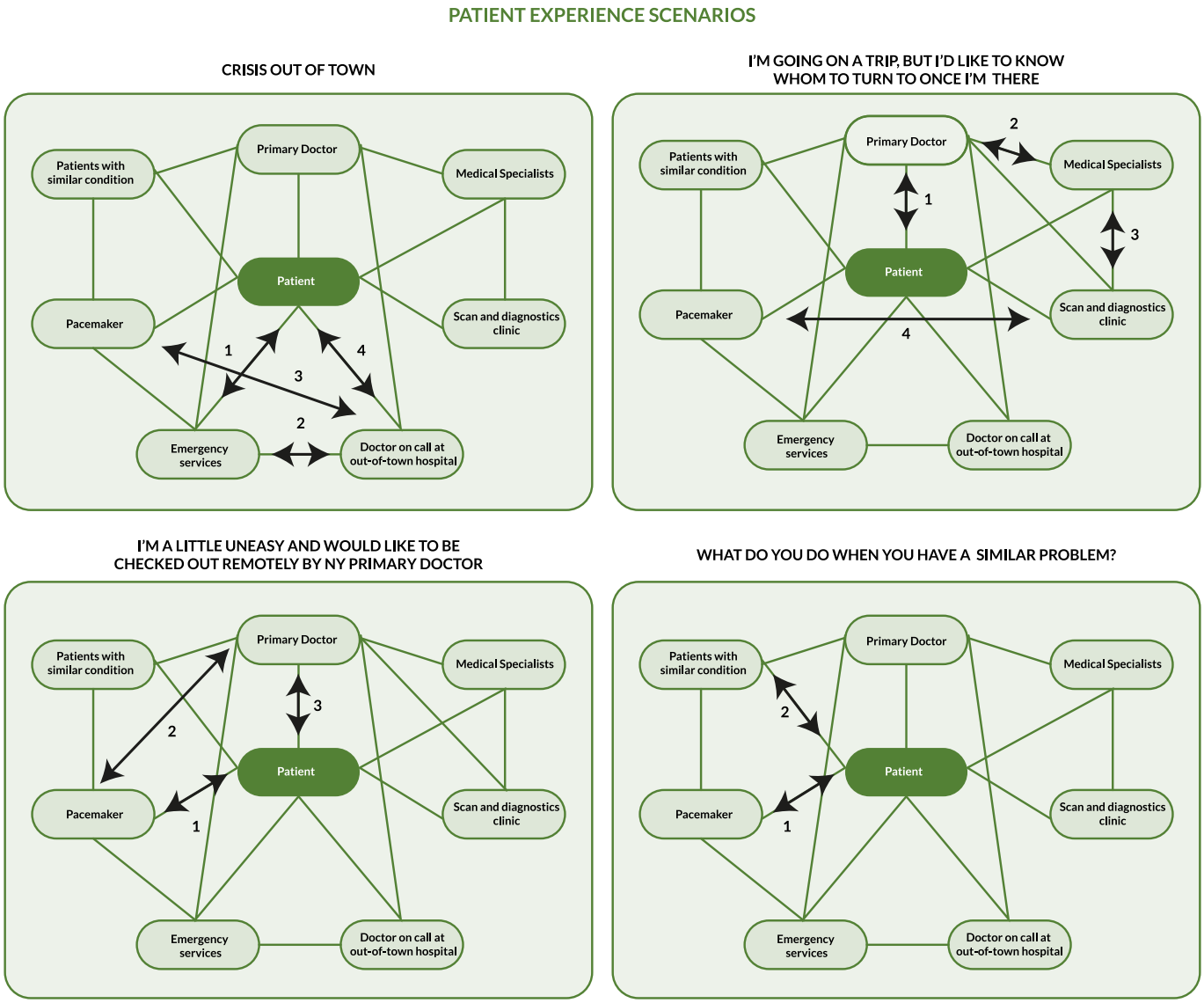

Figure 4: Patient Experience Scenarios (Source: Venkat Ramaswamy)

- Do the activated ecosystem entities (doctors, hospital staff, diagnostic clinicians, specialists, and medical devices including the pacemaker) have the capabilities to recognise these lived-journey situations and offer relevant healthcare services to its patients? Lived-journeys of employees, partners and other collaborators may also be considered. Such a perspective helps expand the **"pie of value"** for the enterprise.

4. The next shift is, then, on the locus of strategy – beyond 'own capabilities' to 'resourced capabilities of platforms'.
    - This manifests in multiple ways – from a healthcare provider providing medical services in one specific space, the hospital, to locations where the patients are present through telehealth – a shift from the physical to the virtual world. Ecosystem processes in the underlying network must be selectively and dynamically activated to enable personalized network-to-individual-to network interactions and outcomes of value. This goes beyond modular, standardized processes that are interchangeable with multiple entities in the ecosystem toward "on-demand" dynamic process capabilities.
    - It also manifests as a shift beyond a system of records (like an ERP system in a hospital) to a system of engagements (for example, the hospital may want to embed a patient-service workflow within a collaboration tool used to communicate with the patient).
5. Finally, the locus of performance goes beyond just 'outputs-uses' to 'sustainable wellbeing impacts'.
    - For a healthcare provider, the traditional performance metrics have centred around number of patients serviced, profits and revenues (and other medical equipment utilisation measures). In the new performance model, value accrues from the interactions and emergent positive experiences of the patient receiving care in the comfort of her home or hospital, activated through digitalized ecosystems, and the sense of relief that other family members experience knowing that urgent care can be accessed easily, and that they can be notified in case of emergencies.
    - The performance impacts have also focused on leveraging digital technologies to make sophisticated health interventions possible – like AI technologies assisting in medical diagnosis and prognosis or 5G technology enabling real-time remote surgery.
    - This is shifting to an additional focus on the wellbeing of patients that includes both their physical and mental wellness and also a focus on preventive healthcare. At the country-level, especially in developing countries, healthcare providers are now increasingly thinking about how to address gaps in achieving Universal Health Coverage.
    - Digital divide in the society poses challenges to the increasing usage of technology in healthcare. Those on the 'right side' of the digital divide are benefitting much more from using the Internet in every domain including healthcare than people on the 'wrong side' of the digital divide.[14] We must ensure that the digital divide does not create new forms of health inequities.

Becoming a co-creative living enterprise

We define Co-creative Living Enterprises in the X-verse thus (see Figure 5):

A Co-Creative Living Enterprise

is a 'living-system' enterprise that acts upon

event-sensed flows of lived-journey engagements in life-eXperience ecosystems,

mediated by resourced capabilities of interactive-platforms

entailing complex adaptive relational ecosystem architectures,

engendering geo-biological, psychological, socio-cultural, and economic wellbeing-impacts,

through risk-managed value co-creation

with all stakeholders as experiencers-creators,

across private-public-plural sectors.

Figure 5: What is a Co-Creative Living Enterprise? (Source: Venkat Ramaswamy)

Even if enterprises do not understand or see it, they are operating in the X-verse. So, how can conventional enterprises become co-creative living enterprises in order to expand their value creation?

We saw in the earlier section about the five loci of value creation that enterprises need to navigate in the X-verse. A more detailed view of the enterprise transformation shifts is shown in Figure 6 – in going beyond a conventional (**blue**) enterprise to a (**green**) co-creative living enterprise.

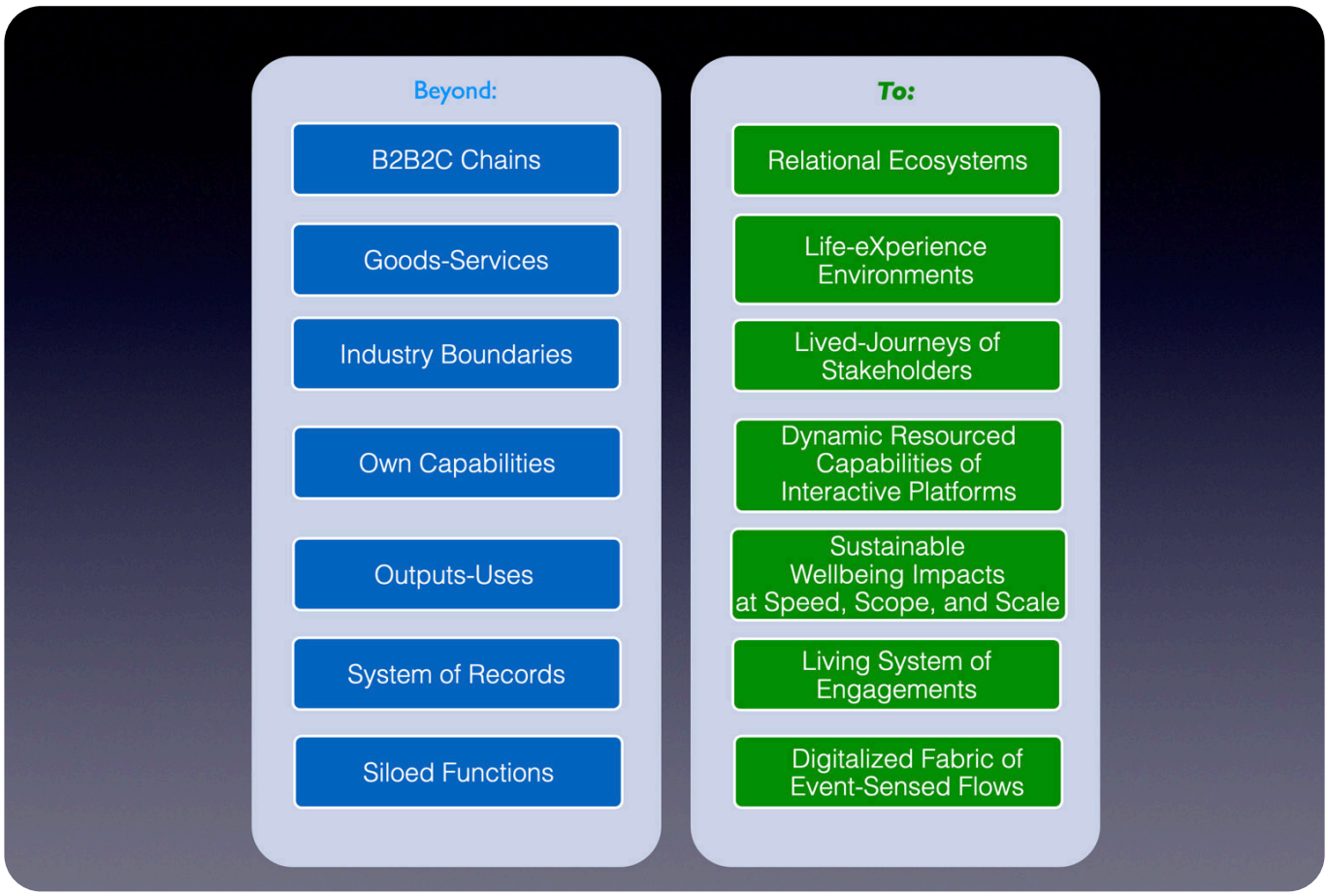

Figure 6: Beyond conventional enterprises to co-creative living enterprises in the X-verse (Source: Venkat Ramaswamy)

Taken together, not just at an individual shift level, but collectively, from **blue** to **green**, as seen in Figure 6, these shifts represent a sea change in how we see value creation. Conventional enterprises need to look at their business through the PIEX lens, and discover new opportunities for value creation. This means applying the PIEX filter to every lived-journey engagement / activity on the demand / supply side and business design itself. (See Figure 7.)

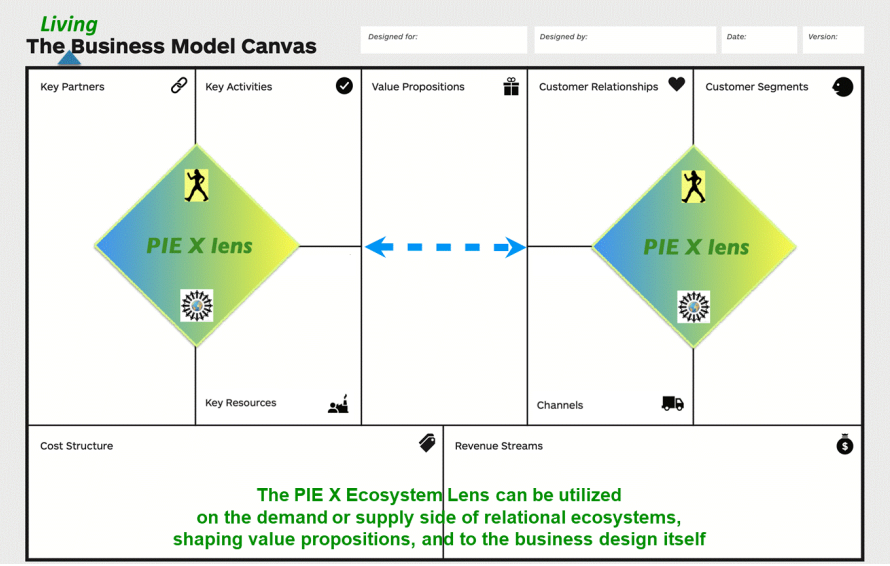

Figure 7: Applying the PIEX lens to the living business model canvas (Source: Venkat Ramaswamy)

Co-Creative Living Enterprises visualize strategic opportunities and manage risks at every moment of engagement of an experiencer in a relational interactive X-verse ecosystem. Rather than merely focusing on the activities in the value chain, enterprises in the X-verse need to consider the lived-journey of engagements of all stakeholding individuals-as-experiencers in digitalized ecosystems, and the experiences that emerge from extended interactivity via new digital interfaces – from pure reality to mixed reality to pure virtuality.[15]

Co-Creative Living Enterprises leverage industry clouds-based platforms to configure a digital fabric of event-sensed flows across interactive ecosystems, entailing datafication, softwarization, and AI, and powering new business configurations, offerings, and operational activities. See Figure 8 to visualize how living enterprises create digitalized interactive ecosystems of lived-journey engagements.

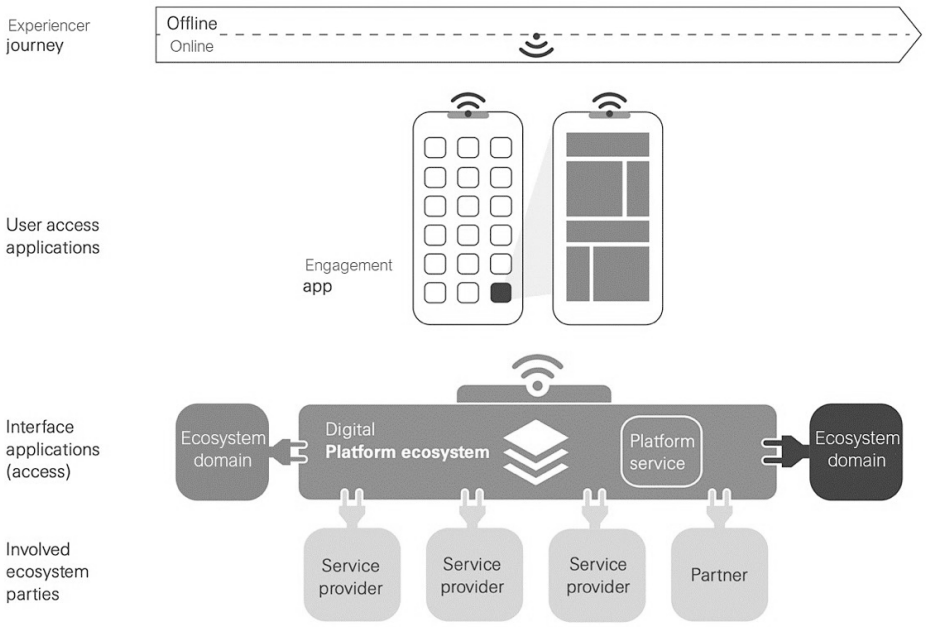

Figure 8: Digitalized ecosystems of lived-journey engagements (Source: Adapted from Swiss Re)

Co-Creative living enterprises can no longer continue to measure their success only in terms of profits, revenues and earnings per share, but go beyond to include the ecological, personal, social, cultural, and economic wellbeing of all stakeholders. They create value together with stakeholding individuals as experiencers-creators.[16]

The resourced capabilities of various connected platforms create a new basis of efficiency for enterprises – as costs come down rapidly on one hand and enterprises create unique impact on the other, they can redeploy capital into a flywheel of value creation. They enable the creation of impacts at speed (time taken for impacts), scope (the domains of impacts), and scale (the extent of impacts).

While the opportunity size of the pie of value increases dramatically, there is also an increase in potential risks – cyber-security risks of the digital platforms, privacy risks in the engagement of the experiencer, etc. These risks have to be managed well. Thus, it becomes important to thoughtfully configure risk-managed flows of lived-journey engagements in interactive X-verse ecosystems.

Co-Creative Living Enterprises weave together a collaboration of experiencers and ecosystem-partners

from across the public-private-plural sectors. (See Figure 9.)

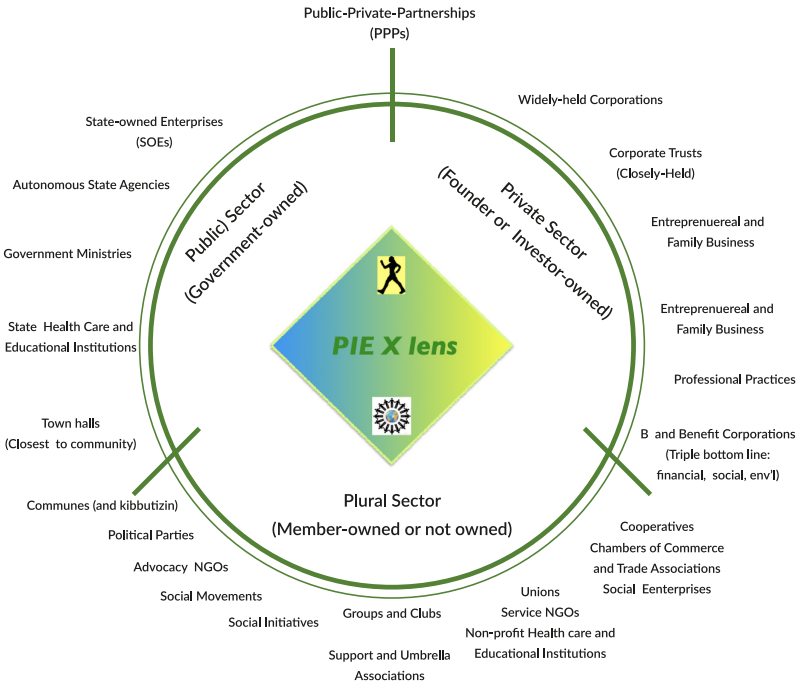

Figure 9: Public-Private-Plural Sectors (Source: Henry Mintzberg)

As an enterprise applies the PIEX lens, it engenders value to various focal stakeholders – the focal experiencers, to the focal hybrid teams, to focal partners, and to other stakeholders. (See Figure 10.)

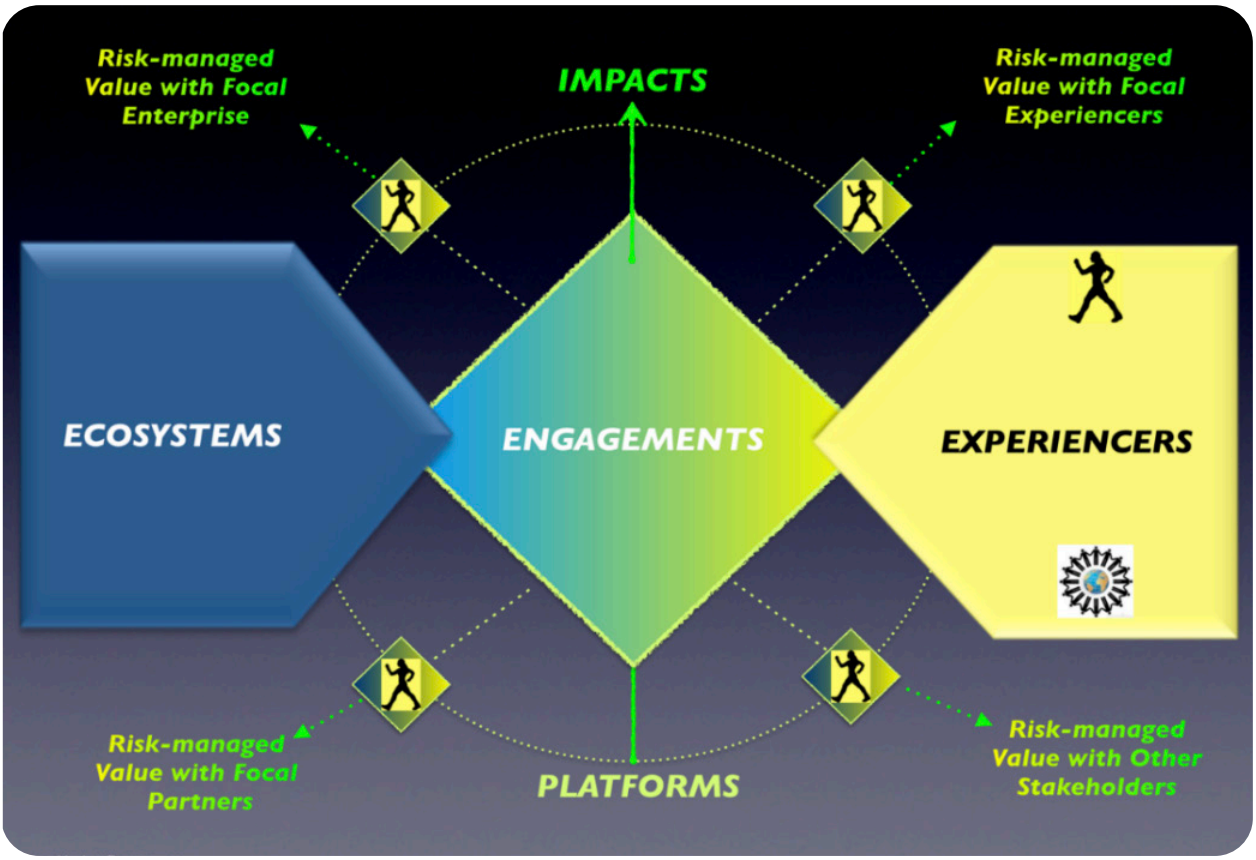

Figure 10: PIE X lens of X-verse innovation and multi-stakeholder value creation in interactive ecosystems (Source: Venkat Ramaswamy)

The use of the PIE X lens occurs in a virtuous cycle of expansive design and co-innovation, together with stakeholders. (See Figure 11.) As part of applying the **PIE X** lens to every aspect of their business, enterprise managers will have to consider the appropriate **levers** for risk-managed X-verse innovation and co-creation unique value in their focal eXperience ecosystems.

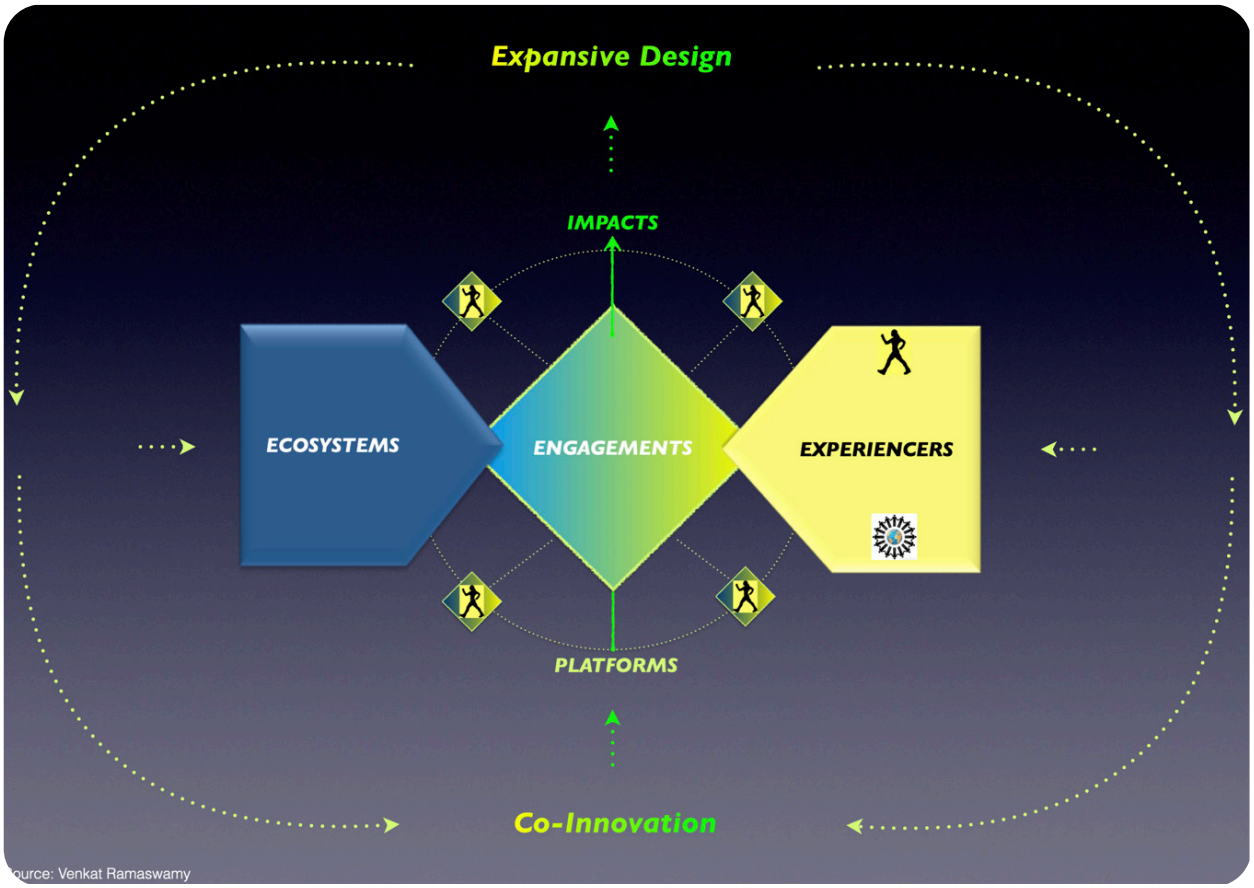

Figure 11: Leading eXperience-verse Ecosystem Innovation and Value Co-Creation to Sustainably Impact Stakeholder Wellbeing (www.venkatramaswamy.com)

These levers (with the prefix "**R-**"denoting "**R**isk-managed) correspond to **Platforms** (R-APPI), **Impacts** (R-CITI), **Engagements** (R-DART), **Ecosystems** (R-GELI), and **Experiencers** (R-SCIM), in a virtuous cycle of **Expansive Design** (R-BEST) and **Co-Innovation** (R-PLAT) – in focal eXperience ecosystems of application. (See Figure 12.)

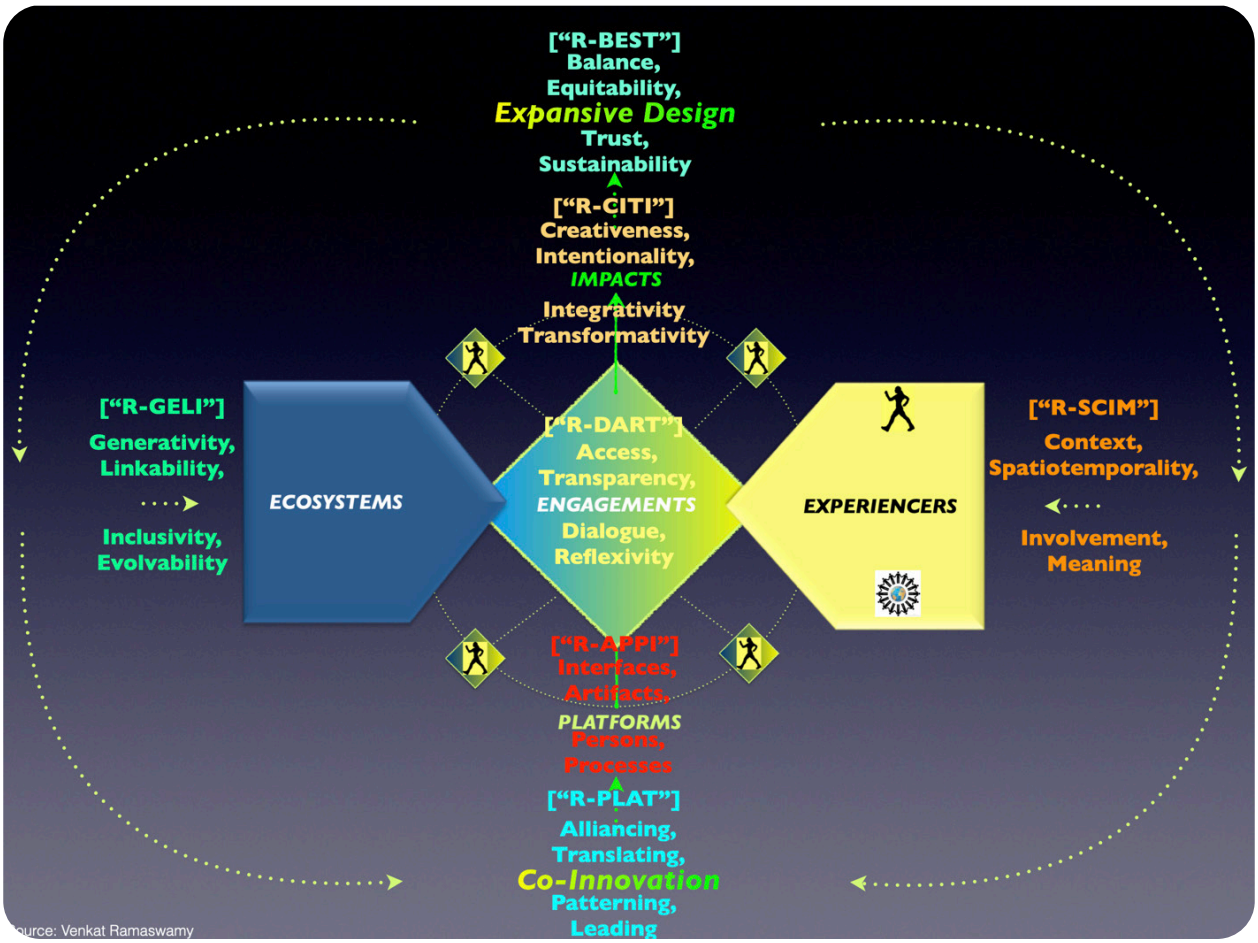

Figure 12: Risk-managed levers for PIE X lens innovation and expanding value creation with stakeholders as experiencers, innovators, and creators (Source: Venkat Ramaswamy)

Taken together, these levers support a new **C**omplex **A**daptive **R**elational **E**vent (CARE) enterprise ecosystem X-verse architecture – one that brings ecosystem fluidity in enacting interactional creation via event-sensed flows of lived-journey engagements through the PIE X lens:

- Levers like R-APPI – for example, who are the persons, the different users of the platform? What kind of artifacts do they share?
- Levers like R-DART that address aspects of appropriate levels of access or transparency in a given engagement. For instance, think of privacy considerations during an interaction.
- Levers like R-GELI – for instance, how inclusive is the eXperience ecosystem? How linkable is the network of experience environments within and across enterprises in the ecosystem?
- Levers like R-SCIM –for instance, to what extent are experiences contextualized? How meaningful are they to individuals-as-experiencers?
- Levers like R-CITI – for example, how might we enhance the creative capacity of individuals?
- Levers like R-BEST – for instance, how balanced or equitable are the outcomes or the impacts? What is the nature of trust required?

- Levers like R-PLAT – for instance, what kind of alliancing is required with different partners? What kind of system leadership is required in co-innovating experience ecosystems with key partners?

The immense power of value co-creation arises from leveraging the PIE X lens in interactive ecosystems with a collaborative innovation process that harnesses the insights, knowledge, skills, and ingenuity of all stakeholding individuals-as-eXperiencers, in a mutually valuable manner. This requires expanding the design of offerings and management systems, which must constantly co-evolve as a function of the co-innovation process, co-creative interactions and organizational change it fosters. (See the **Appendix** for a summary of the levers.)

As Ramaswamy and Gouillart (2010b, p.252) noted in their co-creation manifesto: "The co-creative enterprise has the power to transform relationships among individuals and institutions. The evolution toward a co-creative economy rests on the convergence of private, social, and public sector enterprises around productive and meaningful human experiences, and the realization of human potential."

And as managers shift from one experiencer to the next, they reapply PIEX to the entire lived-journey flows of engagements of that experiencer, and repeat the process from one experience ecosystem to the next, across hybrid teams, partners, and other stakeholders. In doing so, the value that accrues to enterprises expands, multiplying as a function of the amplified impacts of value to various stakeholders, through a strategic Complex Adaptive Relational Ecosystem (CARE) architecture of life-eXperience co-creation. (See Figure 13.)

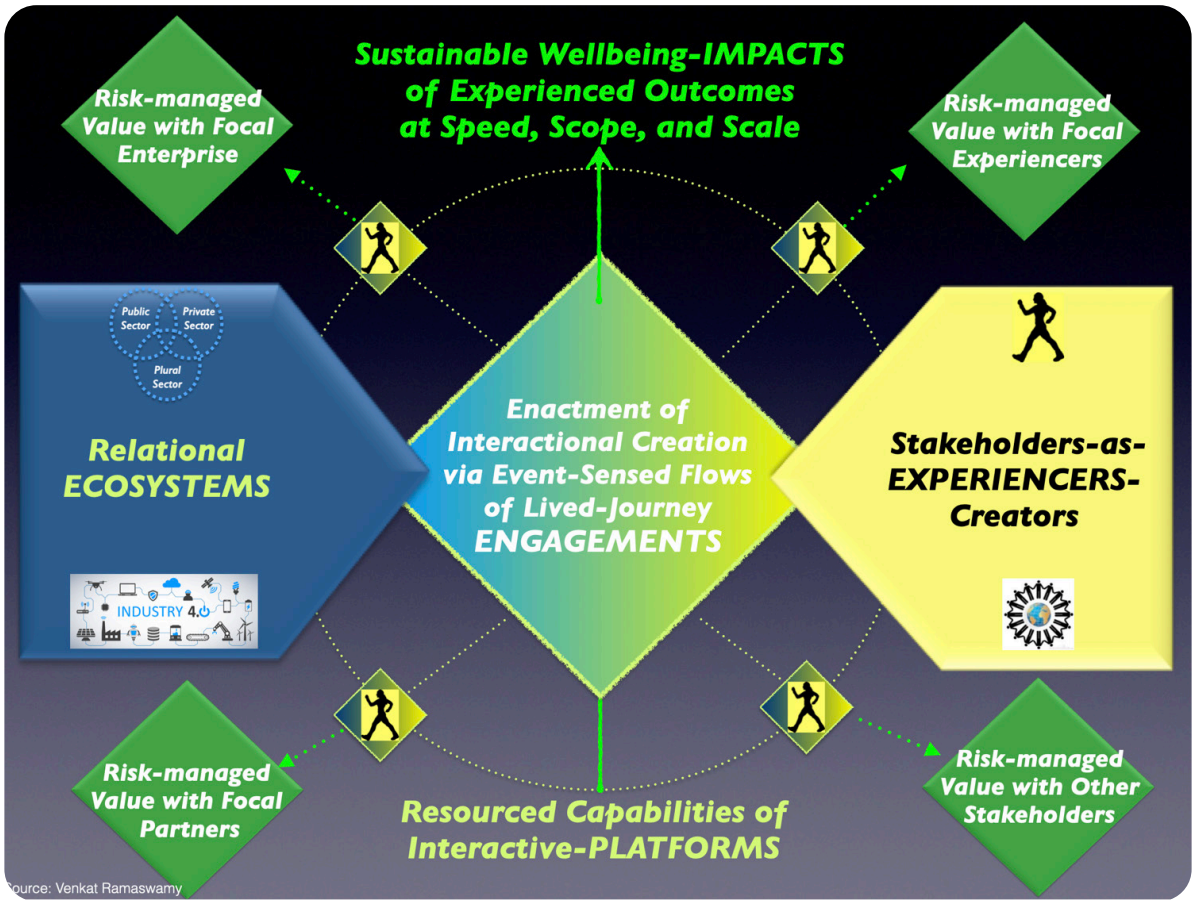

Figure 13: Crafting a strategic architecture of life X-verse co-creation (Source: Venkat Ramaswamy)

Building effective X-verse ecosystems in the future requires going beyond "doing well by doing good" to "doing even better for ourselves by doing well for others." By creating more value with others, the "win more–win more" nature of co-creation simultaneously generates sustainable developmental wellbeing-impacts. Private-public-plural sector X-verse innovation and value co-creation have the potential to balance the so-called 'invisible hand of free markets' with the 'visible hand of governments and civil society', together with stakeholder expectations of more responsible, responsive, and effective enterprises, and coevolving better states of infrastructure, governance, development, and sustainability. Ultimately, co-creative living enterprises have the power to transform our reality of the world. They can guide this personal, organizational, economic, and societal transformation. It is a "way of becoming" toward a world full of creative life-eXperience possibilities.

In summary:

Co-Creative Living Enterprise Transformation is about:

Expansive Design, Co-Innovation, and Interactional Creation of Risk-managed Value,

in eXperience-verse Ecosystems of emergent Life-Experiences,

with all Stakeholders-as-Experiencers-Creators,

enacted via Event-Sensed Flows of Lived-Journey Engagements,

mediated by Resourced Capabilities of Interactive-Platforms,

engendering Sustainable Wellbeing-Impacts,

at Speed, Scope, and Scale.

Figure 14: What is Co-Creative Living Enterprise Transformation? Source: Venkat Ramaswamy

3. Transformational Journey of Enterprises

BECOMING A CO-CREATIVE LIVING ENTERPRISE IN THE X-VERSE

Applying the PIE X lens to organizational transformation

How do enterprises undertake the transformational journey to becoming a co-creative living enterprise? While tech companies have intensified the use of technology, they have themselves had to deal with the strategic transformational shifts wrought by the changing loci of interactions, strategy, innovation, value, and performance that we saw in the previous section. In fact, by "eating their own dog food" so to speak, tech companies have offered lessons from their own transformation, and in turn, driven the tech transformation of their clients.

Let us take a look at Microsoft's own transformation (an enterprise with whom both of us have collaborated , independently, over the years). In doing so, think about a different application of the PIE X lens, this time to the organizational transformational journey of enterprises and the engagements of the people involved therein as experiencers-creators of the transformation. Becoming a co-creative living enterprise is a function of purposefully designed engagements from within an organization that harness the personal and collective intelligence of individuals. After decades of experience with organizational change and jump-starting innovation, it has become abundantly clear to change agents that successful transformational change is best achieved through engagement with those it affects. The best way to build co-creative living enterprises is to apply the PIE X lens in engaging stakeholding individuals in creating the transformational change itself.[17]

Following the Microsoft example, we will discuss a detailed application of the PIE X lens with the automotive giant, Mahindra, where one of us (Venkat Ramaswamy) was involved early on in its own transformation journey.

Microsoft

Microsoft has witnessed a revival of its fortunes, dramatic growth, and value surplus creation since 2014, when Satya Nadella took over as its CEO, the third in its history. From a revenue of over $86 billion and operating income of nearly $28 billion in 2014,[18] Microsoft achieved $168 billion in revenue and operating income of $70 billion in 2021.[19] Its market capitalization increased from nearly $382 billion in 2014 to over $2.5 trillion in 2021,[20] when it became the most valued company on the planet. Microsoft outperformed the S&P 500 Index and the NASDAQ Computer Index, over a five-year period from 2016 and 2021, on the basis of cumulative returns. (See Figure 14). $100 invested in stock or index in June 2016, returned $575 (at Microsoft), $441 (at NASDAQ) and $225 (at S&P 500) in June 2021. This was in complete contrast to the five-year period leading up to 2014 when Microsoft lagged behind the other two indexes.

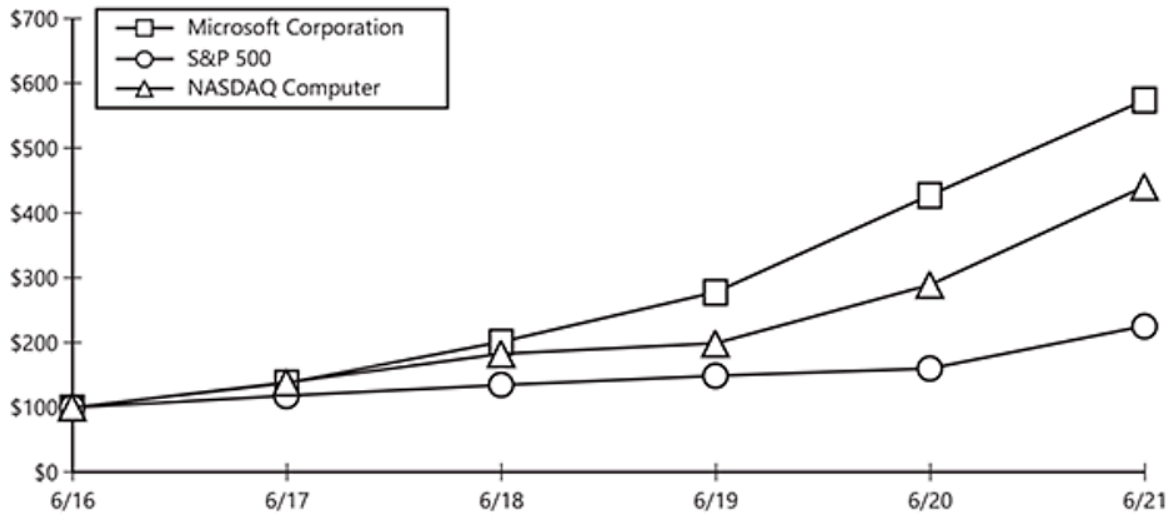

Figure 15: Comparison of five-year cumulative returns (Source: Microsoft)

These financial metrics are outcomes of significant changes brought about in its corporate culture, customer orientation and partnership ethos. Microsoft changed its mission statement from "a computer on every desk and in every home" to "empower every person and every organisation on the planet to achieve more". The new mission embodied the spirit of "renewal of Microsoft" that Satya Nadella discussed with the board when he was appointed CEO.

Microsoft reoriented itself as the productivity and platform company for the mobile-first, cloud-first world. Not PC-first or phone-first. It envisaged mobile-first to mean the mobility of the human experience across all devices, and recognised that the cloud made that mobility possible. It also called out the importance of AI as part of its technology substrate. Nadella says, "PC was the first run time, the next system on top of which programmers will build and execute applications; Web the second run time; and AI is the third run-time".[21] As we identified in our first report in the X-verse series, Microsoft talked about "tech-intensity" driving the next generation of innovation in the cloud. (See Figure 16).[22] It is about tech-adoption with the tech-capability in an enterprise and supported by its trust in technology, in the context of how enterprises digitally transform, build business resilience and create value.

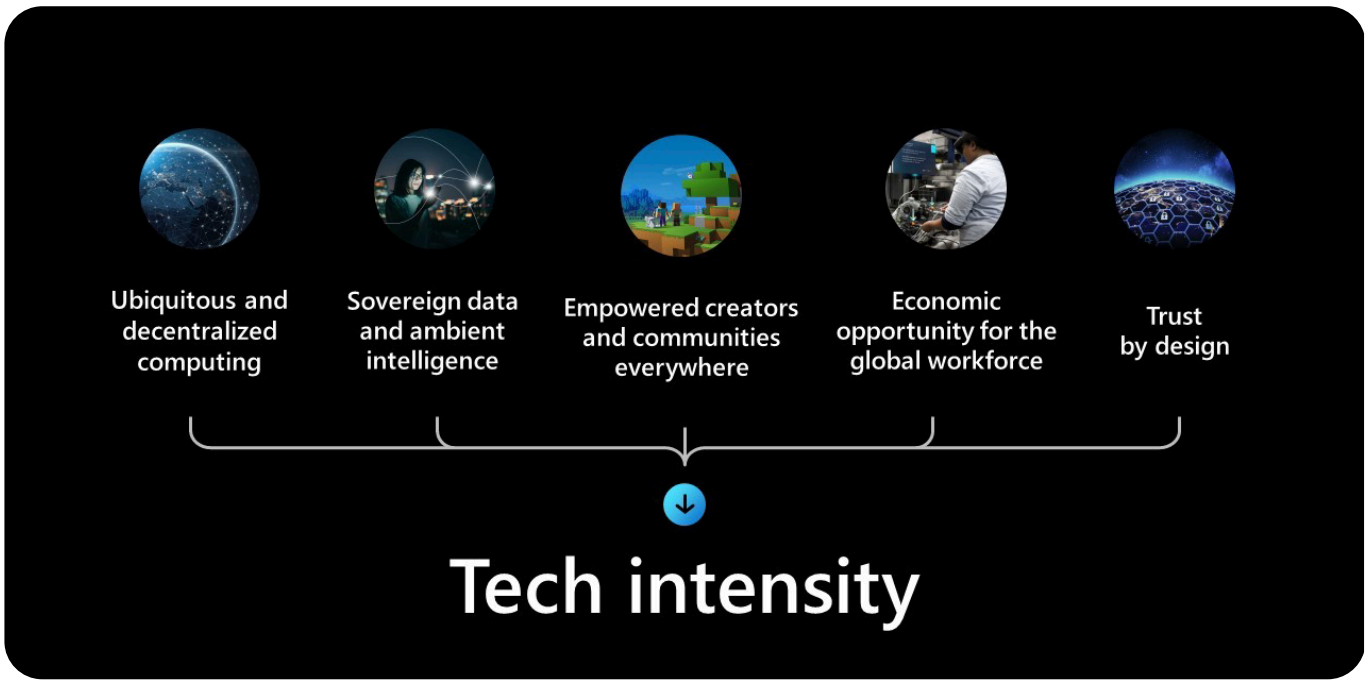

Figure 16: Five key attributes driving the next generation of innovation in the cloud (Source: Microsoft)

Refreshingly, for a tech-company, Microsoft articulated a vision for AI that was experience-centric and focused on augmenting human-capability. In his Ignite 2021 address, Nadella says, "In the AI we create, using all this enormous power of the cloud, we will look for increasing levels of predictive and analytical power, common sense reasoning, alignment with human preferences, and perhaps most importantly, augmenting human capability…..We need to have ethical principles govern the design, development and deployment of AI. Our technology needs to be secured by design and promote zero trust architectural principles. We need to build technology with the design intent to protect the fundamental rights of all people, including privacy and strengthening these institutions we all depend on for our livelihoods and wellbeing. And we need tech advancements that protect our most finite resource, our planet."[23]

However, it took more than just a reframing of its mission and technology focus for Microsoft to succeed. Satya's first mail as CEO to all employees of Microsoft alludes to the essence of the transformation journey. "In order to accelerate our innovation, we must rediscover our soul—our unique core. We must all understand and embrace what only Microsoft can contribute to the world and how we can once again change the world." In the email he inserted the image of a target and in its center appeared the words, "**digital work and life experiences**," surrounded by Microsoft's cloud platform and computer devices.

Ultimately, the transformation at Microsoft played out over several years, and is still regarded as a continuously evolving process. It encompassed the following things which Nadella as the new CEO had to address:

- Communicate clearly and regularly Microsoft's sense of mission, worldview, and business and innovation ambitions;
- Drive cultural change from top to bottom, and get the right team in the right place;

- Build new and surprising partnerships in which it can grow the pie and delight customers;
- Be ready to catch the next wave of innovation and platform shifts;
- Stand for timeless values, and restore productivity and economic growth for everyone.

Let us consider each of these elements in greater detail and look at how Microsoft transformed its culture and sales, partner, employee and developer experiences.

Embracing a growth mindset

Microsoft's clarion call for "rediscovering our soul" was the foundation for a cultural renaissance. Nadella says, "I like to think that the C in CEO stands for culture. The CEO is the curator of an organization's culture."[24] He defined culture as a "complex system made up of individual mindsets. Culture is how an organization thinks and acts, but individuals shape it."

Microsoft leveraged the work of Stanford professor, Carol Dweck, on growth-mindset as a framework for this cultural transformation. Growth mindset was emphasised in three actions by all employees - first, to obsess about its customers; second, to actively seek diversity and inclusion; and third, to become one company, one Microsoft. Customer success became central to the way all employees were expected to think. This meant putting away the differences and sharply competitive nature of engagement between different departments (product teams, sales teams, technical teams etc.) within Microsoft. As Nadella put it, "they (different Microsoft product teams) get to own a customer scenario, not the code". An emphasis was placed on empathy, and being empathetic in listening to customer needs as well as engaging with employees.

There was a transition from being "know-it-alls" to "**learn-it-alls**". To encourage the shift toward a learning culture, Microsoft created an annual hackathon during its OneWeek annual employee event. The hacker sub-culture was known in the tech world for its spirit of fun, collaboration, competition and problem-solving. In the first year of the hackathon, more than twelve thousand employees from eighty-three countries entered more than three thousand hacks, ranging from ending sexism in video games to making computing more accessible to people with disabilities to improving industrial supply-chain operations.[25] The hackathon also became a forum for unearthing leadership talent, even from people who were not on that path as per their existing roles. For example, the team that created learning tools for people with reading and writing disabilities in OneNote (a note taking software) was given the responsibility to manage the product's market expansion.[26]

Microsoft also completely revamped its employee performance management and incentive systems. It dropped the stack ranking method of evaluating employees (rating and ranking them against one another into one of five levels) which resulted in a sense of unhealthy competition and distrust among team members. Instead, Microsoft adopted a system which promoted individual and team contributions to success. Performance reviews, instead of being one-time exercises, happened on a continuous basis. Later, when it discovered that many managers had not fully embraced the growth mindset and were still following the earlier

model of employee management, Microsoft undertook a massive program to train its 18,000 managers on how to "model, coach and care". Talent acquisition was also revamped, keeping in mind the growth mindset, that quality employees / leaders are not born but developed, and that talent could be found everywhere. From going to only a few elite schools to hire, Microsoft expanded its hiring to nearly 500 schools. Executive compensation was modified and linked to progress on dimensions like diversity and inclusion.[27]

All these actionable efforts have resulted in positive outcomes on the ground. According to the Microsoft 2022 Diversity & Inclusion Report, for the first time, women make up more than 30% of the Microsoft's core workforce worldwide. Employees from racial and ethnic minority communities now make up 53% of Microsoft's core U.S. workforce. On its commitment made in 2020 to double the number of Black and African American and Hispanic and Latinx employees in the US by 2025, it has progressed – Black and African American – below Director level (116%); Director level and above (92%); and Hispanic and Latinx – below Director level (47%); Director level and above (58%). When asked whether they feel included in their teams, employees responded to this companywide survey question with an average score of 86 globally.[28]

The transformation involves ongoing communication and engagement with employees. On Yammer, Microsoft allows for enterprise-level social networking. It monitors questions posed on the platform in real-time. Leaders answer directly, and engage with employees across geographies and time-zones. Daily Pulse is a survey sent every day to a set of Microsoft employees. It consists of 20 core questions, 5 org-level questions, and a few open-ended questions that keep changing every month. It takes a snapshot of how employees are feeling about the company, its culture, and other topical themes. The CEO conducts a monthly townhall with all employees, providing business updates and taking questions live. During the event, employee engagement is measured to capture real-time sentiment.[29]

Transforming sales, partnering and marketing experiences

When Satya Nadella took over as the CEO, Microsoft transformed its business model from one with a focus on selling and licensing operating systems, servers and packaged software to one focused on subscription of cloud and services, with Azure at its heart. Consequently, it undertook a major transformation of its sales function, under five pillars – i) industry coverage, ii) technical expertise, iii) customer success, iv) digital selling, and v) one commercial partner.[30]

The sales organization, which was geographically oriented, was restructured around industries in order to offer industry-specific services and solutions to its customers. It focused especially on six industries: education, financial services, government, health, manufacturing and retail. Microsoft brought technical expertise (specialist team units that helped in new business acquisition) closer to the customer by including engineers in the field sales teams (account team units that supervised the client-accounts). It also introduced a customer success unit for the first time in its history (although this was standard practise in other cloud / SaaS companies), a team that would work with customers after the sale is completed and help them leverage cloud capabilities more in their transformation. Sales compensation and incentives were remodelled on actual consumption / usage of cloud by the customers, and not just on total contract value.

Traditionally, Microsoft had many salespeople in a "feet on the street" model and meeting customers face-to-face to make the sale. It adopted an inside-sales model aided with a digital infrastructure and Azure AI-enabled sales guidance to increase its coverage of customers. Finally, Microsoft also transformed the way it engaged with its partners. It merged seven different partner-sales organizations within Microsoft to create One Commercial Partner (OCP). This unit supported the partners in three ways – build-with (to create a solution on Microsoft's platforms), go-to-market with (help with customer segmentation and marketing mix for partner's products), and sell-with (jointly sell partner's product or solution to customers). By 2018, Microsoft had 72,000 cloud partners who were contributing to 95% of Microsoft's commercial revenues.[31]

Microsoft has also started leveraging behavioural analytics to gain sales insights on a more real-time basis and improve commercial revenues. It created a platform that combined data being generated from everyday work in Microsoft Office 365, more traditional datasets, such as revenue and customer relationship management (CRM) data, with insights derived from its Viva Insights platform about internal and external networks, collaboration behaviours, coaching and mentoring, meeting effectiveness, and so on. For instance, one insight it gained was that while sellers and executives were spending more time with customers in high-growth accounts, they were not paying enough attention to the 15 percent of low-growth accounts that have high potential. It also found that higher sales outcomes correlated with larger seller networks—not just external customer networks, but also internal networks within the sales organization and other units of the company.

Microsoft has rolled out dashboards to 500 leaders and 4,000 sellers worldwide. Leaders have access to insights such as customer-contact metrics, sales team behaviours related to strategic priorities, and accounts in which sellers are investing their time. Individual sellers receive a highly personalized set of weekly insights about their own work patterns, along with recommended actions.[32]

Microsoft dramatically changed the way it partnered with companies. It reimagined "mobile-first" to mean mobility of human experiences across devices. Thus, it began working with Google to make it possible for Office to work on their Android platform. Similarly, it partnered with Apple to offer Office on iOS and to enable customers to better manage their iPhones within an enterprise. Although HoloLens competed with the virtual reality platform, Oculus Rift, Microsoft partnered with Facebook to ensure that its Minecraft gaming applications worked on their devices. It also began collaborating with the open-source community and with the Linux operating system, which it had once infamously described as a "cancer". In 2015, it released Visual Studio Code, a code editor optimized for building and debugging modern web and cloud applications, and made it open-source, thus introducing its technologies to developers who traditionally did not work with Microsoft. Its partnership with Red Hat meant that enterprises built on the latter's open-source software could use Azure cloud to scale up globally by taking advantage of investments Microsoft had made in local data centres around the world.

Azure started as the only cloud service provider that allowed for consistent deployment of applications on-premise and in the public cloud. Microsoft provided the hardware specifications to manufacturers like Dell EMC and HPE who built and shipped the server units with Azure Stack installed, that allowed for the hybrid

cloud deployment. These hardware partners collected revenue on all the hardware sales of the Azure Stack. Similarly, Microsoft built Azure AppSource and Azure Marketplace, platforms which showcased ISV partner applications. Enterprise customers could test or install new software in the cloud without the challenge of on-premise integration, and all revenues from third-party applications licensing went directly to the ISV.[33]

Microsoft also changed the way it communicated, both internally and externally. It identified five topics for all its company-facing language: customer-obsessed, growth mindset, diversity and inclusion, making a difference, and One Microsoft.[34] It used many surprising mediums to communicate with employees. For instance, it ran campaigns based on one of these topics on the recyclable coffee cups used at their Redmond campus in the US. Instead of relying on standard press releases for its external marketing, it created a site called "Microsoft Stories" that carried in-depth feature stories about people and projects. Rather than being entirely focused on product features, it created ads that connected with people through story-telling about the company's purpose and passion. For instance, it created a series of commercials under the "Empowering" series – the 2014 Superbowl ad featuring Steve Gleason, former NFL player and now living with ALS, showed him narrating, like he does in his life daily, the spot using his Surface Pro to speak, via eye tracking technology.[35] Its 2019 "We All Win" Superbowl ad was about how Xbox's Adaptive Controller helps children with disabilities to play and feel included socially.[36]

Industry clouds digitally transforming businesses

As part of its increased customer and industry focus, in 2020-21, Microsoft introduced multiple industry-specific cloud offerings. Microsoft Cloud for Retail and Healthcare were followed by the release of Microsoft Cloud for Financial Services, Manufacturing, Nonprofit and Sustainability. The Microsoft industry clouds bring together common data models, cross-cloud connectors, workflows, APIs, and industry-specific components and standards, with the breadth of Microsoft's cloud services, including Microsoft 365 and Teams, Azure, Microsoft Power Platform, Dynamics 365 and security solutions.

In manufacturing, the industry cloud helps create digital-twins of factories, ensuring the safety of frontline workers and creates more resilient and agile factories and supply chains. In our first report under the X-verse series, we explained how AB InBev, the largest brewer in the world, leverages the Microsoft Cloud for Manufacturing. It uses Microsoft Azure Digital Twins to create a live digital model of their breweries and supply chain. AB InBev's brew masters can get a real-time view into the complex brewing process and are able to adjust the biological and chemical process parameters based on active conditions. Frontline operators leverage AI algorithms to automatically compensate for bottlenecks in the packaging process. They use mixed reality for remote assistance and to ensure uptime on the machines. Routing algorithms help the delivery trucks transport the beer cases so they achieve the lightest carbon footprint and ensure that the right beers are delivered to the consumer at the local pub for the perfect sip. [37]

Experience-centric thinking is evident in the way it believes its industry-cloud offerings create value. Through the Microsoft Cloud for Manufacturing at AB InBev, emerging technologies are leveraged at the moment of engagement between the enterprise and the experiencers – the brew masters and digital-twin maintenance

expert. The goal is to engender value to the individual-as-experiencer. This value to experiencers comes first in the form of various outputs and outcomes – such as maintenance service provided and uptimes. Then, value is created through not only optimized processes and high-quality products but also through enhanced environments of emergent experiences throughout the brewing ecosystem.

In the health X-verse report, we saw how Microsoft Cloud for Healthcare provides trusted, integrated capabilities that make it easier to improve the entire healthcare experience, by providing a platform that helps with enhanced patient engagement, empowered health team collaboration and improved clinical and operational insights (see Figure 17).

Microsoft developed the Azure Health Bot that helped during the pandemic to triage symptoms, answer lab and COVID-related questions, and locate nearby clinics. Thousands of bots were built on the Microsoft Health Cloud, and they delivered close to 1 billion messages to over 80 million people worldwide, spanning 25 countries.[38]

Satya Nadella describes how powerful the healthcare cloud can be in his address at Ignite 2021: "Take Dr. Michael Marin, a vascular surgeon at Mount Sinai Hospital in New York City. A world away in eastern Uganda, communities haven't had access to advanced medical care. But now, using HoloLens 2, along with Dynamics 365 Remote Assist and Teams, Dr. Marin is able to coach a surgeon doing a complex procedure 7,000 miles away in real time, expanding access to specialized knowledge and resources, and overcoming disparities in care."

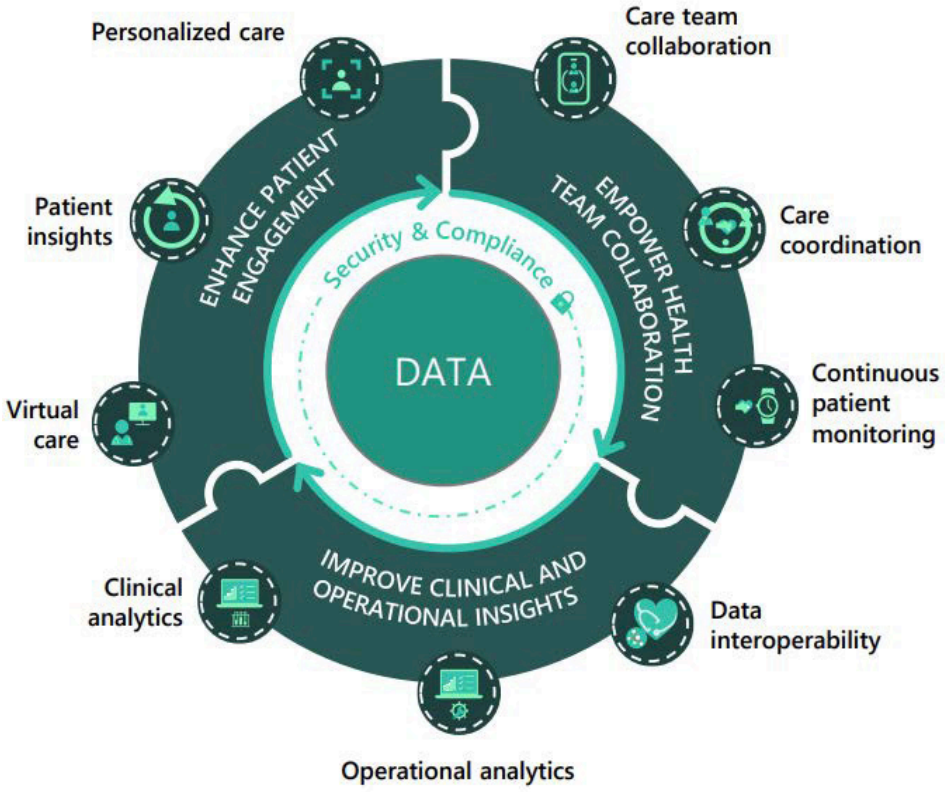

Figure 17: Microsoft Cloud for Healthcare (Source: Microsoft)

In retail, the industry cloud connects physical and digital experiences to better serve customers in new and more personalized ways, and provide omnichannel capabilities. Walgreens Boots Alliance piloted an immersive, mixed-reality training program using Microsoft HoloLens 2 and tablet devices. The program used a three-dimensional model of the reconfigured stores and relevant, industry-specific retail scenarios to teach employees how to restock products, determine if an onion or banana is past its prime, help customers redeem grocery coupons and deal with unfamiliar customer service situations. The company is also using Azure Synapse to bring together data from disparate sources to better understand customer needs and optimize supply chains.[39]

In financial services, the industry cloud allows institutions to modernize core banking services such as payments, manage organizational risks, and create new innovative financial service models. For instance, Standard Chartered Bank and Microsoft are partnering to accelerate the bank's digital transformation to make its vision for virtual banking, next-generation payments, open banking and banking-as-a-service a reality.[40]

The industry cloud for Nonprofits provides common workflows to address administrative needs. For example, Right To Play, a Canadian charity, has leveraged a Microsoft solution to reach more children by massively scaling its fundraising efforts, automating donation processing, and providing real-time and transparent impact reporting.[41] Under sustainability, the industry cloud helps organizations record, report and reduce their environmental impact and provides a platform for environmental social, and governance (ESG) capabilities. Grupo Bimbo, headquartered in Mexico, with more than 200 bakeries and other plants in 33 countries, along with a worldwide distribution network serving more than 54,000 routes, has a massive operating footprint, which makes it challenging to track and analyze its emissions across the full value chain. It is using Microsoft Cloud for Sustainability to gather data from internal systems, external sources, and Internet of Things (IoT) sensors across its operations and supply chain into a common data model for easy monitoring.[42]

Each industry cloud offering is designed to work as one seamless solution and to enable cross-industry workflows. For example, retailers and manufacturers can work across clouds to manage inventory and production in real time, from shelf to warehouse to factory. The sustainability cloud works across industries. The industry clouds help tie its customers' vast and disparate IT systems seamlessly, which Nadella refers to as "digital estates.[43] These industry clouds can jumpstart the digital transformation journey of businesses and enables them to deliver value at a record pace. This is because they provide an on-ramp to the broader portfolio of Microsoft cloud services, enabling customers to begin with the areas where the need for technology transformation is most urgent.

Transforming work and developer experiences

Microsoft's mission to empower every person and organization is founded on its ability to create technology advances that radically democratize creation. Satya Nadella says, "We will need to expand access to skills, tools and platforms, as well as connections and collaboration across communities so that everyone can

create, whether it's building a virtual world, students working on an assignment with short-form videos, knowledge workers creating formulas and spreadsheets, pro developers writing code or domain experts using local tools to build applications."[44]

But a plethora of technological products and solutions without an underlying ease of use and user-centricity would lead to an overwhelming feeling of clutter and despair for the employee. Consider the following scenario, articulated by Microsoft in its case for creating an employee experience platform.[45]

> "Imagine you're a recent college graduate, and you've just started a job at a company that makes personal protective equipment for hospitals. You don't have direct experience with PPE, but your new boss—whom you've met only over video because you work remotely—says your math skills will make you an asset to the supply chain team. On your first day, you roll out of bed, put on the company T-shirt you received in the mail, and log in. You think to yourself, "I'd better learn how we make masks." (You'd better remember to sign up for benefits, too.) But where do you begin? In the past, you might have had a full onboarding orientation, with days of in-person meetings, walk-throughs, and lunches to help you find your way. Now all you have are a chat app, a bunch of cloud platforms that don't seem to fit together, and a nest of poorly labeled file folders, half of which you can't access."

Microsoft, as part of its productive enterprise vision, undertook an intentional shift away from traditional product service models and put the user at the center of the reimagined employee experience (see Figure 18).[46]

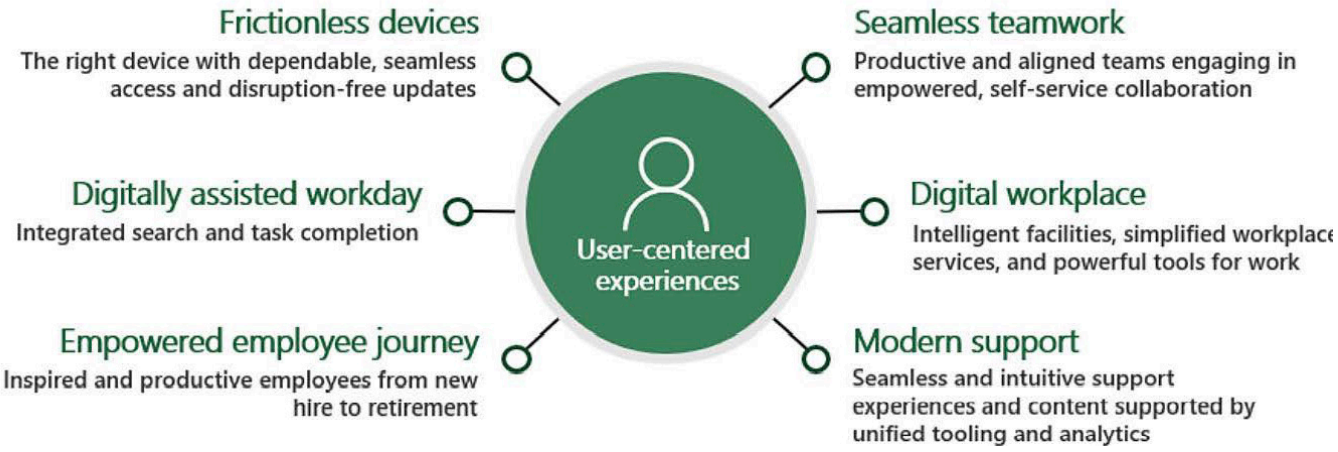

Figure 18: The six investments of the productive enterprise initiative (Source: Microsoft)

The outcome of this initiative was the development of the Employee Experience Cloud, Microsoft Viva. It brings together communications, learning, well-being and knowledge directly within the flow of work so that employees have the information, the resources and support they need to succeed and thrive and stay connected with each other and the company's mission.

The new and improved employee experience for the new employee in the above scenario, and using Viva

would look as follows: [47]

> "AI systems are processing everything from sales decks to meeting agendas to invoices to create Wikipedia-style "rough cuts" of everything your company knows and does, from topics and concepts to people and workflows. In Teams, you get a message from a new coworker with a mask-making acronym you don't know. You hover over it, and a card appears to tell you what it means. An Outlook email from HR about open enrollment triggers another card that lets you dig into your health insurance options. An assignment from your new boss has you thinking, "Where do I start?" until another card appears with a roster of suggested colleagues who could help, all tied to their LinkedIn profiles."

Microsoft has strived hard to bring together various products from its stable such as Teams, Power Platform, Dynamics 365 into its Azure cloud. For example, a service engineer can fix customer issues faster, adding troubleshooting steps to the customer service case record directly in Teams. Microsoft is looking at its collaboration platforms as a foundation for catalysing more innovations from its partners too. Nadella says, "With Teams and Office, we're enabling a new category of cross-device collaborative applications. Just like Win32 defined a new era of apps, and web apps and mobile apps did the same, this new generation of cross-device, collaborative applications will be a transformational first-class platform for you. For example, ServiceNow built a collaborative app for instant response using Teams as the UI, the Microsoft Graph to connect with the right people in the organization, and a bot to alert them to join a conference call when required."[48]

Microsoft's partnership with OpenAI has brought about game-changing innovations to the world of developers and business users. The GitHub Copilot feature, a new AI pair programmer, helps developers write better code. GitHub Copilot uses the OpenAI Codex engine to suggest code and entire functions in real-time, right from the developer's editor. Trained on billions of lines of code, GitHub Copilot turns natural language prompts into coding suggestions across dozens of languages. It shares recommendations based on the project's context and style conventions. Developers can quickly cycle through lines of code or complete function suggestions, and decide which to accept, reject, or edit. A recent analysis of the code on GitHub found that on average more than 27% of developers' code files were generated by GitHub Copilot, and in certain languages like Python that went up to 40%. [49]

Microsoft and OpenAI have trained one of the world's most powerful language models, GPT3, on Azure. The power of GPT3 has been brought to Microsoft's Power Platform, the next generation business process automation and productivity suite. It is a low-code app development platform that helps everyone, from experienced developers to people with little or no coding experience, a.k.a "citizen developers" to build applications. Using GPT3, citizen developers or business users can describe what they want to do in natural language, and it will generate a list of the most relevant Power FX formulas for them to choose from. For instance, the AI-powered features will allow an employee building an e-commerce app to describe a programming goal using conversational language like "find products where the name starts with 'kids.'" And

the system will suggest a programming formula such as "Filter('BC Orders' Left('Product Name',4)="Kids").[50] The code literally writes itself.

Microsoft as a co-creative living enterprise

Microsoft accomplished its remarkable transformation building on its traditional strengths in providing software to both individuals and corporates. But it placed an emphasis on *empowerment* of these stakeholders across the world. Satya Nadella says, "We can't do business effectively in 190 countries unless we prioritize the creation of greater local economic opportunity in each of those countries….In each of these regions, we have to operate with responsibility. Real business success cannot be just the surplus that you create for your own core constituency, but also the broader surplus that is created to benefit the wider society…..How can we help our local partners and startups grow? How can we help the public sector become more efficient? How can we help solve the most pressing issues in society, like access to education and health?"[51] Microsoft has thus reframed the need for technology from a perspective of creating value-surplus in society. This sets the tone for expansive design by amplifying valuable wellbeing-impacts.

Second, Microsoft has also clearly articulated a humanity-centric approach to developing new technology. Nadella says, "I explain Microsoft's approach to AI as based on three core principles. First, we want to build intelligence that augments human abilities and experiences. Second, we also have to build trust directly into our technology. We must infuse technology with protections for privacy, transparency, and security. AI devices must be designed to detect new threats and devise appropriate protections as they evolve. And third, all of the technology we build must be inclusive and respectful to everyone, serving humans across barriers of culture, race, nationality, economic status, age, gender, physical and mental ability, and more."[52] This further sets the tone for expanding the pie of value through inclusive experience environments that span the spectrum of networked interactions, while paying attention to the value-creational engagements in individual-specific ways of socio-cultural impacts.

Microsoft has also looked at its organizational transformation from an employee experience-centric perspective, whether it is the customer-facing sales experience or internal-facing teams experience or the partner-facing experience. This experience-first focus has led to an intensive focus on "future of hybrid work experiences", especially via its employee experience platform, Viva. As hybrid work has led to a growing disconnect between employees and managers/leaders, especially on issues of productivity and maintaining autonomy while ensuring accountability, the benefits of flexibility, and the role of the "office", it now recognizes that "work is no longer just a place but an experience that needs to transcend time and space so employees can stay engaged and connected no matter where they are working". As Satya Nadella has remarked: "Thriving employees are what will give organizations a competitive advantage in today's dynamic economic environment". To address the future of hybrid work challenges, it has purpose-built new experience environments that extends Viva employee experience platform capabilities. For instance:[53]

- **Viva Pulse** is a new app that uses smart templates and research-backed questions to help managers pinpoint what's working well and where to focus, and also provides suggested learning and actions

to address team needs.

- **Viva Amplify** is a new app that centralizes communications campaigns, offers writing guidance to improve message resonance, enables publishing across multiple channels and distribution groups, and provides metrics for improvement.
- **Answers in Viva** is a new capability that uses AI to match employee questions to answers and experts across the organization to help put collective knowledge to work for all employees.
- **People in Viva** is a new capability that uses AI to create rich profile cards with details on an employee's interests, knowledge and team goals to help colleagues easily discover connections, experts and insights across the organization.
- **Viva Engage** fosters digital community building through conversations and self-expression tools with stories and storylines. A **Leadership Corner** invites employees to interact directly with leadership, share ideas and perspectives, and participate in organization initiatives.
- **Viva Goals** helps organizations align employee work to business outcomes. New integrations in Viva Goals bring goals into the flow of work including a richer integration with Microsoft Teams to check in on OKRs (Objectives and Key results).
- Enhanced **integrations between Viva Learning and LinkedIn Learning** makes it even easier for people to access content from LinkedIn Learning Hub right in the flow of work in Teams. Learners can see all their LinkedIn Learning Hub content synced, including custom content, curated learning paths and the courses they have already completed, all reflected directly within Viva. And administrators can set the integration up directly within their settings on LinkedIn Learning Hub — no APIs needed.
- **Viva Sales,** the first role-based experience app in the platform, brings together a seller's CRM with Microsoft 365 and Teams to provide a more streamlined and AI-powered selling experience — right in the tools they're using every day to connect with customers and close deals. Through a partnership with Seismic, its customer engagements can be personalized and scaled through AI-generated content recommendations.
- To help employees start their day on track and streamline access to Viva, a **new home experience in Viva Connections** brings all the Viva apps together in one place, with updates to the Viva briefing email providing more personalized productivity recommendations to help employees catch up on work, meetings, and learning.

But what about the role of physical space? Nadella notes that for 200-plus years, "we have tuned space to drive productivity by bringing people together, having a common sense of purpose, mission, connection, and what have you", but moving forward "can we use space, such that it maps to the expectations of our employees and the task at hand". Microsoft is therefore redesigning the way managers and teams use its campus, by giving tools for flexibility such that teams can come together on demand for a design session, or

in crunch-time mode for building software. A combination of space and the remote digital fabric that it has established through the COVID-19 pandemic is envisioned to mesh together to create collaborative phygital (physical+digital) work experiences on demand. The PIE X lens and levers we have discussed can be utilized to kindle reimaginations of various flows of enactments of interactional creation both in terms of offerings/ business models as well as how work gets done. In the end, as Nadella emphasizes: "I always say, if everybody at Microsoft who works at Microsoft reframed it and said, "I don't work for Microsoft. Microsoft works for me," just for a moment, just as a thought experiment, does that equation compose? Am I able to fulfill my career aspirations, my approach to having impact in the world? Somehow if Microsoft is acting as a platform for that, then it's very different. I feel connected with the mission."[54] As we have been discussing, co-creative living enterprise transformation is as much about connecting with the lived-journeys of employees, as it is with that customers and partners. This is crucial for effective co-innovation of enterprises with its customers and partners.

According to Microsoft: "Digital technology must be the servant of business outcomes, allowing organizations to realize efficiencies across their business, harness data to deliver differentiated customer experiences, make collaboration seamless wherever employees are located and thwart emerging security threats. This is the foundation of co-innovation with our customers and partners, and how we work together to ensure their digital strategy is aligned to business outcomes and delivers measurable value.[55] Co-creating customer success through co-innovation requires democratizing transformation, which as Iansiti and Nadella note requires giving the entire workforce the capacity to become innovators. They note that while the potential for employee-driven digital innovation is impossible to calculate, their research sheds light on how larger, more-diverse groups of people – executives, managers, and frontline workers— need to come together to rethink how every aspect of the business should operate.[56]

The Microsoft example illustrates how a PIE X lens can inform new ways of seeing, thinking about, and doing organizational transformation in the quest to become a co-creative living enterprise. While Microsoft is largely a software platform company, we now turn to automotive giant Mahindra. The automotive industry is undergoing a dramatic transformation from automotive being seen as "hardware assemblies with electronics" to "software platforms on wheels of hardware". In the previous report, we saw the example of John Deere and how tractors have become smart connected offerings. Here, we will focus on application of the PIE X lens to organizational transformation. To do so, we will look at focal experiencers in different spheres of the organizational relational ecosystem. We will apply some of the levers to engagement platforms in such organizational experience ecosystems and see how the reconfiguration of flows of interactions in the lived-journeys of individuals in various hybrid teams can lead to valuable transformational impacts.

Mahindra

The Mahindra Group was established in 1945 in India. It is one of the largest and most admired multinational federation of companies (with consolidated revenues of INR 901,710 million and profits (PAT) of INR 65,770 million in FY22). The Group, spread across 22 businesses, is the world's largest tractor company by volume, enjoys a leadership position in farm equipment, utility vehicles, information technology and financial services in India, has a strong presence in renewable energy, agriculture, logistics, hospitality and real estate, and employs 260,000 people in over 100 countries.[57]

Mahindra and Mahindra (M&M) is a flagship company of the Mahindra Group. M&M's core business is in mobility and farm products and solutions, including SUVs, pickups, commercial vehicles and tractors, to electric vehicles, two-wheelers, gensets and construction equipment. Over 75 years of its existence, Mahindra has demonstrated a spirit of innovation and anti-fragility. In the 1970s, when the petrol prices shot up in India due to a global oil crisis and their cars-demand crashed, Mahindra innovated by modifying its tractor diesel engine to be used in their passenger vehicles and made it a source of competitive advantage. Similarly, when Mahindra found that it had excess capacity in its tractor engine plant, it developed a highly successful allied business, Powerol, that used these engines to power diesel generator sets for power generation. On similar lines of innovation, its Scorpio range of vehicles grew out of the challenge to develop a world class SUV, at a fraction of the cost of such development in the West.[58] In the aftermath of the COVID-19 pandemic, Mahindra has doubled down on its focus on digitalisation and emerging technologies such as EVs to transform its business, bring in efficiencies and offer innovative products and solutions to its customers, partners and employees. Let us take a look at this digital transformation of Mahindra.

FUTURISE – a digital transformation of Mahindra

In FY2022, under the theme of Futurise, Mahindra articulated its ambition to lead in three pillars – outperform financially, lead ESG, and be future-ready. Under being future-ready, it aims to elevate customer experience through digitisation, and fuel businesses of the future with its 'Born Electric Vehicles' vision. See Figure 19 for Mahindra's vision for a tech-enabled redefinition of the future.[59]

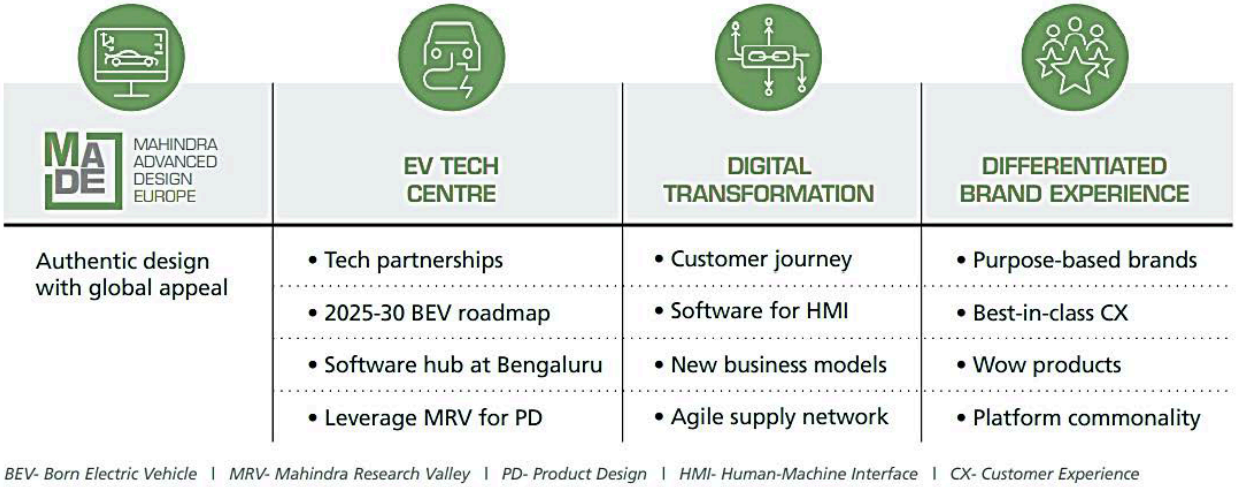

Figure 19: Redefine the future (Source: Mahindra and Mahindra)

Mahindra has undertaken a number of digital initiatives to enhance their automotive customer buying experience. It has deployed immersive 3D visualiser using WebGL tech for customers to virtually experience XUV700, a high-end SUV. Owners also get an interactive manual with the 'With You Hamesha' service app. Its integrated automotive web-based platform 'auto.mahindra.com' is enabled with an innovative chatbot feature for swift query resolution and transactions.

Mahindra has also streamlined its processes at dealerships. It has rolled out a more agile CRM platform across 439 dealerships pan-India, introduced SalesGenie Nxt App to help them manage processes like enquiry management, test drive, quotation, and booking seamlessly. It has also leveraged technology to allow for real-time data integration of call centre and dealer agents to share leads. Their 'World of SUVs' format of next-generation dealerships provides convenience to customers by integrating the virtual world with the real on a phygital platform. Embedded screens and immersive virtual reality with mirror display, Wi-Fi connected customer lounges and specially trained relationship managers provide an immersive customer experience.

Similarly, Mahindra has leveraged digital technologies to transform the agri and farmer experience front too. Krish-e is Mahindra's farming-as-a-service vertical (see Figure 20).[60] It has launched 3 apps – Krish-e, Krish-e Rental, and Krish-e Nidaan – that offer differentiated and farmer focused advisory and rental services, and aims to increase farmers' income through digitally enabled services across the complete crop cycle. In order to enable such an offering,

Figure 20: Krish-e farmer-as-a-service offering (Source: Mahindra and Mahindra)

Mahindra has made strategic investments in Resson – a Canadian predictive analytics company, Gamaya – a Swiss hyperspectral image analytics company, and Carnot – an Indian AI-enabled agri IoT company.

DigiSense4G is Mahindra's next-gen AI-driven open-architecture solution, that helps farmers track their tractors and control their farming activities remotely. The mPragati app provides access to DigiSense features like live location, fuel levels, etc., to its tractors and farm machinery customers. These agri solutions are similar to the ones from Land O'Lakes and ITC that we saw in our previous report on retail and agri X-verse.[61]

Not only its sales and customer experiences, Mahindra is also leveraging technologies to transform its manufacturing capabilities. It has connected critical machines across 8 plants across India through the in-house developed platform, Drona, to ensure better productivity, increased machine availability and improved efficiency. Using advanced AI / ML models that capture over 1,000 data points, ranging from supplier parts to on-road performance, Mahindra can predict and score the performance of its engines with an accuracy of 99.6%. Such models help reduce the testing time and improve quality. It is also running AI / ML models in their automated painting process to help set the right conditions to achieve the best possible output.

Mahindra has extended the principle of customer experience to their manufacturing plants too. It has leveraged Industry 4.0 technologies to create over 3,000 digital interfaces across the plants to enable high visibility and detail. Of these, more than 500 touch points directly contribute to assuring quality and customer experience.

Mahindra is harnessing technology to create more compelling new products, and is betting big on EV technology. For its Born Electric portfolio of SUVs, it is focusing on driving partnerships along with leveraging internal R&D and innovation capabilities of its research facilities at Mahindra Research Valley, EV Tech Centre, Mahindra North American Technical Centre, and UK Design Centre (M.A.D.E.).

All these initiatives will undoubtedly help Mahindra become future-ready and meet its financial performance goals by offering superior products, services and experiences. It also aims to be a purpose-driven brand, similar to the examples of NIKE or Starbucks that we saw in our previous report on the retail and agri X-verse. Mahindra aspires to be a leading company for its ESG commitments. See Figure 21 for a list of FY22 ESG commitments of Mahindra.[62]

Figure 21: ESG commitments of Mahindra, FY22 (Source: Mahindra and Mahindra)

Mahindra aims to be **planet positive** (greening its operations, decarbonising the industry and rejuvenating nature), **people positive** (enabling its associates, communities and customers), and **trust positive** (commitment to its shareholders, partners, and investors). It has estimated to have delivered USD 4 billion worth of social impact.[63]

For instance, on the planet positive front, Mahindra & Mahindra was the first company globally to commit to doubling its energy productivity through the EP100 initiative (a global initiative led by the international non-profit Climate Group, bringing together over 120 energy smart businesses committed to measuring and reporting on energy efficiency improvements). It has also committed to having all its locations certified as 'Zero Waste' by 2030. On the trust positive front, Mahindra has been disclosing information to all stakeholders for over 14 years through its GRI-based[64] sustainability reporting. Since FY18, it has been sharing information through its Annual Integrated Report based on International Integrated Reporting Council (IIRC) Framework. In F22, Mahindra invested over INR 970 million in various social projects in the areas of girl child education (Project Nanhi Kali), skilling of youth (Mahindra Pride Schools and Classrooms),

environment rejuvenation (Project Hariyali) and prosperity of farmers (Project Prerna Krishi Mitr).

Mahindra recognises and measures as part of its annual reporting value created by leveraging multiple types of capital – not just financial capital, but also manufactured, intellectual, human, social & relationship and natural capital. See Figure 22 for Mahindra's value creation model.[65]

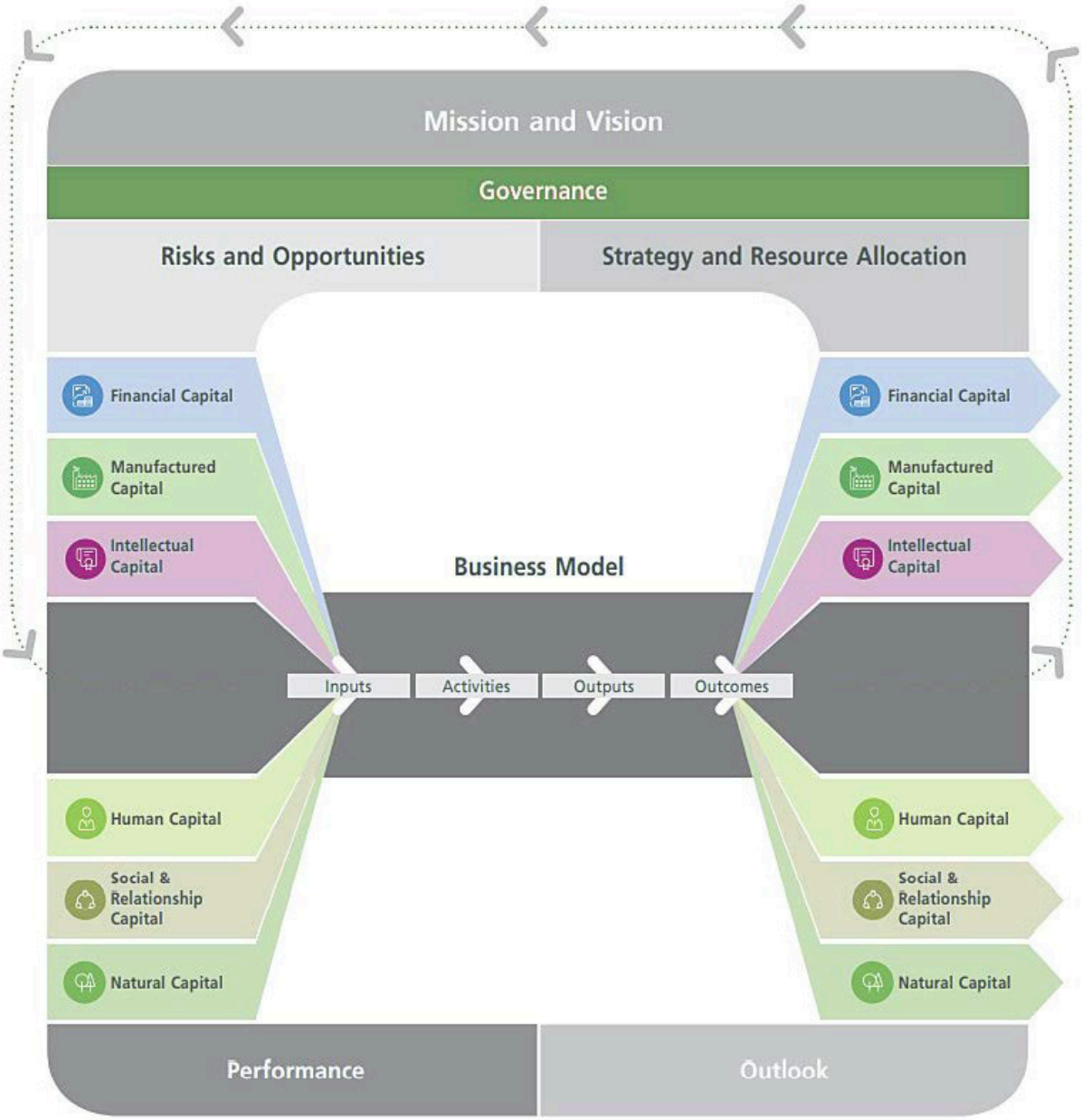

Figure 22: Value creation model (Source: Mahindra and Mahindra)

Mahindra also identifies and monitors "materiality", which are material issues that impact, directly or indirectly, its economic, social or environmental sustainability, and the value created or delivered to its stakeholders over short, medium or long term. See Figure 23 for Mahindra's materiality matrix for the automotive and farm equipment sectors.[66] It periodically evaluates its material issues to introspect as well as shape the future course of action across the triple bottom line – social, environmental and financial.

Materiality Matrix
Automotive Sector

BUSINESS	ENVIRONMENT	SOCIAL
PARAMETERS OF HIGH IMPORTANCE		
Cost control and Profit Margin	End of Life Management	Customer Satisfaction
R&D impetus	Water Intensity	CSR Management
Fuel Efficiency	Energy Efficiency	Employee Productivity
Risk Assessment and Compliance	Recyclable/Recycled Material	Health and Safety
Market/Product competition	Waste Generation	Product Safety
Sustainable Mobility	Climate Change and GHG Emissions	Training and Education
Product Quality	Tail pipe emissions reduction	Gender Diversity
Supply chain Optimisation	Life Cycle Management	Grievance Mechanisms
Logistics Optimisation and Sustainable Logistic		
Emerging Markets Needs		

Materiality Matrix
Farm Equipment Sector

BUSINESS	ENVIRONMENT	SOCIAL
PARAMETERS OF HIGH IMPORTANCE		
Cost control and Profit Margin	Water Intensity	Customer Satisfaction
R&D impetus	Energy Efficiency	CSR Management
Fuel Efficiency	Recyclable/Recycled Material	Employee Productivity
Farm Tech Prosperity (Farmer Prosperity)	Waste Generation	Health and Safety
Risk Assessment and Compliance	Climate Change and GHG Emissions	Grievance Mechanisms
Solution Selling Beyond Products	Water Availability	Supplier Satisfaction/Relationship
Product Quality		Training and Education
Soil Health		Gender Diversity
Supply chain Optimisation		Talent Retention and Succession Planning
Logistics Optimisation & Sustainable Logistics		
Dealer Management		
Market/Product competition		

Figure 23: Materiality matrix for automotive and farm equipment sectors (Source: Mahindra and Mahindra)

The first step in determining material issues is stakeholder identification, followed by the development of an engagement mechanism in order to communicate with them on a regular basis. Mahindra has developed varied mechanisms of stakeholder engagement, involving their customers, employees, partners, dealers, suppliers and investors. See Figure 24.[67]

STAKEHOLDER GROUP	ENGAGEMENT CHANNELS
GOVERNMENT/ REGULATORY AUTHORITIES	Environmental compliance, policy consultations
EMPLOYEES	Conferences, workshops, publications, newsletters & reports, online portals, feedback surveys and one-on-one interactions, employee involvement in CSR activities
CUSTOMERS	Interviews, personal visits, publications, mass media & digital communications, feedback camps, plant visits and support programmes
SUPPLIERS & DEALERS	Supplier & vendor meets, workshops & training, audits, policies, IT-enabled information sharing tools, and recognition platforms
INVESTORS/ SHAREHOLDERS	Annual report, sustainability report, press releases, investor presentations, corporate website, quarterly and annual results, ESG calls
LOCAL COMMUNITIES	CSR activities
EDUCATIONAL INSTITUTES/ UNIVERSITIES	Technical collaborations, capacity building, research

Figure 24: Stakeholder engagement channels (Source: Mahindra and Mahindra)

The foundations for meaningful dialogue with these stakeholders hark back a co-creation movement that emerged in Mahindra a decade back.

A co-creation movement in Mahindra

In August 2010, Naveen Chopra, then senior general manager and head of Plant Quality for the Automotive Division of Mahindra, one of India's largest vehicle manufacturers, attended a seminar on the topic of the co-creation paradigm of value creation conducted by one of us (Venkat Ramaswamy). [68]Co-creation emphasizes the need for creative collaboration and enhanced communication and co-ordination among stakeholders, and Naveen was constantly striving to improve precisely these practices across the five operating sites of Mahindra's Automotive Division.

Naveen decided to experiment with co-creation thinking by applying its principles first in the quality function. In September 2010, he drafted a short presentation on co-creation thinking, sharing it initially with his immediate colleagues and then with his wider quality team across the five plants. Central to co-creation thinking is engaging external and internal stakeholders—including customers, employees, suppliers and dealers--to create value together through platforms of engagements and environments of interactions, purposefully designed and configured to address the interests and needs of participating individuals.

As Head of Quality, he was already collaborating with multiple functions of the business, such as manufacturing, marketing and customer service, in a quest to enhance and enrich the company's quality culture. He himself began to engage employees as stakeholders in internal experience sharing sessions. Simultaneously, Naveen started to tackle the practicalities of communicating co-creation thinking more widely, together with a core team representing different functions—including dealer channel, training, manufacturing, and supply chain management. They put together several examples of co-creation in action, and also communicated more precisely how it worked in practice.

For example, they explained that it was not about just getting feedback but it also involved sharing experiences and experiential learning. An early success was when the team decided to form a small group of engineers, each with about 10 to 25 years of specialist automotive experience, and enable them to pass on their knowledge and expertise to dozens of younger colleagues. The team identified specific stakeholding individuals from the pool of engineers who could benefit from this type of knowledge sharing.

The team established an engagement platform—in this case, "live" monthly workshops—where the whole group could meet to share knowledge and experiences. These were led by a voluntary cadre of experienced engineers who took on the role of trainers. The meetings were more than just about talking shop. To be effective, they required an honest approach from all participants, based on mutual respect, openness and the willingness to experiment. Typically, a workshop would focus on a specific theme, with one or two seasoned engineers passing on their expertise to their junior colleagues.

Between workshops, the groups would document their learning and jointly create an internal training module on the subject, which could be run at any time and updated as necessary. Throughout the month the team focused on making workshop design changes by asking participants how their experiences could be improved and how the platform could be more valuable.

In just two to three months, the platform had enabled specialized knowledge sharing and training to be rolled out at high speed with hardly any extra cost to the company. This early success was soon appreciated at senior management levels within Mahindra. In the ensuing 18 months, around 50 similar modules were created, with 400 to 500 employees benefiting. Says Naveen: "Using traditional classroom training methods, this would have taken us ten years."

In the case of suppliers, the joint team first considered how supplier meetings could improve mutual understanding, cooperation and collaboration. If supplier capability could be augmented, it was reasonable to expect that quality would improve too, with both parties "winning more." Instead of taking the traditional approach of first finding fault with the suppliers and urging them to take corrective action, efforts were made to consider how they interacted with Mahindra. Suppliers were encouraged to share their experiences. There was initially some suspicion among suppliers about the dialog process, which was natural because Mahindra was their customer, but by the end of 2010, some 80 suppliers were on board, with this effort producing the desired results.

In the case of dealers, as with the suppliers, traditional meetings were reformed into a more effective

engagement platform, with emphasis placed on seeing issues from the dealers' perspective and supporting them. Further, stakeholders who were typically not part of the quality conversation, such as auto repair mechanics, were involved in sharing their knowledge – about vehicle defects, failure modes and problem-solving solution, and they also were invited to Mahindra's plants. Again, both Mahindra and the dealers reaped the benefits, from addressing vehicle defects to shaping new product features, including more productive relationships and faster cycle times. Some dealers initiated co-creation thinking in their own businesses. As a result, defects for top dealers reduced significantly. New diagnostics for dealer technicians and new product knowledge enhancement through training sessions on focused topics resulted in getting service right the first time, while also gaining a better understanding of part failures based on actual field experiences.

By early 2011, word of Naveen's success with co-creation was spreading within Mahindra, with other area executives beginning to see its potential to transform their own functions. As momentum continued to build, a co-creation workshop for about 350 people was held in May 2011 where several individuals shared their experiences. Several people beyond the core team took the lead in conducting sessions. Some executives who were exposed to co-creation thinking at this event began acting on it, in areas as diverse as sustainability and social impact.

Then, in the next Global Program for Management Development (GPMD) program in early August 2011, the core team shared their experiences with several other leaders from within the Mahindra extended enterprise. By the end of August 2011, six more executives had become co-creation champions, some of whom had begun to embed early co-creation thinking into activities they were spearheading. In particular, a culture of co-creation had begun to spread in the extended supply chain network. The head of manufacturing in the automotive division became an ardent co-creation champion. He enlisted his own core team, beginning with an experimental program in engagement of contract labour. Through this program, by asking contract employees for ideas and giving them the ability to self-organize, the Mahindra officers had been able to achieve their quality-related goals more consistently. The manufacturing team then tackled core areas in the production process, including redesigning the manufacturing shop floors by setting up internal platforms of engagements.

Further, co-creation began to spread in the extended supply chain network. This was crucial to the success of Mahindra Automotive because an automobile typically has more than 5,000 parts, with Mahindra manufacturing core components such as the engine, transmission, and body in its plants and with as much as 70 percent of parts coming from a network of suppliers. While Mahindra engages primarily with Tier 1 suppliers who provide sub-assemblies and systems, Tier 1 suppliers in turn procure components from Tier 2 suppliers. However, these Tier 2 suppliers are small to medium enterprises with limited resources and skills, often with traditional practices and lacking exposure to modern methods. Following the co-creation workshops, Mahindra began involving over 400 tier 1 suppliers – both officers and operators – in "co-creation competitions," inviting the best entries to share their "Kaizen, Pokayoke, and Quality Control" stories, first with Mahindra senior management and then across the Tier 1 network.

The popularity of this program was a positive surprise for Mahindra management, which assumed that the

suppliers would be hesitant to share practices with each other. In reality, however, the alternate thinking of learning by sharing facilitated by Mahindra began to spread as Tier 1 suppliers starting seeing the power of creating value together as an example of "win more-win more." Once this took root, Tier 1 suppliers began to engage Tier 2 suppliers, inviting Mahindra to participate as well. For Mahindra this was a unique opportunity to promote comprehensive holistic growth and the improvement of Tier 2 suppliers' productivity, quality, cost, delivery, safety and morale. And so, Mahindra enabled a "supplier cluster" platform of co-creation engagements at the Tier 2 level – facilitated by Tier 1 suppliers – bringing together groups of five to 15 co-located Tier 2 suppliers manufacturing similar products for a common shared purpose of improvement and for achieving agreed deliverables. This has also resulted in transforming the culture of Tier 2 suppliers, working together with Tier 1 suppliers and positively affecting quality and delivery at the Tier 1 level, and subsequently enhancing automotive quality overall at Mahindra. Over 10,000 supplier personnel were involved, with about 30 clusters having been formed, and over 50 lean management projects executed.

In November 2011, the company held an event involving over 1,000 Mahindra employees, suppliers, dealers and even its other non-traditional stakeholders, such as banks and educational institutions. As a step toward wider societal responsibility, the principles and successes of Mahindra's co-creation journey were shared with this broad spectrum of business and social stakeholders. In turn, local banks and schools learned to create platforms to engage their own stakeholders.

Mahindra next began to harness the power of technology and social media to move the crucial engagement platforms beyond face-to-face workshops, to achieve wider geographical and enterprise ecosystem impact. For a widely diversified conglomerate like Mahindra, further development of digital forums enabled the enterprise ecosystem to scale co-creation and share its best practices and make its principles, methods and tools more easily accessible throughout its many functions and divisions.

Mahindra achieved a balance between co-creation and the management systems of the conglomerate enterprise, through co-creation champions at the corporate level in other areas. For instance, leaders who were engaged with many different internal functions in developing a collective corporate identity, Mahindra Rise, were co-opted. Mahindra also engaged change-makers across India through a societal engagement platform (www.sparktherise.com). Further, Mahindra undertook co-creative engagement of manufacturing operators in training, competency enhancement of employees, and talent development of officers. Likewise, platforms for co-creative new product development began to involve the marketing and branding functions together with communities of consumers, including the launch of new vehicles.

Thus, the culture of co-creation became part of Mahindra's DNA, and continued to evolve. Anand Mahindra says, "The co-creation mantra is now embodied in the three basic tenets of the Mahindra Group –accepting no limits, thinking alternatively, and driving positive change in everything we do." Naveen Chopra, Mahindra's first co-creation champion, is now Head of Product Development & Component Development and Material Management, Mahindra Trucks & Buses, and is continuing on his co-creation journey.

Mahindra as a co-creative living enterprise

What makes Mahindra a living enterprise? In the course of its digital transformation journey, we can see Mahindra has undertaken the following six steps.

1. Identify key stakeholders and increase their willingness to engage. In 2012, Anand Mahindra, chairman of Mahindra Group, articulated a vision of creating Mahindra as a reflective organization. Reflective Conversations Community (RCC) is a cultural transformational intervention in the Mahindra Group aimed at creating higher levels of employee engagement and better connect with stakeholders. By 2021, more than 2,600 employees had benefited from instructor-led workshops and have made use of digital solutions to strengthen their reflective conversation skills.

2. Set up platforms purposefully designed to engage individuals more co-creatively, with environments of interactions configured around people's "lived" experiences. The scope of interactions allowed by the platform gradually increase as the intensity of value creation increases, allowing the co-created outcomes resulting from the platform to be more valuable to stakeholding individuals. For instance,

3. Identify and support new co-creation champions. Co-creation initiatives have less chance of scaling up and succeeding without other co-creation champions to "fan the spark and spread the fire of positive energy." The ability to scale co-creation transformation enterprise-wide and in the ecosystem in which it operates depends upon identifying and supporting influential new champions of change in related parts of the enterprise ecosystem.

4. Expand the circle of stakeholders and joint value creation opportunities. Initiating ecosystem-wide change requires expanding the circle of stakeholders, thus revealing new opportunities to bring together sets of stakeholders and communities. Enabling them to engage together can create new co-creative capacities in the enterprise ecosystem.

5. Deepen the impact and enable the viral spread of "win more-win more" value creation in the enterprise ecosystem. A key to effective implementation involves linking together platforms and their environments of interactions across value chain activities. In scaling co-creation in the enterprise ecosystem, interactive and experience-based technology not only helps to make co-creation communities more generative, but also more inclusive.

6. Engage stakeholders across private, public, and plural sectors to amplify wellbeing-impacts for the benefit of all. As individuals' and partnering enterprises' joint interests expand, they create value together through a multitude of channels and interactions. Jointly building co-creative capacities of an enterprise's ecosystems increasingly entails a convergent engagement across private, public and plural sectors.

The payoffs of building co-creative living enterprises include greater creativity and productivity, lower costs, lower employee turnover, new business models and new sources of stakeholder and enterprise value. To do this, organizations must design and support engagement platforms – both face-to-face forums and online discussions – that offer stakeholders the opportunity to debate, discuss, and establish priorities and

participate fully.

Our analysis also reveals certain newer opportunities for Mahindra to further embrace the spirit of being a living enterprise. For instance, the predominant value creation model, as reflected in Figure 16, is still based on "inputs, activities, outputs and outcomes". Even when it considers experiences, it is mainly focused on "customer experiences". As we have seen, experiences emerge at every point of engagement of every stakeholder (customer, partner, employee etc.) and Mahindra and its experience-environments. Adopting an experience-centric perspective in innovation and value creation across the entire stakeholder ecosystem, as we saw in the Microsoft example, can further transform Mahindra toward becoming a full-fledged co-creative living enterprise across the entire ecosystem of experiences in which it operates.

As Anand Mahindra noted: "In the decade since co-creation was mooted, technological platforms have enabled human engagement at deeper levels and on an infinitely broader scale. As a consequence, businesses can and must expand their strategies to encompass a profitable engagement with all stakeholders. The powerful idea that 'we can do even better for ourselves, if we do well for others' encompasses the way that successful organizations will contribute to wealth, welfare, and wellbeing in society.[69]

4. Digital India Innovation and Co-Creative Living Enterprise Transformation

BECOMING A CO-CREATIVE LIVING ENTERPRISE IN THE X-VERSE

Applying the PIE X lens to organizational transformation

Tech-intensity as empowering India

We began this report series with the IT story of India, and how against all odds, it placed India on the global centre stage. India's Prime Minister Narendra Modi sees "technology as a means to empower and as a tool that bridges the distance between hope and opportunity."[70] India's adoption of digital technologies, especially in the last decade, has played a significant role in this remarkable growth and value creation. In 2021, India had over 624 million internet users (45% of the population), 448 million social media users (32% of the population), and 1.1 billion mobile phone connections (79% of the population). India in 2020 consumed around 40 million terabytes of data, a ten- fold increase from 2015, and it has one of the lowest costs of mobile data in the world, in a 2022 comparison of 233 countries.

The Economist believes that India is likely to be the world's fastest-growing big economy in 2022. It has highlighted factors like India's pre-eminence in IT and a high-tech welfare safety-net in the country as pillars that support this fantastic growth. Aided by the Government of India's policies such as Digital India and Startup India, India has become the third largest startup ecosystem in the world, and with about 100 unicorns (startups with valuation greater than USD 1 billion), it is third on that list too, after the US and China.

Aadhaar, managed by the Unique IDentification Authority of India (UIDAI), is the world's largest biometric identity system. It is also the fastest to reach 1 billion users in just 5.5 years, besting even some of the most popular Internet and social media platforms in the world. Aadhaar can be used by citizens while availing various government services like direct benefit transfer schemes, subsidised cooking gas connection, subsidised rations from the public distribution system, benefits under government pension schemes, e-sign, and digital locker. For instance, the tech-enabled Direct Benefits Transfer system has ensured that payments totaling USD 270 billion since 2017 have taken place, directly into the bank accounts of roughly 950m people, at an average of $86 per person per year (this welfare pay-out is one third of India's extreme poverty line of USD 250 per person per year).

DigiLocker is a flagship Digital India online service provided by Ministry of Electronics and Information Technology (MeitY). DigiLocker is an account in cloud to Aadhaar holders to access authentic documents in digital format like their driving license, vehicle registration, academic marksheets and certificates in digital format from the original issuers of these certificates. The important benefits for Indian citizens to use DigiLocker include access to important documents anytime and anywhere, consent-based document exchange, and faster delivery of services. For organizations accepting documents using DigiLocker exchange the benefits include reduced overheads, secure document gateway, and real time verification. As of September 2022, there are about 124 million DigiLocker users who access about 5.6 billion documents.

The Unified Payments Interface (UPI) enabled financial payments revolution has transformed the lives of hand-cart street vendors and *kirana*-shops. UPI introduced in 2016 is an instant payment system developed by the National Payments Corporation of India (NCPI). It allows instant transfer of money between any two parties' bank accounts typically using a mobile phone. UPI makes digital transactions easy across different platforms and for all users, a critical problem to solve to make India's digital economy a reality. UPI's number

of transactions and transaction value has surpassed those of combined debit and credit card transactions in India. A recent example of a nation-wide use of Aadhaar is in India's Covid-19 vaccination program. Interestingly, an Indian can register using their Aadhaar, get a paid Covaxin jab (an Indian vaccine), and make the payment via. Unified Payments Interface (another Indian innovation) using a mobile phone to the healthcare service provider.

SWAYAM (Study Web of Active learning by Young and Aspiring Minds), the world's biggest MOOCs platform, is developed by AICTE under the Ministry of Education of Government of India for the purpose of offering online learning courses for students from Class 9 to post-graduation. The Indian higher-ed regulations now allow students to earn up to 40% credits from among the thousands of credit-based courses on SWAYAM. The Annual Refresher Programme in Teaching (ARPIT) by Ministry of Education (MoE) leverages SWAYAM for professional development of the faculty in higher education institutions. Samarth, under MoE's 'National Mission in Education through ICT', is a University Information Management System that offers an open source, open standard enabled robust, secure, scalable and evolutionary process automation engine for universities and higher education institutions (HEIs).

In the second report, we discussed in detail the DIKSHA (Digital Infrastructure for Knowledge Sharing) initiative of MoE. DIKSHA offers a national digital infrastructure and tools for school education. It is aimed at addressing India's unique requirements of federal structure of education, very large population size, and an incredible diversity of languages – 1.5 million schools, 248 million students, 9.4 million teachers, 60+ educational boards across the country and 20+ regional languages. DIKSHA caters to five key personas across various learning services – student, teacher, parent, community member and administrator. DIKSHA consists of an API-based microservices digital stack built on open-source technology, that provides platforms for a variety of educational use-cases such as online courses, content authoring tools, digital credentials and so on.

In the third report on healthcare, we saw how science and technology splendidly came to India's support during the pandemic – be it in the development of vaccines, the scientific and technology infrastructure for genome sequencing, test kits, contact tracing and vaccination-drives, and helping shift work to the online world. In 2020, India launched the Ayushman Bharat Digital Mission that aims to create an 'open digital health ecosystem'. The key building blocks of this digital stack include standardized health registries of doctors and healthcare facilities like hospitals and diagnostic centres, a unique patient identity (Health ID), and federated health records (PHR and eMR). Unlike the traditional Health Management Systems (HMS) which are closed, the Indian digital health stack proposed by ABDM has protocol-driven (Unified Health Interface – UHI) architecture, is available as digital public goods, is patient (citizen) centric with consent architecture, and allows for ecosystem (government, private and plural sectors) to innovate on the digital stack.

Aarogya Setu (for contact tracing) made use of cutting-edge Bluetooth technology, algorithms and artificial intelligence to monitor Covid-19 cases and manage the pandemic. Later, innovative capabilities were added to it including features like e-pass, QR code scanning, open application programming interface (API) service for organizations to obtain information on the health status of their employees in real time. Co-WIN (for

vaccination management) was created as a tech-based platform facilitating the planning, implementation, monitoring, and evaluation of Covid-19 vaccination in India. It offered features such as beneficiary registration management, vaccination appointment scheduling, beneficiary verification & vaccine administration, and vaccine certificate issuance.

In the third report, we also saw the transformative power of the Unified Health Interface (UHI). Using UHI, a patient can book a doctor's appointment on a tele-health app that she has on her mobile, while the doctor will receive and accept this booking on a hospital specific app that he uses. The doctor's prescription may be processed by an online pharmacy on its own platform. Although each of them is utilizing their own application / platform, they are able to seamlessly interact with each other because all the applications conform to the UHI protocols. This is similar to how users may use different email apps (Gmail, Outlook etc.) and send mails to each other thanks to open protocols (SMTP).

In the fourth report, we saw how the Open Network for Digital Commerce (ONDC) protocol brings about population-scale inclusion in digital commerce, with otherwise digitally-excluded small retailers and consumers. Inclusion in retail e-commerce is one of the biggest objectives of ONDC. Inclusion may be in the form of buyers and typically small-sized sellers who are onboarded to ONDC. It is also in the form of the breadth of product / service categories available on the network – from grocery to fashion and electronics to travel and pharmacy and so on. India is at the forefront when it comes to thinking around data governance, and is experimenting with a unique consent-based data sharing framework (Data Empowerment and Protection Architecture), creation of high-value national datasets, and has released a draft India Data Accessibility & Use Policy 2022. India has the opportunity to become a technology supplier of such public-good digital stacks and data exchange platforms to the world. We also saw how digital technologies are transforming agriculture and helping raise farm productivity, allowing farmers to engage in precision agriculture, enabling provision of financial products (insurance, loans etc.) to farmers and so on.

However, as we have discussed at length, tech intensity alone is not enough, as a new wave of value creation has emerged in the world which goes beyond the technology-intensive eras of the Industrial Revolution into the eXperience-verse. This X-verse revolution is fundamentally transforming the way we live, work, play, and learn, through digitalized emergent experiences. It is unlike the previous four Industrial Revolutions, where the emphasis has been on material technology – the power of steam, electricity, computer, and data - as driving goods and services. The X-verse era is powered by engagements entailing emergent experiences of value in digitalized interactive ecosystems, where humanization of value and wellbeing-impacts at large must be considered in harnessing the data power of digital technology. Steve Jobs, co-founder of Apple, in one of his famous keynotes talked about Apple being at the crossroads of technology and the liberal arts. Increasingly, enterprises whether in the private, public, or plural sector find themselves at the intersection of technology, society, economy, and markets.

As digitization increases in an increasingly cloud-first, AI-first world, and businesses worldwide embrace newer technologies such as Web3 and metaverse to produce new offerings and services for their customers, the opportunities for the Indian IT services industry will only increase. For Indian IT to become the talent-base

for the world, it has to skill and reskill its workforce. It was estimated that about 200,000 IT professionals were skilled on digital technologies in 2019-20,18 and more than 4 million people would be trained on digital skills between 2020 and 2025. The skilling ecosystem in India has to gear up for this transformation. Educational institutions can play a significant role in developing online degree programs in digital technologies to produce millions of students ready for the IT industry. However, as called out in a *Science* article, "models for higher education in science, technology, engineering, and mathematics (STEM) are under pressure around the world. Educations should support a diverse population of students in a world, where using knowledge, not merely memorizing it, is becoming ever more important, and the need to focus on core ideas, crosscutting concepts, and scientific practices."[71] Research is becoming more action-based, as is the need for public engagement by technology institutes with the complex challenges faced by society. To paraphrase Nadella's growth mindset, academic institutes must transform beyond "know it alls" to "learn it alls.

We next discuss how IIT Madras, a leading educational institution in India, has embarked on such a transformation journey. It is also an example of a non-profit organization in the plural sector. Both of us obtained our under graduate degrees from there. One of us (Krishnan Narayanan) is the current President of the IIT Madras Alumni Association. Thus, we collectively bring in several years as experiencers of the IIT Madras ecosystem, and currently have a ring-side view of the happenings at the institution.

IIT Madras

In the 1950s, the Government of India conceived of establishing five educational institutions of national importance, and created "Indian Institute of Technology" (IITs) at Kharagpur, Bombay, Madras, Kanpur and Delhi. The primary focus was on education i.e., production of high calibre scientists and engineers. A focus on research and technology management followed, with an ultimate objective of impacting the socio-economic development of India. IIT Madras, as did the other IITs, soon developed a reputation for excellence in teaching, especially in its under-graduate program, and their graduates went on to do very well globally in academia, industry and entrepreneurship. In the first 3-4 decades after set-up, their outputs in research and technology development, and contribution to the Indian society were not commensurate with their overall reputation.[72]

The government conducted three reviews (by the Nayudamma Committee in 1984, Rama Rao Committee in 2004, and Anil Kakodkar Committee in 2011) of the IIT model. In 1996, IIT Madras set up a Strategic Planning Committee, and its Board instituted the Strategic Management Project to build up internal capability for change. Over the years, IIT Madras created three multi-year strategic plans (for the periods 2001-10, 2014-20, and 2021-27), that have guided its remarkable transformation.[73]

The results of this transformation are remarkable – IIT Madras has been ranked #1 in India's National Institute Ranking Framework (NIRF) and Atal Ranking of Institutions on Innovation Achievements (ARIIA), ever since the ranking's inception in 2015. It is now clearly perceived as a post-graduate and research-intensive university, and not just as a top undergraduate teaching institution. It is also the institute of choice in India

for industry for collaborative research and development. IIT Madras has also created a thriving deep-tech startup ecosystem that boasts of companies making advanced technology products such as EVs, IoT-driven asset management, conversational AI engines, 3D-printed rocket engines, and so on. See Figure 25 for a snapshot of IIT Madras' performance between the period 2011 and 2021.

Category	Outcome; Growth
Faculty	598 faculty (2021);28% growth (2011-2021)
Sponsored + consultancy projects	INR 714 crore (2020-21);208% (2011-2021)
Patents filed	1548 (2021);1910% (2011-2021)
Companies incubated	221 (2021);2110% (2012-2021)
Fund raising	INR 100 crore (2021);488% (2011-2021)

Figure 25: Performance of IIT Madras between 2011 and 2021 (Source: Analysis of data from IIT Madras)

As part of its Strategic Plan 2021-27, IIT Madras has identified the following six areas of priority – internationalization, local relevance, transparent and effective governance, translational research, interdisciplinary research and development; and, online education. (See Figure 26.)

WHAT						
An IITM with a diversified group of faculty, students and staff pursuing nationally relevant and internationally recognised basic and transitional research						
WHY						
TO MEET INSTITUTIONAL AND NATIONAL ASPIRATIONS						
HOW						
Moving to hybrid pedagogy	Nurturing deep-tech startups	sustaining growth in industry engagement	Recruiting international students and faculty	Enabling faculty to build active international collaborations	Engaging alumni/ corporates partners	Upgrading infrastructure to global standards
ENABLES						
Motivated Faculty and Staff		Well-qualified Students at Admission		Commensurate Infrstructure for living, leaerning and innovation		
CORE ACTIVITIES						
Developing high-quality human resources to build the nation		Pursuing world-class research-blue sky, translational and transformational		Providing thought leadership to society and governments		

Figure 26: IIT Madras Strategic Plan 2021-2027 (Source: IIT Madras)

Articulating his vision for growth, the Director of IIT Madras, Prof. V. Kamakoti, says, "In the next five years, we would like to realize an IIT Madras with a diversified group of faculty, students and staff actively pursuing nationally relevant and internationally-recognised fundamental and translational research. We would like to have students from all parts of India, especially rural India to be associated with IIT Madras. We would like to see a recognizable difference in the presence of international students and faculty on campus. Finally, we believe that translational research, which has been one of IIT Madras' forte, should become internationally visible through impactful patents and start-ups originating from the Institute."[74]

We will look at the institutional transformation journey of IIT Madras along three dimensions – **education, research, and technology services to industry and society**. Applying a PIE X lens organizationally, we will focus on how IIT Madras has engaged with its stakeholders like faculty, students, alumni, government, international organizations and others.

Education at IIT Madras

IIT Madras has made significant shifts in its curriculum design and pedagogy, keeping the students in mind. It recognised the importance of offering greater flexibility to students in taking up courses across multiple disciplines. Unlike the US university system, in India the traditional model was fairly restrictive – undergraduate students typically enrolled into a particular engineering program at the time of joining, and were offered electives only from that discipline. This was largely true of the system at IIT Madras too in the past. (The authors completed their under-graduate program at IIT Madras in this model). A student can now take nearly 50% of courses from disciplines outside of his / her anchor engineering department. IIT Madras now offers a number of interdisciplinary dual degree (IDDD) programs to its students in areas like advanced materials & nano technology, biomedical engineering, and data science, plans to start multidisciplinary programs in areas such as health policy studies, computational linguistics, and disability studies.[75] As Kamakoti notes: "Interdisciplinary education will have better prospects in future."[76]

Across the world, there is a growing recognition of the importance of introducing 'Arts' in STEM education. In order to produce students who can confidently progress in their careers and lives, IIT Madras introduced a holistic education curriculum. Some examples of courses offered include courses such as "Life Skills" and "Habits, Happiness and Success". In both, IIT Madras faculty has co-opted its alumni in teach these courses. For instance, Life Skills is offered to roughly 1,200 first-year students annually, both in person and online. These students learn essential life skills, such as active listening and effective communication, as well as how to build healthy relationships, express oneself freely, manage time, navigate conflict, and more.[77]

It is in the area of digital education that IIT Madras has created the most pathbreaking impact. It is seeking to nonlinearly expand its outreach using online platforms and establish a paradigm for high-quality online education at scale. We had explored some of the key initiatives anchored by IIT Madras in our earlier report on the Education X-verse. [78]

Consider the National Programme on Technology Enhanced Learning (NPTEL), begun in 2003 by eight

institutions (IITs at Madras, Bombay, Delhi, Kanpur, Kharagpur, Guwahati and Roorkee and IISc) and anchored at IIT Madras. NPTEL is a platformized MOOC learning ecosystem and is directed towards providing learning materials in science and engineering by adhering to the syllabi of All India Council for Technical Education and the slightly modified curricula of major affiliating Universities. The focus areas for NPTEL are: i) higher education, ii) professional education, iii) distance education and iv) continuous and open learning.

NPTEL partners with around 4200+ colleges in the form of NPTEL local chapters, and each college has a coordinator with whom NPTEL works closely. The other educational institutions are encouraged to build their own versions of NPTEL courses based on their curriculum design. In fact, over 20% of the NPTEL audience is faculty from various colleges across the country. NPTEL courses are also taken to the teachers through many faculty-development workshops. The interaction between teachers in various colleges and the course developers in IITs/IISc is a mandatory and unique requirement for NPTEL. Several IITs such as IIT Madras, IIT Roorkee, IIT Tirupati, and IIT Palakkad and other colleges are now allowing these courses to be taken for credits. NPTEL is launching a new portal NPTEL+ to expand the variety of offerings and courses for learner upskilling, and includes programs / specialised courses from industry / alumni partners.

NPTEL has been hugely successful, in terms of its reach and impact. It is the largest online repository in the world of courses in engineering, basic sciences and selected humanities and social sciences subjects. It is the most accessed library of peer-reviewed educational content in the world. NPTEL has seen 16 million+ enrolments, 1.5 million+ exam registrations, 4500+ local chapter colleges, 3500+ MOOCs completed, 60+ Industry associates, 2300+ unique courses available for self-study. The YouTube channel for NPTEL is the most subscribed educational channel, with 1.3 billion views and 37+ lakhs subscribers. India needs many more teachers for effective implementation of higher education in professional courses. Due to NPTEL, it is now possible for anyone outside the IIT system (both students as well as faculty members) to be able to do an online certification course and get a certificate from the IITs.

The NPTEL team at IIT Madras have developed another innovative offering – the world's first online BSc Degree program in Programming and Data Science at IIT Madras, launched in June 2020. While the course is completely online, IIT Madras has partnered with TCS iON for conducting proctored in-person exams. The program is split into three levels that have to be completed strictly in sequence. But students are allowed to enter and exit at different levels – foundational level with a certificate, the middle level with a diploma, and the third level with a degree. Such a model with multiple entry-exit points is consistent with India's New Education Policy (NEP) guidelines.

IIT Madras is also looking at online education as a model to significantly increase Gross Enrolment Ratio (GER) for India. Top-ranked universities globally are able to support large UG programs (see Figure 27). Engineering UG programs are significantly larger than IITs (with an intake of a few thousands per IIT), and many admit 10% or more of applicants.[79] In its first year of operations, this one program, online BSc, has enrolled nearly the same number of students as those enrolled in all other programs together at IIT Madras.

Country	University	#UG s on roll
USA	UC System	25000+ (engg)
	UT System	25000+ (engg)
	and Many more	
Singapore	NUS	10000+ (engg)
	Nanyang	11000+ (engg)
Germany	TU9	1,50,000+ (all)
Australia	Go8	2,00,000+ (all)

Figure 27: Global engineering UG programs intake (Source: IIT Madras Data Science Program)

The program also addresses another important aspect that all leading educational institutions are expected to offer – equity and access to high-quality education. Students and working professionals can get a degree / diploma from an IIT regardless of their age or location, and with a wide range of academic backgrounds. All applicants go through a qualifier process – they get access to four weeks of video content from the institute, after which they are eligible to appear for the qualifier exam. Admissions are not based on the hypercompetitive Joint Entrance Examination (JEE), and thus allows for greater equity in terms of participation. Andrew Thangaraj, Coordinator for the Online Diploma and Degree Programme at IIT Madras, says, "The JEE Main and JEE Advanced together are extremely difficult and "keep 99.99% of the world out". We wanted to break that barrier and to show what IIT-quality education is."[80]

The results of the program (between Jan 2021 and Sep 2022) are startling with respect to equity – 25% of the 86000+ applicants qualify (as compared to 2% qualifying through the IIT JEE exams), with 25% female, 30% non-engineering backgrounds, 20% employed, and 20% over the age of thirty.[81] IIT Madras provides income-based scholarships of up to 75% for students pursuing its online BS Degree, started in 2021. It also collaborates with the government of Tamil Nadu under an initiative called 'Anaivarukkum IITM' (IIT Madras for everyone) to ensure students from all districts of the state get admitted.[82]

Inspired by the success of its online programs and its experiences with digital learning during the COVID-19 pandemic, IIT Madras is aiming to move to hybrid pedagogy for all its courses in the future – retaining the best of intense class-room learning while leveraging technology platforms to the maximum extent. Every classroom is being fitted with appropriate digital infrastructure, and course content and pedagogy is being modified to support offering all courses in hybrid mode. Students can now spend time at internships in companies and yet leverage the online mode to attend classes. This will also greatly enhance industry upskilling initiatives aimed at working professionals who can take classes from their work spot.

Research at IIT Madras

In order to become a world-class research institution, IIT Madras has enhanced its focus on key experiencers like faculty and students. The management has placed a great emphasis on the quality of research outputs. Faculty promotions are tied to research quality metrics. Consequently, over 85% of papers published by IIT Madras faculty are in the same journals as faculty in top-50 universities.

It has established a 5-step path for career advancement of faculty and rewards for high-achievers. Over 50 Chairs have been created, with high-performing professors being awarded these positions. Early, mid-career and lifetime achievement awards were instituted for the faculty. In these cases of both chairs and awards, IIT Madras leveraged its alumni for funding. For instance, the Young Faculty Recognition Award, instituted in 2010 with a grant from alumnus P. Balasubramanian, recognises meritorious teaching, research and professional service activities. The Prakash Endowment, created by an alumni batch in memory of one of its classmates, awards externships to fund young faculty members from IIT Madras to pursue research in the best laboratories across the world for a few months.[83] The Subra Suresh Lecture Series, named after a distinguished alumnus of IIT Madras and funded by another, brings Nobel laureates and other distinguished speakers from around the world to offer a broad perspective of science to researchers and the public.[84]

Inspired by the highly successful 'Undergraduate Research Opportunities Program – UROP' at Massachusetts Institute of Technology (MIT), IIT Madras runs the 'Young Research Fellow' (YRF) program for its third year undergraduate and dual degree students. It provides students one-on-one interaction with the high calibre IIT faculty members to motivate them towards a career path in research, and interaction with the alumni around 'career and life coaching'.[85]

IIT Madras also adopted a number of innovative practices to encourage more students to pursue research. It has created the interdisciplinary dual degree (IDDD) programs, with upgrade paths open to all branches of undergraduate degree. The Office of Global Engagement at IIT Madras runs "Grieshma", the internship program for international students to experience the institute and its cutting-edge research and to train for a research career. They have also announced an International Interdisciplinary Master's Program (I2MP) in nine interdisciplinary areas. This program offers courses in Indian culture to international students. It also runs a dedicated research skill course to prepare these students for thesis works of masters programs.

IIT Madras was identified as an institute of eminence by the government of India with the intent of empowering it to become a world class teaching and research institution. With the funding available under this initiative, IIT Madras undertook an innovative and an almost market-like approach to nurturing research programs at the institute. More than 300 faculty members formed multi-disciplinary teams and identified cutting-edge challenges in 21 clusters to explore over the next few years. See Figure 28.[86] Each of these clusters was provided with a seed funding and encouraged to undertake multiple research initiatives, some of which could evolve in the future to become thriving Centres of Excellence. The CoEs that succeeded, in its research goals and in securing external funding, would receive additional funding from IIT Madras too.

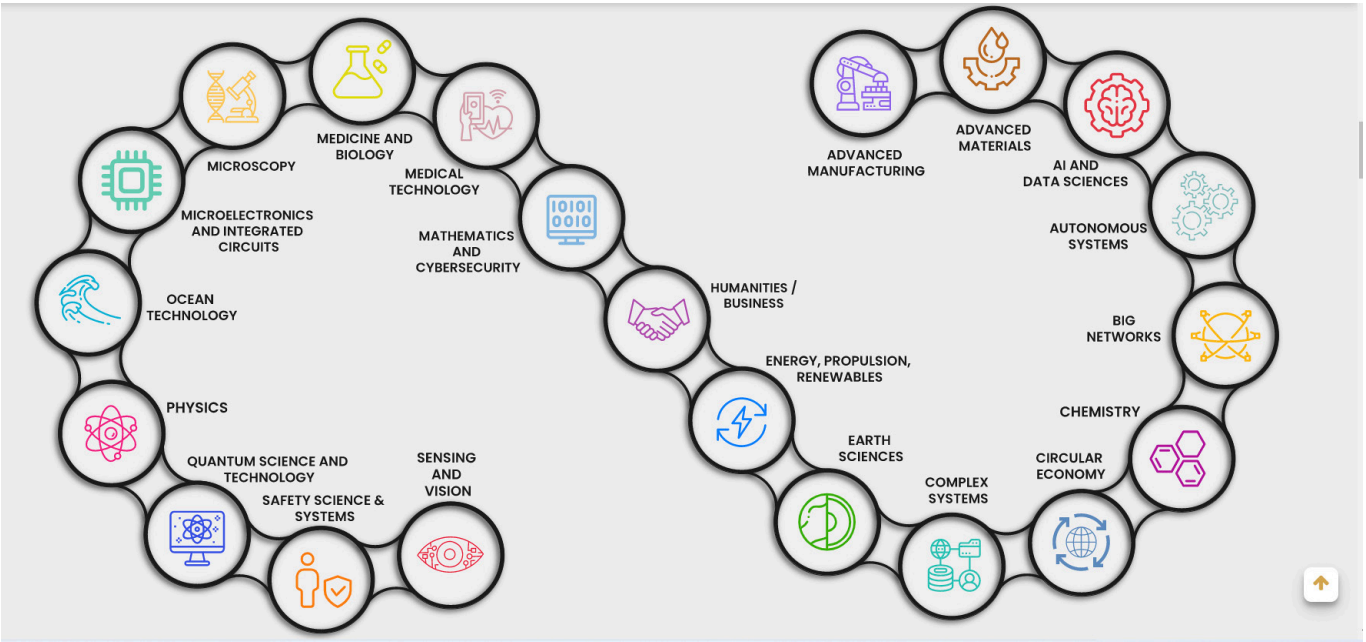

Figure 28: IIT Madras Thematic Research Clusters (Source: IIT Madras)

Let us consider a few examples of clusters and CoEs at IIT Madras.[87]

- The energy cluster has active participation from more than 50 IIT Madras faculty, over 250 post graduate students (PhD and MS) and about 20-30 post-doctoral fellows working in various domains related to energy research. The Centres under the 'Energy, Propulsion, Renewables' cluster include the following: i) Sustainable gas turbine technology, ii) Carbon Capture, Utilization and Storage, iii) Source technologies for operation of microgrids, iv) Photo- and electro- chemical research, and v) Energy Storage, Management, and Integration. An umbrella organization, the Energy Consortium, has been formed with the help of funding from the alumni to coordinate the activities across these research centres.
- The Robert Bosch Centre for Data Science and AI (RBCDSAI) was founded in the year 2017 at IIT Madras. It is a multi-disciplinary AI research center involving 28 faculty from 10 different departments and 80+ researchers, working on both basic research and applied research projects.
- The Thematic Unit of Excellence (on Nanotechnology – https:// tue.iitm.ac.in/TUE.php) and the International Centre for Clean Water (https://iccw.world/) have been researching on areas such as nanomaterials and smart materials as solution for water purification, sensing, monitoring of quality of water flow etc. Clean water technologies from IIT Madras have reached over 12 million people. A particularly encouraging aspect is that some of the IIT Madras BTechs and PhDs have taken up water as their career option and have built companies on their research outcomes. One such technology, named AMRIT (anion and metal removal by Indian technology) is supplying 60 million litres of arsenic free water each day, for 1.2 million people.
- The Technologies for Low-Carbon and Lean Construction (TLC2) centre aims to develop innovative low-carbon, lean construction technologies for minimizing waste throughout the construction value-chain, and lead solution implementation across organizational and policy levels. It is currently

working with large industries such as LaFarge, L&T, BASF, Saint Gobain, UltraTech etc., governments of India, Tamil Nadu etc. and standardization organizations such as BIS.

One interesting model that IIT Madras experimented with was in setting up endowed chairs in neuroscience. Brain science is an emerging area of research for the world, and India could become one of the top research destinations in this domain with a targeted approach. Such a research model allows for seeding capability with the help of endowed Chairs occupied by world-class multidisciplinary scientists.

Accordingly, IIT Madras established the Centre for Computational Brain Research (CCBR) in 2014 for brain research at the interface between Neuroscience and Engineering disciplines. It was supported by philanthropic funding of one of its distinguished alumni, Kris Gopalakrishnan. The Centre has three distinguished faculty chairs, and ten IITM faculty from multiple departments. Over a period of time, a number of papers in reputed international journals, several research projects, knowledge-dissemination workshops, computational tools and infrastructure have been created. This model has helped create significant knowledge base and capability around brain sciences in the country.[88] In 2022, IIT Madras launched the Sudha Gopalakrishnan Brain Centre to map human brains at a cellular level. It has already developed a high-throughput 'histology' pipeline that processes whole brains into high-resolution digital atlases. Through this technology platform, the centre is imaging post-mortem whole human brains of different types and ages.[89] IIT Madras also forged cross-sector collaborations with institutions like Christian Medical College (CMC) Vellore, National Institute of Mental Health and Neuro Sciences (NIMHANS), and Saveetha Medical College and Hospital.[90]

Another example of a successful multi-institution, public-private sector research collaboration is around 5G. The ministry of IT in India (MeitY) had set up a 5G research program in five institutes, anchored by IIT Madras and IIT Hyderabad. This program has been an important first step for India to emerge as a significant contributor to future wireless technologies. It helped create 5Gi technology that makes 5G technology work well in rural areas with low-speed mobility and doubles the range of large cell towers, thereby increasing coverage.

Under this research, a 5G testbed was built which would be useful for validating 5G applications and sub-systems, especially for startups which cannot afford such an infrastructure on their own. The testbed has begun licensing technology for 5G manufacturing ecosystem. Thus, in addition to the MNC vendors manufacturing equipment in India, it is most likely that for the first time, there may be significant Indian players competing with them. As a result of the PLI (Production-linked Incentive) policy, most 5G phones sold in India are likely to be assembled in India, and exported too. An excellent example of how research and science and technology can directly contribute to the national strategy of Atmanirbharta (self-reliance). The 5G Core, which is formed by sophisticated software defined networks, would allow an opportunity for Indian IT services companies to participate in the 5G software opportunity in India and worldwide. For example, Larsen & Toubro Infotech and IIT-Madras have announced a collaboration to promote research towards development of low-cost, low-frequency 5G network setup for better connectivity in rural India.[91]

Entrepreneurship, innovation and societal impact

One of its most significant contributions has been in nurturing an innovation and entrepreneurship ecosystem focused on deep-tech. The IIT Madras innovation ecosystem is the best in the country, and has become a reference model for other institutions to emulate. (See Figure 29.)

IIT Madras Innovation and Startup Ecosystem

1. The IIT Madras Research Park is India's first university-based research park.

2. The Incubation Cell became a natural home for many of the startups from campus and beyond.

3. Sector-specific incubators of IIT Madras like Rural Technology Business Incubator, Bio-incubator, Healthcare Technology Innovation Centre and Pravartak Foundation.

4. Alumni groups like the IIT Madras Entrepreneurs Forum.

5. Programs to support entrepreneurship among faculty and research scholars such as the Gopalakrishnan Deshpande Centre for Innovation & Entrepreneurship.

6. The Entrepreneurship Cell of IIT Madras (E-Cell) is a student hub for entrepreneurship related activities at IITM.

7. Nirmaan: A pre-incubation cell which serves as the student startup lab.

8. Founded from funds donated by the alumni of the 1981 batch, the Centre for Innovation (CFI) is a student maker space / tinkering lab.

Figure 29: IIT Madras innovation and startup ecosystem (Source: IIT Madras)

The IIT Madras Research Park (IITMRP) is an important fulcrum point for this ecosystem. Its main objectives are to develop an innovation capability and to transfer basic research into applications that can be commercialized. It creates a collaborative environment between industry and academia through joint research projects and consulting assignments. It nurtures a self-sustaining and technologically fertile environment that aligns R&D to potential needs of the industry.

The Research Park has a unique Credit Point System that facilitates sustained collaboration with IIT Madras. The industry can earn points through several engagement models including: 1) Sponsoring employees as students at IITM; 2) R&D and consultancy projects; 3) Internship opportunities for IITM students; 4) Receiving mentorship from IITM faculty; 5) Interaction with IITM CoEs and incubates; 6) Supporting technical events at IITM. It has over 3000 professionals working across 70+ corporate R&D units, multinational research centres, government research institutions, public sector companies, IIT Madras CoEs and laboratories, and 200+ startups. For instance, Saint Gobain Research India has undertaken 21 R&D projects that have resulted in the launch of over 20 new products and 5% of their patents. Similarly, BHEL R&D Gateway has completed 62 research projects and implemented 33 of them commercially.[92]

The IIT Madras Incubation Cell (IITMIC) is India's leading deep-tech startup hub. It has supported 240 deep

tech startups in 8 years with a valuation of INR 10,500 Cr (based on angel/VC investments raised). Nearly 60% of the founders are faculty, students, or alumni of IITM, while the rest are external entrepreneurs. IIT Madras has created sector-specific incubators like Rural Technology Business Incubator, Bio-incubator, Healthcare Technology Innovation Centre and Pravartak Foundation. In this effort, it has collaborated with government institutions like the Department of Biotechnology and Department of Science and Technology.[93]

There have been three factors behind the success of IITMIC: 1) backing of the IIT Madras Research Park; 2) backing of alumni of IIT Madras; and 3) backing of faculty of IIT Madras. One example of alumni volunteers who have greatly helped the IITIC is the IIT Madras Entrepreneurs Forum (IITMEF), with alumni chapters in India and the Bay Area, US. One of the successful interventions of IITMEF has been the Mentoring Clinic. The alumni participate in initial screening of incubator applicants. The mentoring program is structured to meet diverse needs e.g., those who need advice on next steps, validation of ideas and strategy, and those who need more regular guidance.

On the faculty front, the Gopalakrishnan Deshpande Centre for Innovation & Entrepreneurship provides a model that encourages them to embrace entrepreneurship – not just at IIT Madras but across leading educational institutions in India. Through a structured training program, this centre works with STEM colleges and scientific research institutions across India to implement a 'Lab to Market' mission by helping faculty, researchers, and students commercialize their research ideas by creating deep-tech startups. We are beginning to see some green-shoots of positive impact of such efforts – by 2018- 19, about 35% of the total portfolio of 170 deep-tech startups established at the IIT Madras Incubation Cell had faculty members as founders or minority shareholders.[94]

IIT Madras has also undertaken a number of student-oriented initiatives to spark the entrepreneurial spirit – the Centre for Innovation, E-Cell and Nirmaan. For instance, Nirmaan offers the following to all selected student teams – 1) High quality mentorship by IITM Alumni; 2) Seed funding for prototype/MVP development 3) Co-working space; and 4) Access to research labs and workshops on campus for product development and validation. The incubation activities in a 4-stage process are managed by the Nirmaan team on a SaaS platform.

The results of this entrepreneurship transformation are remarkable. (See Figure 30).

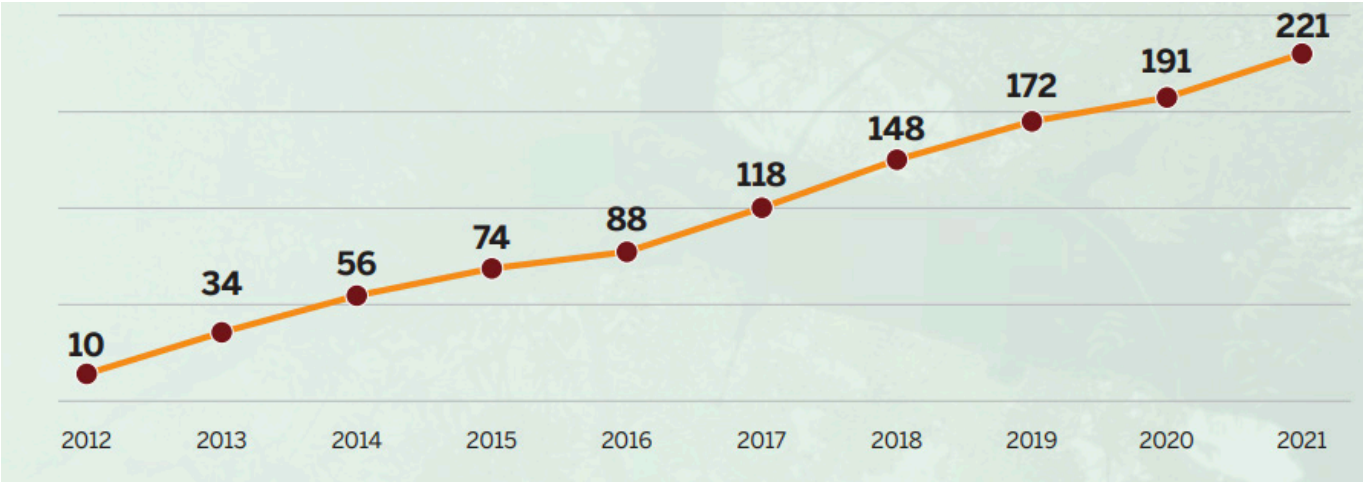

Figure 30: Number of companies incubated at IIT Madras (Source: IIT Madras)

Over the decade, the number of startups incubated in the IIT Madras ecosystem grew 22-fold. Buoyed by is extraordinary success, IIT Madras is looking at leveraging the 10X programme of IITMRP and incubating companies/technologies that create high-value IPR, creating more start-ups, and growing human capacity in design and innovation in other Indian educational institutions.[95] Ashok Jhunjhunwala, Institute Professor, IIT Madras and President, IITMRP, IITMIC and RTBI, says, "The first goal is to nurture 30 to 50 products for which R&D is carried out primarily in India, each to have revenues of ₹500 to ₹1000 Crores per year. The second goal is to enable 1000 incubations per year. Towards this, we aim to partner with about 100 incubators in tier-2, tier-3 and tier-4 institutes and nurture their select incubates to succeed. The third goal is focused on nurturing talent. 1 million engineers graduate a year in India, but we have very few technologists who are in the top 2% in any area. We have to enable its ecosystem to hire 2000 youngsters every year and make 500 of them become amongst the top 1% to 2% in their field of expertise. The fourth goal is to ensure that in five areas, India is recognised as amongst the top five in the world by 2030. To "get India to move towards 100% Renewable Energy" is first of the area that we are pursuing."[96]

IIT Madras has an important objective of making significant contribution to technology needs of India. In 2021-22, the institute's industrial Consultancy and Sponsored Research (ICSR) department generated more than INR 10,000 million of revenue and funding through projects and consultancy, with 71% coming from governments and the remaining from the private sector. [97] The major projects included ones on education through Information and Communication Technology using Direct-to-Home, road safety, speech technologies and datasets in Indian Languages, and the amount was the highest in its history.

It has also developed and transferred to industry/startups many key technologies in domains like water, construction, telecom, renewable energy, and defence. Some notable examples include a widely deployed nanomaterials-based water treatment system for removing arsenic, off-grid solar power systems installed in far-flung villages where the grid does not reach, mobile cataract surgery vehicles for patients in remote locations without access to hospitals, affordable, sustainable and rapid gypsum-based house construction technology, motorized wheelchair that can double as a three-wheeler for commuting, and technologies to reduce road accidents and resulting mortality.[98]

In its efforts to create societal impact, IIT Madras has found a willing partner in its alumni. The Mission Million Smiles of the IIT Madras Alumni Association (IITMAA) aims to positively impact alumni and people in society (put a million smiles on their faces). For instance, some alumni provided seed funding of INR 30 million to establish AquaMAP, a centre focused on water management in India.[99] One of us (Krishnan Narayanan) is a founding governing board member of AquaMAP. Commenting on its establishment, Mahesh Panchagnula, Dean (Alumni and Corporate Relations), said, "I am thankful to our alumni who have given their time, treasure and talent and helped shape this initiative on water management, a topic of immense national importance. This initiative is also special because we have conceived a unique Alumni-Engagement Model to support the professors at AquaMAP." [100]

AquaMAP and IITMAA collaborated for systematic outreach and engagement with the alumni community. (See Figure 31.) Four categories of alumni volunteers were identified, and over 50 alumni began volunteering

as part of the AquaMAP community in the first year of operations. This engagement model has been extended to non-alumni members too. For instance, when a global technology major gave a CSR grant to AquaMAP to provide waste-water management solutions for a village off Bengaluru, Karnataka, AquaMAP inducted employees from the company as volunteers for this project. AquaMAP has also partnered with other organizations, across public, private and plural sectors, such as the Office of Principal Scientific Adviser, Government of India and Siruthuli, a Coimbatore based NGO focused on water conservation, to expand its reach.

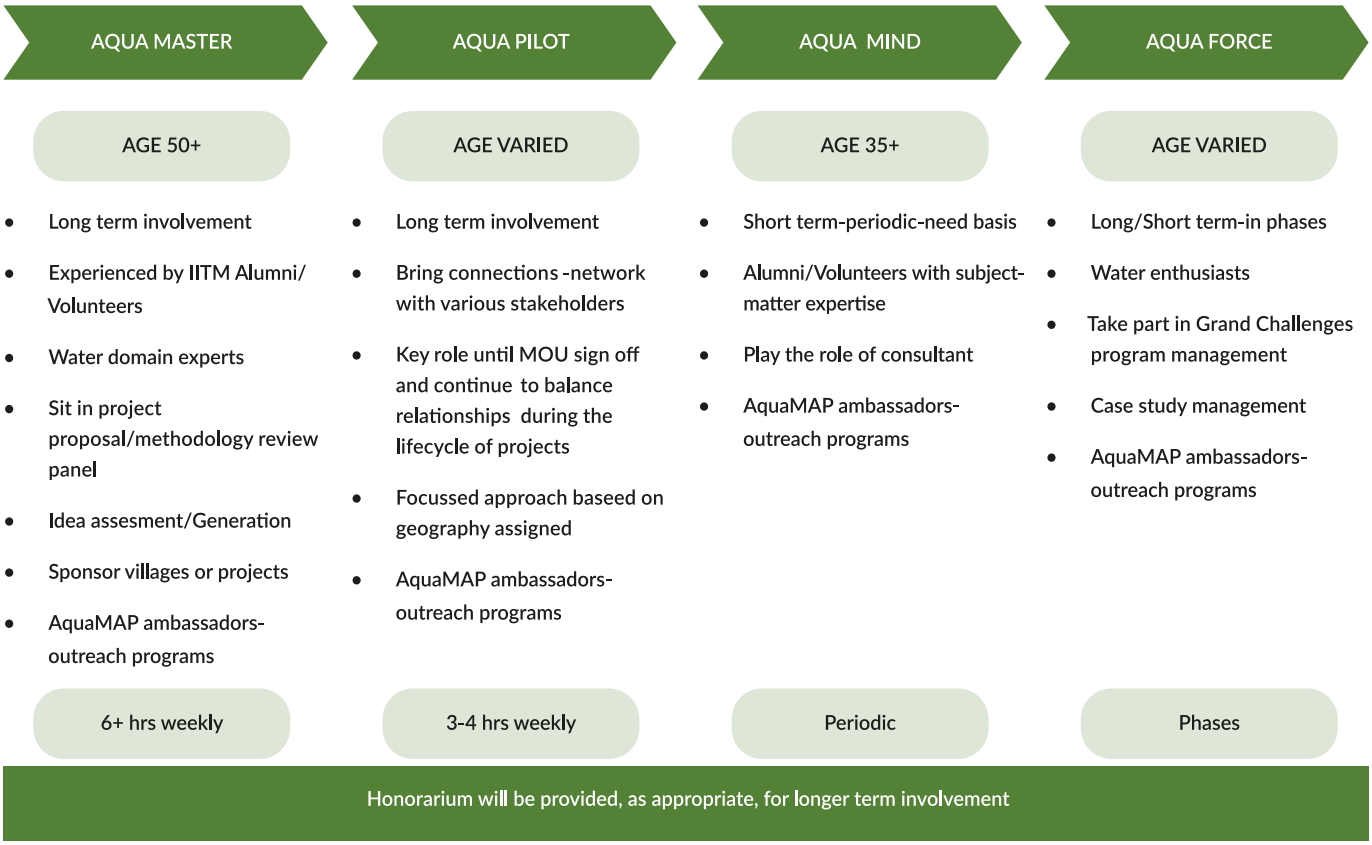

Figure 31: Alumni engagement model at AquaMAP water centre (Source: IIT Madras)

Co-creative living enterprise transformation at IIT Madras

IIT Madras is in its early days of co-creative living enterprise transformation. It has already begun to reimagine education for its students by focusing on more interdisciplinary and increasingly action-based learning-experience environments. Learning is not restricted only to specific domains of engineering; instead, the students are provided multi-disciplinary options; learning is not restricted just to the classrooms, with great emphasis on internships, hackathons and field-based experiences. This is most evident in the way IIT Madras encourages the spirit of innovation and entrepreneurship. Student-oriented cells and centres, such as E-Cell and Centre for Innovation, offer a makers' environment and a hands-on experience to them. All of this activates the R-CITI levers that we saw in Section 2, and is aimed at enhancing the creative capacity of experiencers (students), and amplifying valuable impacts in their lived-journeys.

Structured incubation service is offered at various stages of the student's lived-journey – Nirmaan in the early years, the Incubation Cell in a more mature stage of their startup, and the Research Park for research and innovation related work opportunities at global companies. IIT Madras has also co-opted many successful alumni into this learning mix, tapping into their lived-journeys as successful entrepreneurs from India, US and across the world. These alumni engage with the students through myriad programs, both formal and informal, organized by the institute and the alumni association.

The way IIT Madras has transformed its focus on research demonstrates the power of X-verse ecosystems in play. Across its several research centres of excellence, such as the ones on brain science and 5G, it has nurtured inter-disciplinary and international collaborations and partnerships across public-private-plural sectors. IIT Madras leverages the resourced capabilities of its ecosystem partners to ensure successful research outcomes are delivered. It has also tapped into its alumni network to seek funding for its high-quality research centres and researchers. For instance, the IIT Madras Foundation, a non-profit alumni entity set-up in the US, has raised over USD 25 million for initiatives such as student scholarships, endowed institute chairs, and Women Leading IITM (WLI) to boost women researchers in science and technology. [101]

Thus, in terms of research and incubations services, R-GELI levers can be activated further by enhancing the 'linkability' of the network of organizations in the IIT Madras ecosystem. In digital programs such as NPTEL and online BSc / BS degrees, IIT Madras has moved to a living-system of engaged learning with its learners. It is able to create learning impacts at scale – the online BSc program takes in nearly as many students in one year as the combined numbers of all other programs at the institute. IIT Madras has been able to rapidly scale the reach of these programs and contribute to India's aspiration of enhancing its GER to 50%. It also has visibility into the current state and progress of learning of each of its students on its digital platforms. For starters, for the four terms between Jan 2021 and Apr 2022, it knew the following data – ~15 million views of course videos, 38700+ unique questions asked, 2+ million graded assignment submissions, 170K posts and 690K reads on discussion forums.[102] Based on the insights from data analysis on learning and teaching, IIT Madras is able to structure course pedagogical and administrative interventions. For instance, in May 2022, 950 of 1950 students in the course "Intro to Python" failed the programming exam even though they passed the theory part. The team then designed an appropriate intervention – 25-day bootcamp, for 2 batches for 2 hours a day, and 502 students of those who failed signed up. Of these, it could see that only 245 were actively engaged (attending over 50% sessions and solving 50% problems). Based on their performance in the bootcamp, a re-exam was offered to 85 students, of which 55 passed.[103]

IIT Madras has also made a significant shift in terms of its developmental impacts on the nation. See Figure 32 for a mapping of where the diploma awardees of its online BSc program are located in India. 18% of them come from households with less than INR 500,000 per annum. The equitable impact the program has had can be fathomed from the words of one of its students: "I saw lots of opportunities and always cursed my poverty - why I am not capable of paying. I have dreams, I am capable still. But you people make this programme so much comfortable and leaves no reason or excuses for someone who want to be successful but not have opportunity." [104]

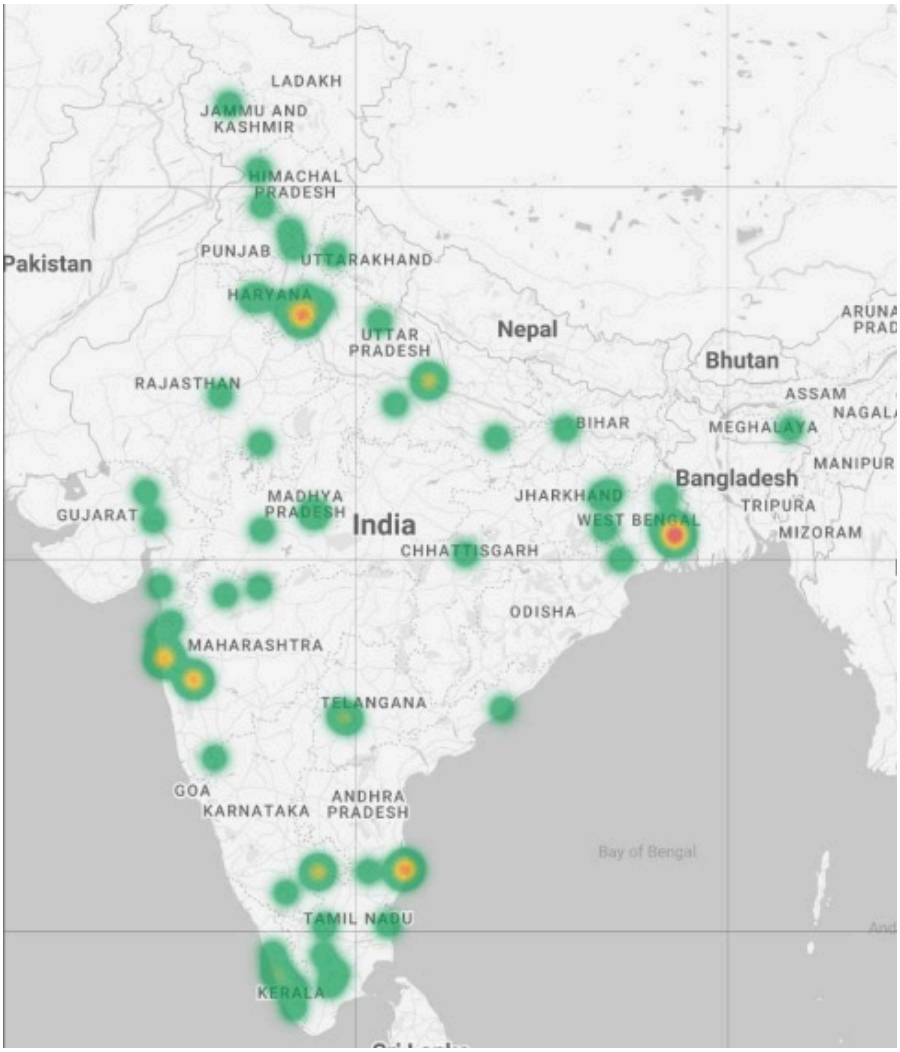

Figure 32: IIT Madras diploma awardees locations (Source: IIT Madras Online Program)

While it has continued to focus on education and research as core priorities, it has also paid particular attention to the larger societal impact that its work is bringing. It is harnessing its research to address the societal challenges faced in India in areas like housing, energy, water, healthcare and so on. It is nurturing a thriving innovation and entrepreneurial ecosystem.

The R-BEST levers can be activated further examine how balanced outcomes are across stakeholders, and enhance equitability of developmental wellbeing-impacts. For instance, IIT Madras asked itself the following questions in order to run a high-quality, large-scale program online while balancing the interests of different stakeholders – i) How to assuredly produce employable, skilled graduates at a larger scale? ii) How to ensure valuable faculty time does not need to scale with number of graduates? iii) How to operate in a financially self-sustained manner, and yet keep fees affordable? iv) How to keep the program accessible to all who might be interested and may not have strong background? and v) How to protect the brand of institutions that have traditionally been highly selective in admissions?

It has articulated a vision for "IIT Madras for all" – to make the institute accessible to a wider section of the

society, including marginalised and economically weaker communities. Under its "Kalvi Shakthi" initiative, it is planning to set-up rural interaction / technology centres to provide free education in maths, science, and English for 8th to 12th students in the rural Tamil Nadu and other regions in India.

This analysis also reveals other areas of opportunities. Just like it has leveraged digital platforms to transform its digital learning ecosystem, IIT Madras could also consider a digital transformation of its research ecosystem. For instance, it could create a "scientists' workbench" which brings together researchers from various departments, other global universities and companies on a common platform to pursue scientific grand challenges. It could create massively linked scientific datasets as a public utility. On its alumni engagement front, IIT Madras has proposed in its Strategic Plan 2021-27 to create an equivalent of an 'IITM LinkedIn' system, either on the web or through an app, which allows alumni to connect seamlessly to one another and to the Institute, to pursue opportunities of mutual benefit. Thus, alumni's engagement through fundraising can be positively impacted by the creation of bilateral value where they, corporates, and society also benefit through the activities undertaken at IIT Madras. As an educational institution, of engineering, science, technology and management disciplines, IIT Madras has an opportunity to create learning programs, at scale, on life-experience co-creation, and nurture co-creative technologists with an experience-first, humanity-first and developmental perspective.

Life-experience co-creation has the power to transform relationships and our social realities, meaningfully transforming the identity of the system we live in, and the quality of our human experiences. The key to established organizations successfully becoming a truly co-creative living enterprise is to begin cultural transformation from the inside. This is because, for one thing, in many organizations the conventional institution-centric logic of value creation is dominant and pervades the design of the organization, how it functions and, ultimately, how individuals in the enterprise engage with one another and with external stakeholders. Leading co-creative living enterprise transformation means involving employees at all levels, as well as engaging partners and other external stakeholders. As we saw in the examples of Microsoft and Mahindra, in a truly co-creative living enterprise, *leaders at all levels* must go beyond the conventional institution-centered "cascade and align" view of management, to an experience-centered ecosystem view of "engage and co-create".[105] The PIE X lens opens up the organizational aperture and how we see, think, and act on X-verse innovation and co-creating unique value with all stakeholders, as we have seen through the various examples in this series.

5. Conclusion

BECOMING A CO-CREATIVE LIVING ENTERPRISE IN THE X-VERSE

Applying the PIE X lens to organizational transformation

In this report, we examined in detail how conventional enterprises can organizationally transform themselves to go beyond conventional industry value creation practices, and become next generation co-creative living enterprises in the X- verse of the future.

As we have seen, the eXperience-verse revolution is about a fundamental expansion in the nature and means of value creation. This expansion entails shifts in both the opportunity space and the resource space of value creation and how enterprises connect the two. In the X-verse, value creation is getting decentered and democratized. Technology leverage has become experiencer-centric, even as its innovation becomes ecosystem-centric. The universe of experiencer environments and new experiences, which emerge from moments of engagements of experiencers in relational digitalized interactive ecosystems, constitutes the X-verse. Experiences of value must be co-created in the X-verse, among experiencers and activated networked environments of ecosystems. All enterprises operate in the X-verse, even if they don't realize it. With the advent of digital technologies, it has become possible to innovate unique eXperiencer environments and enhance valuable experiences to all stakeholding individuals seen as experiencers-creators, with speed, scope, and scale of wellbeing-impacts. The **PIE X** (**P**latforms, **I**mpacts, **E**ngagements, e**X**periences) lens helps enterprises see new innovation and value creation opportunities (and challenges) in the digitalized interactive ecosystems of the X-verse. Co-creation advantage obtained through "engagement power" in the X-verse goes beyond the traditional "competitive advantage" of conventional enterprises.

Leading X-verse innovation and value creation requires co-creative living enterprise transformation. The paths to transformation are many, representing a strategic choice to be made by each enterprise depending on its prevailing culture, management outlook, initiatives, aspirations, and leadership. Success is a function of the active involvement of all stakeholding individuals as experiencers-creators at all levels. Systemic leaders at all levels can apply the PIE X lens to organizational transformation in becoming a co-creative living enterprise. Ultimately, the goal is to allow each individual to co-create his or her own experience, not only in the change process but also in the eventual day-to-day experience that will result from the change process.

Welcome to the eXperience-verse revolution. To paraphrase Mahatma Gandhi: *Are we ready to co-create the change we want to experience personally and collectively in the world*?

6. Appendix – Risk-managed Levers of Innovation and Value Co-Creation in X-verse Ecosystems

BECOMING A CO-CREATIVE LIVING ENTERPRISE IN THE X-VERSE

Applying the PIE X lens to organizational transformation

Platforms: APPI levers

Digital infrastructure operates in various layers of the technology stack from hardware to operating systems, applications, content, and data. In conceiving platforms of experience-centric innovation in relational X-verse ecosystems, there are four specific "**APPI**" levers of **A**rtifacts, **P**ersons, **P**rocesses, and **I**nterfaces, which are often applied in the following sequence:

Interfaces: How might we bring together digital and physical interfaces (such as devices, apps, webfronts) in event-sensed flows of data, content, and service exchange in X-verse ecosystems?

Artifacts: How might we bring together digital and physical artifacts (such as products, symbols, data, text, pictures, audio, and video) in event-sensed flows of data, content, and service exchange in X-verse ecosystems?

Persons: How might we connect with the agency of persons (customers, employees, partners, and other stakeholders) in event-sensed flows of data, content, and service exchange in X-verse ecosystems?

Processes: How might we bring together digital and physical processes (increasingly software-enabled, such as algorithms) in event-sensed flows of data, content, and service exchange in X-verse ecosystems?

Engagements: DART levers

The creational engagements among actors have to be more purposefully configured for the enactment of interactional creation, engendering more valuable wellbeing-impacts to stakeholding individuals-as-experiencers-creators.

To facilitate such value-creational engagements, there are four specific "**DART**" levers of **D**ialogue, **A**ccess, **R**eflexivity, and **T**ransparency, which are often applied in the following sequence:

Transparency: How might we enhance the transparency of information, tools, expertise, and skills, in value-creating engagements?

Access: How might we enhance access to resourced capabilities in value-creating engagements?

Dialogue: How might we enhance active, explicit dialogue in value-creating engagements?

Reflexivity: How might we enhance reflexivity (i.e., "feeding back into") in value-creating engagements?

Impacts: CITI levers

Facilitating service simultaneously to millions of individuals in a reliable and sustainable manner, requires impact amplification through large active cross-sector networks of actors. To facilitate such amplification of wellbeing-impacts, there are four specific "**CITI**" levers of **C**reativeness, **I**ntentionality, **T**ransformativity, and **I**ntegrativity, which are often applied in the following sequence:

Creativeness: How might we enhance the collective creative capacities of actor-networks of X-verse ecosystems to amplify valuable impacts?

Intentionality: How might we address the heterogeneous intentionalities of actor-networks?

Integrativity: How might we enhance the integration of resourced capabilities?

Transformativity: How might we enhance the transformation of resourced capabilities into experienced outcomes that amplify valuable impacts?

Ecosystems: GELI levers

The experience-centric innovation of value creation in X-verse ecosystems can be expanded by applying four specific (risk-managed) "**GELI**" levers of **G**enerativity, **E**volvability, **L**inkability, and **I**nclusivity, which are often applied in the following sequence:

Generativity: How might we make interactive structures of ecosystems, within and across interactive system-environments of various stakeholders, more generative?

Linkability: How might we link together experience ecosystem environments to facilitate

better networked interactions of event-sensed flows in lived-journey engagements of interactional creation?

Inclusivity: How might we make networked experience environments more inclusive, so as to recognize all stakeholders as both experiencers and creators in lived-journey engagements of interactional creation?

Evolvability: How might we better evolve the capabilities of experience ecosystems in expanding wellbeing-impacts at speed, scale, scope, and scale?

Experiencers: SCIM levers

While the risk-managed GELI levers of interactive structures facilitate the configuration of network-to-individual-to-network (N2I2N) interactions in expansive ways, it must simultaneously be coupled with configuration of unique experience-centric individual-tonetwork-to-individual (I2N2I) interactions, across all stakeholding individuals. This can be facilitated by applying four specific (risk-managed) "**SCIM**" levers of **S**patiotemporality, **C**ontextualization, **I**nvolvements, and **M**eaning-making, which are often applied in the

following sequence:

Contextualization: How might we recognize the varying contexts of interactive agency in cocreating value, to facilitate better experienced outcomes and wellbeing impacts in the lived journey engagements of individuals?

Spatiotemporality: How might we recognize the spatiotemporality of events associated with interactive agency, in co-creating value in the lived-journey engagements of individuals?

Involvements: How might we recognize heterogeneous involvements in events associated with interactive agency, in co-creating value in the lived-journey engagements of individuals?

Meaning: How might we recognize the ways by which individuals attach personal meaning to events associated with interactive agency, in co-creating value in the lived-journey engagements of individuals?

Expansive Design: BEST levers

To facilitate expansive design of X-verse ecosystems, four "**BEST**" levers of **B**alance, **E**quitability, **S**ustainability, and **T**rust, are often applied in the following sequence:

Balance: How might we balance heterogeneous stakeholder values more effectively?

Equitability: How might we address the equitability of wellbeing-impacts more effectively?

Trust: How might we address trust more effectively?

Sustainability: How might we best address the sustainability of X-verse ecosystems?

The risk-managed BEST levers help navigate the expansive design of X-verse ecosystems in an age of increasing stakeholder capitalism, ESG considerations, and increasing use of Sustainable Development Goals (SDGs) based impact metrics. Its effectiveness, however, depends on connecting it with the other levers we discussed, such as SCIM interactive agency, e.g., making participants' engagement experiences more meaningful, and DART value-creational engagements, e.g., reflexively plowing back insights gained into deepening capabilities.

Co-Innovation: PLAT levers

Given the heterogeneity of individuals and offerings to be supported, experience ecosystems have to be "event-based" recognizing the spatiotemporal context of the individual on the one hand, while being generative and linking together those experience environments in the network to fulfill varying outcomes on demand. This requires connecting the R-SCIM levers of interactive agency with the R-GELI levers of interactive structures. The CARE architecture must be fluid enough to engage stakeholding individuals on both the supply and demand side, and as insight giver and receiver. The same is true for stakeholding partners.

Co-innovation of CARE architectures can, in general, be facilitated by four key "**PLAT**" levers of **P**atterning, **L**eading, **A**lliancing, and **T**ranslating, often applied in the following sequence:

Alliancing: How might we enhance actor-network alliancing in co-innovation of X-verse ecosystems?

Translating: How might we enhance actor-network translation in co-innovating X-verse ecosystems?

Patterning: How might we enhance the patterning of X-verse ecosystems through co-innovation?

Leading: How might we enhance leadership in systemic ways in co-innovating X-verse ecosystems?

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