Intelligence With Purpose: AI, Human Flourishing, and the Future of Technology 5.0

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Abstract

Artificial intelligence (AI) is no longer merely a technical phenomenon — it is a civilisational force reshaping how humans work, relate, heal, and find meaning. As the world transitions from the efficiency-driven paradigm of Industry 4.0 (IR4) to the human-centred vision of Technology 5.0, the central question is no longer *what AI can do*, but *what AI should serve*. This paper advances a purpose-driven framework for AI within the Technology 5.0 paradigm, grounded in three interconnected pillars: Intelligent Systems, Human Flourishing, and Responsible Innovation. Drawing on the European Commission's Industry 5.0 policy framework, IndustriAll Europe's policy brief, interdisciplinary research in health informatics, neuroscience, positive psychology, and AI governance, the paper argues that human flourishing — not efficiency alone — must become the ultimate benchmark of technological progress. Real-world applications including AI-enabled chronic disease monitoring, digital phenotyping for mental health surveillance, Bayesian neural networks for rare disease prognosis, and federated learning for distributed health infrastructure are examined as concrete instantiations of purpose-driven AI. The paper further addresses the governance imperative, situating explainable AI (XAI), bias mitigation, and emerging regulatory frameworks within the broader Technology 5.0 vision. The paper concludes with a call for engineers, researchers, educators, and policymakers to embrace what is termed the wise systems imperative — designing AI that is not merely smart, but purposeful, equitable, and anchored in a deep respect for human dignity.

Keywords-Technology 5.0, Industry 5.0, Artificial intelligence, Human flourishing, Explainable AI, Digital health, AI governance, Human-centric design, Responsible innovation

1. Introduction

The history of industrial revolutions is, at its core, a history of choices about what technology should serve. The steam engine served industrial production. Electricity served scale. Computing served information. Each revolution expanded human capability — and each also generated unintended consequences that the succeeding era had to reckon with. We are now living through such a reckoning.

Industry 4.0 — the fourth industrial revolution (IR4) — delivered remarkable gains in productivity, automation, and connectivity. Smart factories, cyber-physical systems, the industrial Internet of Things (IIoT), and AI-driven analytics transformed global industry over the past decade. Yet as the European Commission's seminal Industry 5.0 vision document [1] acknowledges, and as IndustriAll Europe's 2024 policy brief [2] reinforces, IR4's gains came at a cost: the paradigm was "mainly focused on technology-driven organisational change with efficiency at its core", and it largely failed to account for the broader societal, environmental, and deeply human dimensions of technological transformation.

The discourse that has emerged in response — variously called Industry 5.0, Society 5.0, or Technology 5.0 — represents not merely a new set of technologies, but a fundamental reorientation of purpose. As Diana Ognyanova of the European Commission's Directorate-General for Research and Innovation articulates, Industry 5.0 is "not a revolution" but a paradigm that "nests the Industry 4.0 approach in a broader context and provides a holistic approach to the challenges of the twin transition" [3]-[4]. The twin transition — simultaneous digital and green transformation — demands that technological progress be anchored in human-centricity, sustainability, and resilience rather than efficiency alone.

This paper makes three contributions. First, it provides a comprehensive analysis of the conceptual shift from IR4 to Technology 5.0, drawing on primary European Commission policy documents. Second, it proposes an original triadic framework — the **Intelligence With Purpose (IWP) Framework** — comprising Intelligent Systems, Human Flourishing, and Responsible Innovation as the three pillars of purpose-driven AI in the Technology 5.0 era. Third, it grounds this framework in concrete research applications and offers implications for researchers, engineers, educators, and policymakers.

The paper proceeds as follows. Section 2 traces the paradigm shift from IR4 to Technology 5.0. Section 3 elaborates the human flourishing imperative. Section 4 presents the IWP triadic framework. Section 5 examines real-world AI applications through the lens of the framework. Section 6 addresses the governance imperative. Section 7 discusses implications and future directions. Section 8 concludes.

2. From Industry 4.0 to Technology 5.0: A Paradigm Shift

2.1 Foundations and Achievements of IR4

Industry 4.0 emerged in Germany in the early 2010s as a national industrial strategy to revamp competitiveness through digital integration [5]. Its foundational technologies — cyber-physical systems (CPS), the industrial Internet of Things (IIoT), cloud computing, big data analytics, robotics, and machine learning — fundamentally transformed production processes. Smart factories became the emblematic innovation: cyber-physical systems that use AI and machine learning to analyse data, drive automated processes, and learn iteratively [2].

The gains were substantial. IR4 increased productivity, flexibility, resource efficiency, and product quality across manufacturing sectors globally. It generated an unprecedented wave of robotisation and created new categories of high-value employment in software engineering, data science, and systems integration. For early adopters, IR4 represented a genuine competitive advantage.

Yet IR4's architecture contained a structural limitation: it was designed to optimise processes, not to serve people. The human worker appeared in IR4 discourse primarily as either a resource to be optimised alongside machines or a cost to be minimised through automation. Questions of worker wellbeing, societal equity, environmental sustainability, and the meaning of work were treated as externalities — important, perhaps, but outside the paradigm's core concern.

2.2 Unresolved Tensions of IR4

As adoption of IR4 deepened, several tensions became impossible to ignore. First, the spectre of technological unemployment — the fear that automation and AI would render vast categories of human labour obsolete — generated significant social anxiety and policy concern [2]. The "future of work" became one of the most contested policy debates of the 2010s.

Second, the Covid-19 pandemic exposed the fragility of the highly globalised, efficiency-optimised supply chains that IR4 had enabled. Just-in-time manufacturing, geographically concentrated production, and minimal redundancy — all virtues under an efficiency paradigm — became catastrophic vulnerabilities under systemic shock. As IndustriAll Europe [2] notes, "the Covid-19 crisis highlighted the value-chain fragility that exists due to the highly globalised economic model of the present day."

Third, IR4's data-intensive, connectivity-driven architecture created new risks: algorithmic bias, surveillance capitalism, digital divide amplification, erosion of worker autonomy, and what IndustriAll Europe [2] identifies as "advanced surveillance and monitoring of workers." The very technologies that enabled IR4's productivity gains also created new vectors of harm and inequity.

Fourth, and perhaps most fundamentally, IR4 was ill-suited to address the accelerating climate and sustainability crisis. Industrial production optimised for throughput and cost — IR4's natural outputs — was incompatible with the deep decarbonisationrequired by the European Green Deal and global climate commitments [6].

2.3 Emergence of Technology 5.0

Technology 5.0 emerged from two converging policy traditions. Japan's Society 5.0 vision, articulated by the Cabinet Office of Japan [7], proposed a "human-centred society that balances economic advancement with the resolution of social problems" through deep integration of cyberspace and physical space. Concurrently, the European Commission's Industry 5.0 framework, crystallised in its 2021 ESIR Policy Brief [1] and subsequent initiatives, defined Industry 5.0 as a paradigm in which "industry is the driving force for systemic transformation towards a more sustainable, circular, resilient and human-centred economy" [2].

Critically, both the European Commission and IndustriAll Europe are explicit that Technology 5.0 is not a replacement for IR4, nor a simple chronological successor. As [3] states, it is "not a revolution" but an enveloping and reorienting of IR4 within a broader purposive context. Technology 5.0 builds on IR4's technological foundations — IIoT, cloud computing, robotics, big data analytics — while integrating new breakthrough technologies including generative AI, quantum computing, blockchain, collaborative robots (cobots), extended reality (XR), digital twins, and smart materials [2].

The paradigmatic shift is captured in a single phrase from IndustriAll Europe [2]: the essence of Technology 5.0 lies in the shift "from efficiency to resilience." This is not a rejection of efficiency, but a subordination of it to larger purposes — human flourishing, environmental sustainability, and systemic resilience.

2.4 Three Pillarsof Technology 5.0

The European Commission has defined Technology 5.0 through three non-negotiable pillars [1]-[3]:

- **Human-centricity** represents the most fundamental departure from IR4. Technology 5.0 repositions the human being not as a cost, resource, or optimisation variable, but as the purpose and beneficiary of technological systems. IndustriAll Europe [2] articulates this as a shift in which "technology should serve people, not the other way around." Workers are viewed as an investment rather than a cost, and the design of technological systems must accommodate human needs, capabilities, and dignity rather than requiring humans to continuously adapt to machines.
- **Sustainability** embeds environmental responsibility as a core design criterion for industrial systems. Technology 5.0 orients industry toward circular economic models — regenerative, restorative, and distributive — that reduce greenhouse gas emissions, minimise raw material demand, and support the achievement of net-zero targets [6]. The concept of "doughnut economics" [8], with its inner social foundation and outer ecological ceiling, provides a useful mental model for this dual accountability.
- **Resilience** addresses the systemic fragility exposed by the pandemic and geopolitical disruptions of recent years. Technology 5.0 prioritises diversified supply chains, robust risk management, and adaptive capacity over pure optimisation. Workers' resilience — sustained through lifelong learning, upskilling, and reskilling — is explicitly included within this pillar [2].

Together, these pillars represent a shift in the fundamental governance model of technology: from "shareholder to stakeholder value," as the European Commission's own banner for Industry 5.0 declares.

3. The Human Flourishing Imperative

3.1 What is Human Flourishing?

The concept of human flourishing has deep philosophical roots. Aristotle's eudaimonia — often translated as happiness or flourishing — referred not to subjective pleasure but to the objective exercise of distinctively human capacities: reason, virtue, and social engagement [9]. In contemporary positive psychology, Seligman operationalises flourishing through the PERMA model: Positive emotion, Engagement, Relationships, Meaning, and Accomplishment[10]. Ryff's multidimensional model of psychological well-being adds dimensions of autonomy, environmental mastery, personal growth, positive relations, purpose in life, and self-acceptance[11].

What is common across these frameworks is the insistence that flourishing is irreducibly more than the absence of suffering or the presence of pleasure. It involves the full exercise of human capacities in the context of meaningful relationships and purposive activity. This richness is precisely what makes flourishing such a demanding and importantcriterion for technology design.

3.2 Flourishing as a Design Criterion

The Technology 5.0 literature consistently invokes human wellbeing as a design target, but stops short of operationalising it with the depth that positive psychology and neuroscience offer. IndustriAll Europe [2] notes that "mental health and well-being must be given equal importance in the design of digitalised working environments" — a significant acknowledgement, but one that requires elaboration.

Palaniappan, in his neurobiological flourishing framework, proposes a tri-domain model integrating identity, relational, and purposive dimensions of wellbeing [12]. This model, grounded in the neuroscience of self-concept, attachment, and goal-directed behaviour, provides a concrete architecture for operationalising flourishing as a design criterion for AI systems. The identity domain asks: does this technology affirm or undermine users' sense of self? The relational domain asks: does this technology strengthen or erode human connection? The purposive domain asks: does this technology support or displace meaningful human agency?These questions are not merely philosophical; they have measurable correlates in neurobiological outcomes (e.g., cortisol levels, vagal tone, prefrontal activation) that can serve as empirical anchors for flourishing-centred technology assessment [13]-[14].

3.3 Neuroscience of Flourishing in Technology 5.0 Context

Neuroscience increasingly supports the view that human beings are fundamentally relational, purposive, and meaning-seeking creatures whose wellbeing cannot be reduced to material provision or cognitive load reduction. Cozolino's work on the social brain [13] demonstrates that relational attunement is not merely a psychological preference but a neurobiological necessity — isolation activates the same neural circuits as physical pain. Davidson and Begley in [14] show that emotional regulation, resilience, and wellbeing are neuroplastic — capable of being cultivated through intentional practice — which has implications for how AI-assisted work environments are designed.

In the Technology 5.0 context, these insights suggest that AI systems designed for human flourishing must attend not only to task performance but to the quality of human experience during and after AI interaction. A system that automates away human agency — even if it increases productivity — may be counterproductive to flourishing. Conversely, AI cobots that support human workers in moving "from repetitive jobs to more creative jobs that require problem-solving and organisational skills" [2] may actively support flourishing by expanding the domain of meaningful human activity.

3.4 Flourishing and Human Dignity

Underlying the human flourishing imperative is a deeper claim about human dignity — the intrinsic worth of every human person that cannot be reduced to economic or functional utility. This claim, while having rich theological and philosophical articulations (including the imago Dei tradition in which every human being bears the image of the divine), has secular purchase as well. VanderWeele in [15] demonstrates empirically that flourishing — operationalised across happiness, health, meaning, virtue, and close social relationships — is a coherent and measurable construct that transcends cultural and philosophical boundaries.

The dignity claim means that no technological system - however efficient, however economically beneficial - can be considered successful if it systematically degrades the dignity, agency, or relational fabric of the human beings it affects. This is not merely an ethical constraint on technology design; it is a positive design imperative that opens vast creative territory for purposeful AI innovation.

4.IWP:A Triadic Framework

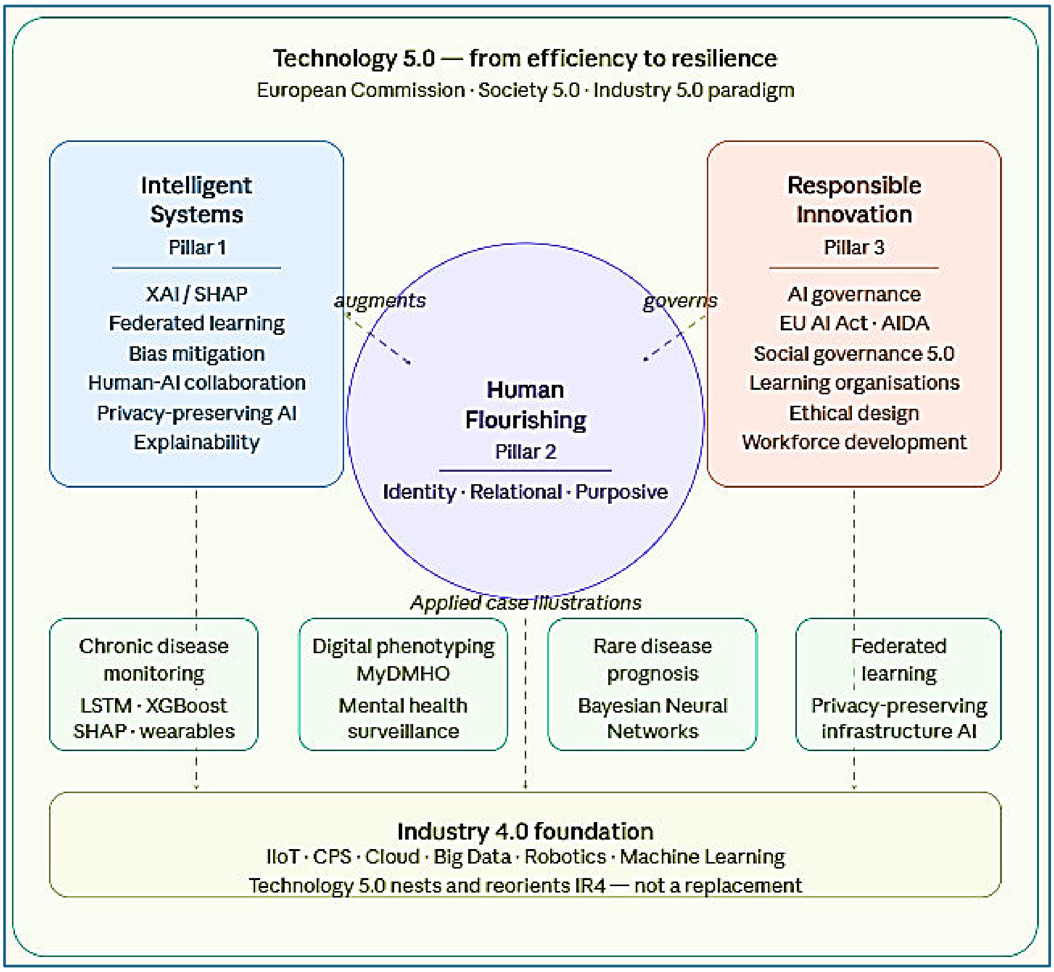
4.1 Framework Overview

The **Intelligence With Purpose (IWP) Framework** proposes that AI systems operating in the Technology 5.0 era must be evaluated and designed across three integrated pillars: **Intelligent Systems**, **Human Flourishing**, and **Responsible Innovation**. These pillars are not independent domains but mutually constitutive: the intelligence of a system has no meaning apart from its flourishing-promoting purpose, and its innovative character must be responsible if it is to achieve either.

The framework responds to a gap in existing discourse. Technology 5.0 policy documents articulate the goals of human-centricity, sustainability, and resilience with increasing clarity, but provide limited guidance on how AI systems specifically should be designed to achieve these goals. The IWP Framework offers a concrete, operationalisable architecture for this purpose, grounded in both the Technology 5.0 policy tradition and interdisciplinary research in AI, health informatics, and human flourishing science.

The IWP Framework is depicted in Figure 1, which illustrates the three pillars in structural relationship. Human Flourishing (Pillar 2) occupies the central position, flanked by Intelligent Systems (Pillar 1) on the left and Responsible Innovation (Pillar 3) on the right. Pillar 1 augments the flourishing core through explainable, privacy-preserving, and bias-mitigated AI architectures, while Pillar 3 governs it through ethical frameworks, regulatory compliance, and social accountability mechanisms.

All three pillars rest on the Industry 4.0 technological foundation — reoriented, not replaced, by the Technology 5.0 vision [2]. Four applied case illustrations grounded in health



informatics research demonstrate how the framework operates in practice, and are elaborated in Section 5.

4.2 Pillar 1 – Intelligent Systems

The first pillar concerns the technical architecture of AI systems designed for Technology 5.0. Four capabilities are essential:

- **Explainability -** AI systems deployed in human-affecting contexts must be explainable — capable of providing intelligible accounts of their reasoning to affected stakeholders. Explainable AI (XAI) methods, including SHAP (SHapley Additive exPlanations) values, LIME, and attention mechanisms, provide tools for making complex models such as deep neural networks and gradient boosting systems interpretable [16]. Without explainability, AI systems cannot be trusted, audited, or contested — prerequisites for human-centred deployment.

- **Fairness and bias mitigation -** AI systems trained on historical data inherit and often amplify existing biases — in healthcare, criminal justice, hiring, and lending [17]. A multidimensional bias taxonomy is essential for identifying, classifying, and mitigating biases across data acquisition, model training, and deployment phases. In the Technology 5.0 context, fairness is not merely a technical property but a social and ethical requirement grounded in the human-centricity pillar.

- **Privacy-preserving architectures -** Federated learning — in which AI models are trained across distributed data sources without centralising raw data — represents a key Technology 5.0-aligned technical innovation [18]. By enabling AI to learn from sensitive health, financial, or operational data without exposing individual records, federated learning supports both the analytical power of AI and the privacy and autonomy rights of individuals.

Adaptive, human-collaborative systems. Technology 5.0 AI systems must be designed for human-AI collaboration rather than human replacement. This means building systems that augment human judgment rather than supplanting it, that escalate decisions to human oversight in high-stakes contexts, and that are designed with workers as active participants in their development and deployment — not merely as end users [2]-[3].

4.3 Pillar 2 – Human Flourishing

The second pillar operationalises human flourishing as an explicit design criterion for AI systems. Building on the tri-domain model of Palaniappan [12], three dimensions of flourishing must be incorporated into Technology 5.0 AI design:

- **Identity -** AI systems must preserve and affirm users' sense of self, agency, and purpose. Systems that reduce humans to data points, that make consequential decisions about people without meaningful human input, or that undermine users' sense of competence and autonomy work against this dimension. Systems that surface personalised insights, support self-understanding, and expand rather than constrain human choice work toward it.

- **Relational -** AI systems must be evaluated for their effects on human relationships — with colleagues, with care providers, with family and community. Technologies that mediate or replace human relational encounters without adequate substitution — such as chatbot-only mental health support for individuals who need human therapeutic relationship — may efficiently address surface needs while undermining deeper flourishing. Conversely, AI systems that remove administrative burdens from healthcare workers, freeing them for deeper human engagement, actively support the relational dimension.

- **Purposive -** AI systems must support rather than displace meaningful human agency and purpose. IndustriAll Europe envisions Technology 5.0 enabling workers to shift from operational to supervisory, coordination, and planning roles — from manual to data-driven analytical tasks [2]. This shift represents not merely a change in job content but a potential expansion of meaningful agency, if managed with genuine human-centricity. AI systems designed to automate routine tasks while creating space for creative, relational, and purposive human activity embody this dimension.

4.3 Pillar 3 – Responsible Innovation

The third pillar addresses the governance, ethical, and accountability dimensions of AI development in the Technology 5.0 era. Three elements are essential:

- **Ethical governance frameworks** - Effective AI governance in Technology 5.0 requires multi-level frameworks spanning organisational, national, and international levels. The European Union's AI Act [19] represents the most comprehensive regulatory framework to date, establishing risk-based requirements for AI systems with particular attention to high-risk applications in healthcare, education, employment, and critical infrastructure. UNESCO's Recommendation on the Ethics of Artificial Intelligence provides complementary global guidance [20]. Canada's proposed Artificial Intelligence and Data Act [21]reflects similar impulses in North American policy. Collectively, these frameworks signal a global convergence on the principle that AI governance must be proactive, values-driven, and inclusive.

- **Social governance 5.0** -IndustriAll Europe makes the crucial observation that "Industry 5.0 alone is at risk of remaining an academic concept" without a corresponding transformation in corporate and social governance. Corporate governance 5.0 must replace the short-term shareholder value orientation of IR4 with long-term objectives encompassing social, socio-economic, and environmental dimensions. Social governance must ensure that workers and communities are genuine stakeholders — not merely beneficiaries — in the governance of AI systems that affect them. This is the organisational and institutional analogue of human-centricity at the system level.

- **Learning organisations** - Technology 5.0 requires organisations capable of continuous learning and adaptation. As AI reshapes the division of labour — automating physical and routine cognitive tasks while creating demand for social, organisational, creative, and analytical capacities — organisations must become "learning organisations" [2] that continuously invest in the skills, capabilities, and wellbeing of their workforces. This is both a human development imperative and a competitive necessity.

Table 1 summarises the IWP Triadic Framework - Pillars, Components, Applications, and Metrics.

5. AI in Practice – Case Illustrations

The IWP Framework is not merely conceptual. It is grounded in a body of research applying purpose-driven AI to real health and societal challenges. The following case illustrations demonstrate how the

Table 1. The IWP Triadic Framework — Pillars, Components, Applications, and Metrics

Pillar	Key Components	Applications	Success Metrics
Pillar 1: Intelligent Systems	XAI, federated learning, privacy-preserving AI, bias mitigation	Chronic disease monitoring, rare disease prognosis, infrastructure maintenance	Model accuracy, explainability scores, fairness indices
Pillar 2: Human Flourishing	Tri-domain health model (identity, relational, purposive), digital phenotyping, wearable sensing	Mental health surveillance, population wellbeing monitoring	Flourishing indices, health equity measures
Pillar 3: Responsible Innovation	AI governance, ethical design, regulatory compliance, workforce development	Bias taxonomy deployment, XAI standards, reskilling programmes	Governance compliance, stakeholder trust scores

framework's three pillars manifest in practice.

5.1 AI-Enabled Chronic Disease Monitoring

Chronic non-communicable diseases — including diabetes, cardiovascular disease, and hypertension — represent the dominant global burden of morbidity and mortality, accounting for approximately 74% of deaths worldwide [22]. Yet traditional healthcare models are reactive and episodic, unable to detect early warning signals or enable timely intervention at population scale.

AI-enabled chronic disease monitoring using wearable sensors and multimodal machine learning addresses this gap directly. A framework integrating Long Short-Term Memory (LSTM) networks for temporal sequence modelling, Random Forest for feature-importance analysis, and XGBoost for ensemble prediction — applied to continuous wearable sensor data streams including heart rate variability, activity levels, sleep patterns, and glycaemic indicators — demonstrates how Pillar 1 (Intelligent Systems) serves Pillar 2 (Human Flourishing) in a Technology 5.0 context. SHAP value analysis provides the explainability layer, enabling clinicians to understand which sensor features are driving risk predictions for individual patients — a prerequisite for clinical trust and adoption [16].

Evaluated against the IWP Framework: the system's intelligent architecture (Pillar 1) serves the identity dimension of flourishing by returning data-driven insights to individuals about their own health trajectories; the relational dimension by preserving the clinical relationship as the interpretive context for AI outputs; and the purposive dimension by enabling proactive self-management. The responsible innovation pillar (Pillar 3) is served by SHAP-based explainability and by privacy-preserving federated deployment across care settings.

5.2 Digital Phenotyping for Mental Health Surveillance — The MyDMHO Vision

Mental health represents one of the most underserved domains of global health, particularly in low- and middle-income countries (LMICs). In Malaysia, as across the ASEAN region, population-scale mental health data is fragmented, self-report-dependent, and systemically delayed. The proposed National Digital Mental Health Observatory (MyDMHO), developed under the GET 2026 initiative, envisions an AI-driven population-level mental health surveillance system anchored in digital phenotyping — the continuous, passive collection of behavioural digital data from smartphones and wearables as proxies for mental health states [23].

Digital phenotyping data streams — including movement patterns, social interaction frequency, sleep-wake cycles, linguistic patterns in text, and application usage — are processed through machine learning pipelines to generate population-level mental health phenotypes. Early warning signals for depression, anxiety, psychosis, and burnout can be detected weeks before clinical presentation, enabling proactive public health intervention at scale.

Evaluated against the IWP Framework: MyDMHO exemplifies Pillar 1 through its multimodal AI architecture; Pillar 2 through its explicit focus on population flourishing and mental health equity — addressing communities historically excluded from specialist care; and Pillar 3 through its commitment to ethical governance of highly sensitive behavioural data, with federated architecture minimising privacy exposure.

5.3 Bayesian Neural Networks for Rare Disease Prognosis

Rare diseases present a particular challenge for AI: data scarcity, diagnostic complexity, and the catastrophic cost of misclassification. Bayesian Neural Networks (BNNs) — which extend conventional deep learning with principled uncertainty quantification — address this challenge by providing not only predictions but calibrated confidence intervals that communicate what the model does and does not know [24]. In rare disease prognosis, this uncertainty quantification is clinically essential: a BNN that outputs "I am 65% confident of this prognosis, with a 95% credible interval spanning benign to severe" is far more clinically useful than a point estimate without uncertainty characterisation.

Within the IWP Framework, BNNs for rare disease prognosis serve Pillar 1 through their principled treatment of uncertainty; Pillar 2 through the dignity they afford rare disease patients — treating them as individuals whose cases merit careful, calibrated analysis rather than algorithmic throughput; and Pillar 3 through their inherent explainability, which supports the clinical oversight and accountability that responsible AI governance requires.

5.4 Federated Learning for Distributed Health Infrastructure

Healthcare data is simultaneously among the most valuable and most sensitive categories of information in existence. Centralised AI training on healthcare data creates acute privacy risks, regulatory compliance challenges, and institutional barriers to data sharing. Federated learning — in which AI models are trained locally at each data node (hospital, clinic, or device) and only model parameters, not raw data, are aggregated — provides a technical solution that is strongly aligned with Technology 5.0's human-centricity and sustainability pillars [18].

Applied to predictive maintenance of Malaysian wastewater and public health infrastructure, federated learning enables AI models to learn from data distributed across multiple municipal authorities without centralising sensitive operational data. This simultaneously improves predictive accuracy (through broader learning), reduces data governance risk (through privacy preservation), and builds institutional trust (through transparent, auditable model aggregation).

5.5 Cross-Cutting Analysis

Across all four cases, a consistent pattern emerges. Technology 5.0-aligned AI systems share three characteristics: they are explainable (Pillar 1), making their reasoning accessible to human oversight; they are purposive (Pillar 2), serving concrete human flourishing outcomes rather than abstract performance metrics; and they are governed (Pillar 3), operating within ethical and regulatory frameworks that ensure accountability. This convergence validates the IWP Framework as a coherent and generalisable architecture for purpose-driven AI.

6. Governance Imperative: Controlling AIwith Purpose

6.1 AI Control Discourse

As AI systems grow in capability and pervasiveness, the question of control — who governs AI, by what values, through what mechanisms — has become one of the most consequential policy debates of our era. Russell in [25] argues that the fundamental challenge of AI safety is ensuring that AI systems pursue objectives that are genuinely aligned with human values, not merely proxy metrics that appear aligned in training conditions. This alignment challenge is not merely technical: it requires that the values themselves be carefully articulated, contested, and embedded in governance structures.

The emerging global discourse on AI control encompasses technical alignment research, regulatory frameworks, standards development, and civil society accountability mechanisms. Common to these diverse approaches is a recognition that AI systems, left to self-optimise without purposive constraint, tend toward outcomes that serve narrow metrics — engagement, clicks, throughput — at the expense of broader human flourishing. The answer is not to suppress AI capability, but to govern it purposively.

6.2 Regulatory Frameworks for Purpose-Driven AI

The European Union's AI Act [19] represents the world's most comprehensive AI governance framework to date. Its risk-based classification system — from minimal risk (AI in video games) to unacceptable risk (social scoring systems) — provides a proportionate regulatory architecture that imposes the highest accountability requirements on AI systems deployed in healthcare, education, employment, and critical infrastructure: precisely the domains where the IWP Framework operates.

Canada's proposed Artificial Intelligence and Data Act [21] pursues similar goals through complementary mechanisms, requiring high-impact AI systems to conduct algorithmic impact assessments, implement risk mitigation measures, and ensure human oversight. The Montreal Declaration for Responsible AI [26], developed through participatory processes involving researchers, policymakers, and civil society, articulates eight principles — wellbeing, autonomy, justice, privacy, knowledge, democracy, responsibility, and sustainability — that closely mirror the IWP Framework's pillars.

UNESCO's global AI ethics recommendation [20] adds an important LMIC and postcolonial dimension, insisting that AI governance frameworks must be sensitive to diverse cultural, economic, and developmental contexts — a particularly significant consideration for Malaysia and the broader ASEAN region.

6.3 XAI and Bias Taxonomy as Governance Instruments

Explainability and fairness are not merely technical desiderata — they are governance instruments. A multidimensional bias taxonomy [17] that classifies biases across data (historical bias, representation bias, measurement bias), algorithm (aggregation bias, evaluation bias), and deployment (deployment bias, feedback loops) provides a structured tool for AI governance that can be integrated into institutional review processes, procurement requirements, and regulatory compliance frameworks.

Similarly, SHAP-based explainability deployed as a standard output of AI systems in healthcare and public policy contexts provides an accountability mechanism: it enables affected individuals to understand, contest, and seek redress for AI-generated decisions. The ERA Industrial Technologies Roadmap on Human-centric R&I [3] explicitly calls for integrating human-centricity into "certifications and standards for business to design and develop human-centric technologies and practices" — a direction that XAI and bias audit tools directly support.

6.4 Compliance Culture to Purpose Culture

The deepest challenge of AI governance in the Technology 5.0 era is not regulatory compliance — it is cultural transformation. IndustriAll Europe [2] identifies this directly: "Industry 5.0 alone is at risk of remaining an academic concept. What is needed within companies and industries is a new type of thinking related to their business strategy: corporate and social governance 5.0." This new thinking requires replacing the quarterly results orientation of IR4-era corporate governance with long-term objectives encompassing human dignity, environmental sustainability, and societal resilience.

For AI developers and deployers, this cultural shift means asking not merely "Does this system comply with the AI Act?" but "Does this system serve human flourishing? Does it treat the people it affects as ends in themselves? Does it strengthen or weaken the fabric of human community?" These are not supplementary questions to be addressed after technical development is complete — they are foundational design questions that must shape AI systems from their inception.

7. Implications& Future Directions

7.1 For AI Researchers and Engineers

The IWP Framework calls AI researchers and engineers to a new design ethic. Technical excellence — model accuracy, computational efficiency, architectural novelty — remains essential but insufficient. The benchmark of Technology 5.0-aligned AI is not performance on a test set but impact on human flourishing in deployment context. This requires engineers to develop competencies beyond their disciplinary core: in positive psychology, in health equity, in ethical reasoning, in participatory design — engaging the communities their systems will affect as active participants in the design process rather than passive recipients of technological outputs [3].

Concretely, this means that AI research papers should routinely include flourishing-impact assessments alongside performance benchmarks; that system design processes should include co-design sessions with affected communities; and that explainability and fairness should be treated as first-class system requirements rather than post-hoc additions.

7.2 For Policymakers

The Technology 5.0 policy architecture is taking shape in Europe and Japan, but its implementation in LMICs — including Malaysia and the broader ASEAN region — remains nascent. Policymakers in these contexts face the challenge of adapting frameworks designed for high-income, high-institutional-capacity environments to contexts with different resource endowments, institutional capacities, and social priorities. UNESCO's global framework provides a starting point, but regional adaptation — through ASEAN-level dialogue, national AI ethics commissions, and community consultation — is essential [20].

A specific policy recommendation follows from the IWP Framework: human flourishing indicators should be incorporated as formal metrics in national AI policy evaluation frameworks, alongside conventional economic metrics such as productivity gains and job creation. If human flourishing is to be the purpose of Technology 5.0, it must be measured and governed as such.

7.3 For Educators

The transition from IR4 to Technology 5.0 demands a corresponding transformation in computing and engineering education. The Horizon Europe Bridges 5.0 project [27] — explicitly focused on building workforce skills for Industry 5.0 — reflects a growing recognition that the human-centric, sustainable, and resilient capabilities required by Technology 5.0 are not automatically produced by conventional STEM curricula.

PhD programmes in computing must integrate interdisciplinary exposure to positive psychology, health ethics, governance studies, and sustainability science. Masters-level programmes must develop graduates capable of asking not only "How do I build this AI system?" but "Should this system be built? For whom? With what governance? Serving what human purposes?" These are not soft supplements to technical rigour — they are the intellectual capabilities that Technology 5.0 AI practice demands.

7.4 Limitations and Future Research

Several limitations of the current framework warrant acknowledgement. First, the IWP Framework is primarily conceptual and requires empirical validation across diverse AI deployment contexts. Future research should develop operationalised measurement instruments for each of the framework's three pillars and test them in field studies across healthcare, manufacturing, education, and governance contexts.

Second, the framework's human flourishing pillar draws primarily on positive psychology and neuroscience traditions developed in Western, educated, industrialised, rich, and democratic (WEIRD) contexts. Extension of the framework to ASEAN and Global South contexts — with diverse cultural understandings of flourishing, community, and human purpose — is an important future research direction.

Third, the AI governance landscape is evolving rapidly. The regulatory frameworks cited here — the EU AI Act, Canada's AIDA, UNESCO's recommendation — represent the state of the field as of early 2026, but the governance architecture will continue to develop. Future research should track regulatory evolution and assess its alignment with the IWP Framework's principles.

8. Conclusion

The transition from Industry 4.0 to Technology 5.0 is not primarily a technological event — it is a civilisational choice about what technology should serve. Industry 4.0 answered this question implicitly, by building systems that served efficiency and economic growth and treating human and environmental consequences as externalities. Technology 5.0 answers it explicitly, by insisting that industry must be "the driving force for systemic transformation towards a more sustainable, circular, resilient and human-centred economy" [2].

This paper has proposed the Intelligence With Purpose (IWP) Framework as a concrete, operationalisable architecture for AI systems aligned with this vision. Through three integrated pillars — Intelligent Systems, Human Flourishing, and Responsible Innovation — the framework provides AI researchers, engineers, policymakers, and educators with conceptual tools for designing, evaluating, and governing AI systems that genuinely serve human flourishing rather than merely optimising proxy metrics.

The case illustrations — from chronic disease monitoring and digital phenotyping to rare disease prognosis and federated infrastructure maintenance — demonstrate that Technology 5.0-aligned AI is not a utopian aspiration but an achievable research and practice agenda. What is required is not new technology alone, but new purpose: a commitment, embedded in research design, organisational culture, governance frameworks, and educational curricula, to the proposition that the measure of a technological system is ultimately human.

As the European Commission's Industry 5.0 vision declares, the goal is a shift "from shareholder to stakeholder value" — from technology that serves capital to technology that serves people. The IWP Framework is offered as a contribution toward that goal: a call to build AI systems that are not merely smart, but wise — systems whose intelligence is always already in the service of human flourishing.The measure of Technology 5.0 is not the intelligence of our machines. It is the flourishing of our humanity.

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