

### **The case for ethics, it's the time now**

Since the days of man as hunter gatherers, the success and prosperity of humanity has been associated with one key differentiator against other species, i.e. the invention of tools and artefacts. This was inevitably driven by need and necessity to generate a differential advantage against the adversity for survival. The advent of agriculture gave the manmade tools a new dimension, the ability to cultivate land, produce surplus food and transcend beyond the daily challenges of subsistence and survival. Whilst the invention of tools and artefacts bore testament to man's superior cognitive powers, these arose in response to the man's needs to complement his feeble physique and powers in a harsh eco-system in a largely functional role. In this spirit, the quality, efficacy and diversity of tools and artefacts increased to enhance performance. However, performance of tools, products and services have often been viewed narrowly through a utilitarian perspective often focused on market mechanisms of price, functionality and desirability/quality. This has held true largely due to the limited impact of products and services on the society at large. A condition that is no longer tenable given our overt dependence on technological tools, products, services and artefacts that are transforming our lives and making us dependent without the ability to influence their design, production, functionality or holding the supply chain accountable. In this setting, a new paradigm is called for that goes beyond concerns over commercial and functional performance and encourages the providers of products, services and systems towards transparency, accountability, explainability and observance of higher ethical values in their increasingly global roles. This is the era of ethics and moral considerations by all enterprises, public or private, for or not for profit. Strangely but not unexpectedly, this also applies to the safety as well as security of products, services and systems. We will explore the rationale, necessity and the attainment of this laudable emergent property in this section.

### **Facets of performance**

A purposeful aggregate of interconnected parts performing one or a suite of functions is regarded as a system. A system generally resides in an environment (larger eco-system) or as part of a larger system (system of systems) and manifests properties and behaviours that are not attributable to its constituents alone but their interworking. This is referred to as emergence or emergent property of a system. Apart from emergence, a system can also be viewed from specific stakeholder perspective that constitute nine inter-related facets of performance comprising;

- Technical and functional,
- Commercial, cost and profitability,
- Environmental,
- Integrity (Reliability, Availability and Maintainability),
- Resilience,
- Safety and Security,
- Sustainability,
- Quality,
- Social and individual perceived value and preference

These facets of system performance are interrelated and their individual desired level of attainment often involves a degree of trade-off and the discretion of the stakeholders regarding an acceptable level for each attribute. A desirable product, service or system delivers an optimal blend of these in a given context and at a cross section in time.

One particular aspect of performance or behaviour that is traditionally not analysed or treated systematically and comprehensively is the value aspect. Traditionally this is regarded as the forte of the marketing department to cater for the consumer preferences and choices to maximise sales opportunities. One key aspect of value is the social/ethical value that is concerned with the cultural, social moral norms of good/decent behaviour and impact of products, services or systems on the ethical values held in the stakeholders community or the whole society. This implies the design decisions and structural and behavioural aspects require stakeholder consultation and identification of ethical values that may be affected by the system of interest's concept of operation in addition to all other requirements relating to other facets of performance cited above.

### **The need for a New Dimension**

Beyond safety after 2 millennia, new concerns over the protection of the life and property have emerged in physical and cyber security context. Whilst safety is regarded as freedom from unacceptable levels of human harm from unintended random or systematic errors and failures, security is broadly freedom from unacceptable risks of human harm or loss of property arising from intentional acts and causes. The assurance of safety and security are broadly approached from the perspective of risk of human harm and property loss to the direct users and stakeholders of a product, service or system. The well-being, happiness and overall quality of life in the social context is the next dimension of interest largely driven by the emergence and advancement of digital technologies that pervade our lives and may progress further to impact on many aspects of our lives normally considered private and personal. This is rather unprecedented in human history and requires urgent review, evaluation of the existing and emerging social hazards and formulation of proactive strategies to preserve and protect moral and ethical values that have evolved over millennia for the advancement and prosperity of human societies.

### **Ethics and Morals**

Ethics is the branch of knowledge that deals with moral principles that govern human behaviour. Morals are the measures of right and wrong in the judgements and decisions that we face in life.

### **The Principal Ethical Philosophies**

There are a number of predominate ethical canons and philosophies that view human behaviour and choice of options and consequent decisions in all walks of human endeavour. The oldest school is attributed to Aristotle labelled as Virtue Ethics. This is largely concerned with individual qualities (virtues) that underpin our behaviours and promotes well-being. The focus is largely on virtues rather than the negative individual traits that are referred to as vice. In this individual and bottom up perspective, the promotion and upholding of individual virtues are considered instrumental to the collective societal well being and quality of interactions and relationships. This is analogous to the consideration of the quality ingredients being essential to the integrative virtue at the total

system/societal perspective. Whilst this approach has its virtues, it evidently lacks the systems perspective in that emergence of a virtuous society at peace and happy with itself is not necessarily and entirely conditioned on moral choices by the individual members.

The second school of philosophy regarding ethics is the so called Consequentialist school that is more concerned with the system level emergence of happiness and well being from the integral of actions, choices and decisions made by the human agents, sub-systems and components of a system of interest. This regards any choice or decision ethical/moral so long as it contributes or perceived to contribute to maximising the satisfaction, fulfilment and happiness for the largest number of beneficiaries. This is analogous to an economic utility function and the desire for maximisation of return on an investment as a rational course of action. There are many challenges in utilitarianism least of all estimating, anticipating or rationalising a system level effect from a component level course of action. This is as much an issue with human affairs as is with complex technological systems. The nearest analogy with technological systems is a systems analysis technique known as Failure Mode, Effects and Criticality Analysis (FMECA) that strives to identify critical component level failures that have a major impact on system level reliability, safety and availability.

The third established perspective on ethics is from the leadership and stewardship implications. The Deontological or Duty Ethics proposed by Emmanuel Kant explores the ramifications of choices, options and decisions by those who occupy the positions of responsibility, authority and leadership. This is driven by the realisation that senior decision makers' choices and decisions are more influential/impactful and more significant in terms of effects on the stakeholders hence the necessity for moral considerations. One key criteria for morality of duty holder's decision and choices driven by their personal maxims is to ensure all others impacted by decisions are treated fairly, with dignity and not used as means to the decision makers' ends and objectives. The influential decision makers are also encouraged to consider circumstances in which their decisions could become universal laws and whether they would be willing to endure life influenced and shaped by those laws. The duty ethics demands moral scrutiny, considerations and judgements by those in a position of authority that would impose limits on their choices, striving to ensure every critical decision is taken empathically in an informed moral context.

The three schools of ethical philosophy endeavour to scrutinise the morality of human choices and decisions from individual virtue (component), the consequence/utility (system level) and from duty holders (governance) perspective. From a holistic systems analytical view point, the three canons of ethical philosophy provide an encompassing framework for understanding, analysing and proactively addressing ethical concerns arising from our choices, decisions and actions from a personal, corporate and collective perspective. However, these largely represent an ethical framework from the Western world's philosophical paradigm. The ethical values that underpin our cultural, historical and social morals may also originate from a multitude of other rich and equally pertinent ecosystems that have their origins in ethnic beliefs, behavioural codes, creed and culture. A universal ethical framework should additionally factor in values that are not necessarily traceable to personal virtues, duty holder's maxims or pure utilitarianism. Ancient human societies and associated cultures have largely evolved in relative isolation, each entertaining their own ethical values and moral codes. These will additionally provide a potent landscape for the exploration of ethical values and moral implications in the design of products, services and systems alongside the three philosophies cited earlier.

## What Next?

There are a number of developments that herald a ray of hope in this dynamic, fast paced and often confusing scene. This is largely driven by the current necessities and the initiatives of a number international standardisation and professional institutions.

In the larger context of social good and societal impact, the international Institution of Electrical and Electronic Engineers, IEEE, has recently embarked on an ambitious programme of developing standards for Ethically Aligned Design. Apart from generic guidance on the Ethically Aligned Design now in second revision, the IEEE Standards Association currently hosts 14 working groups focused on various aspect of design and behavioural features of smart, autonomous and AI technologies, products, services and systems. The whole initiative is under the IEEE P7000™ series of standards projects under development and represents a departure from the 1300 IEEE global standards on technology, interoperability and safety and currently comprise;

1. **IEEE P7000™** - [Model Process for Addressing Ethical Concerns During System Design](#)
2. **IEEE P7001™** - [Transparency of Autonomous Systems](#)
3. **IEEE P7002™** - [Data Privacy Process](#)
4. **IEEE P7003™** - [Algorithmic Bias Considerations](#)
5. **IEEE P7004™** - [Standard on Child and Student Data Governance](#)
6. **IEEE P7005™** - [Standard on Employer Data Governance](#)
7. **IEEE P7006™** - [Standard on Personal Data AI Agent Working Group](#)
8. **IEEE P7007™** - [Ontological Standard for Ethically driven Robotics and Automation Systems](#)
9. **IEEE P7008™** - [Standard for Ethically Driven Nudging for Robotic, Intelligent and Autonomous Systems.](#)
10. **IEEE P7009™** - [Standard for Fail-Safe Design of Autonomous and Semi-Autonomous Systems](#)
11. **IEEE P7010™** - [Wellbeing Metrics Standard for Ethical Artificial Intelligence and Autonomous Systems](#)
12. **IEEE P7011™** - [Standard for the Process of Identifying and Rating the Trustworthiness of News Sources](#)
13. **IEEE P7012™** - [Standard for Machine Readable Personal Privacy Terms](#)
14. **IEEE P7013™** - [Inclusion and Application Standards for Automated Facial Analysis Technology](#)

The current concerns over safety, reliability, security and even ethics require an integrated framework that guides, empowers and supports an inclusive approach to the development of products, services and systems and does not treat each dimension of performance as an independent facet of self-serving significance. This holistic framework is likely to be sustainability in the sense that a product, service or system that does not embody a judicious blend of all performance requirements cited before would fail to be sustainable technically, commercially, environmentally or from a societal point of view. This will pose a challenge but offer the promise of going beyond individual concerns, ethics, safety, security and localism whilst taking a macro perspective. In this new paradigm, the laws and regulations will be supplemented by an agile, responsive and informed global community.